Metro Occasional Paper Series: No. 3

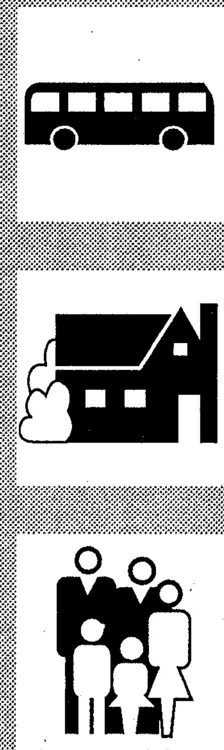
Metro Measured

Transportation •

Housing •

Regional Growth •

May 1994



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Acknowledgements

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Metro
Metro is the directly elected regional government that serves more than 1 million residents in Clackamas, Multnomah and Washington counties and the 24 cities that make up the Portland metropolitan area.

Metro is responsible for solid waste management; operation of the Metro Washington Park Zoo; transportation and land-use planning; regional parks and greenspaces; and technical services to local governments. Through the Metropolitan Exposition-Recreation Commission, Metro manages the Oregon Convention Center, Civic Stadium, the Portland Center for the Performing Arts and the Expo Center.

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Foreword

Metro Measured:
A Multiregional Comparison

We intend this report to be a fairly casual and descriptive comparison of Metro to 54 other U.S. regions. Using 1990 census and highway user statistical data, we have compiled data on per capita vehicle miles traveled, journey to work travel times, per capita income, population, crime rates, house values, regional growth rates, density, mode choice, etc. The body of the report contains more than 30 charts comparing Metro on a wide variety of measures.

We have deliberately avoided any elaborate statistical analysis preferring instead for the data comparisons to speak for themselves. In this fashion, readers of the report can make the best use of their own experience and expertise to provide useful interpretations of the data. This is not to say that we avoid interpretations or making conclusions regarding the various comparisons. However, our interpretations and conclusions are offered as only one option from the many that the data may suggest.

As we note several times in the body of the report, correlation between two measures does not require causation. We depict most of the data in the report in the form of XY graphs. This allows a visual interpretation of the degree to which two measures are or are not correlated. We intend for data so presented to stimulate readers to evaluate whether a relationship exists between various correlated data measures and whether that relationship will be useful in formulating Metro's growth management policy.

METRO MEASURED: A MULTIREGIONAL COMPARISON

"... All this information just confuses the issue ..."
— Dan Mosee, October 1977

INTRODUCTION

Just where in the U.S. is Metro anyway? We hope that the accompanying figures and charts help establish how Metro stacks up in terms of transportation, growth, size, housing prices, income and social indicators. In this study we compare various transportation and socio-economic data reported for up to 55 U.S. regions, generally for the year 1990.[1]

In order to facilitate comparing a lot of related numbers, we have generally made use of XY-type graphs that allow us to compare two sets of data at once. Each of the 55 comparison regions ends up being a data point skewered by a straight line originating at the "x axis" and a straight line emanating from the "y axis." Anticipating that geometry defeats our eloquence, Chart 1 presents an example of what we are talking about using the cities of Spokane, Portland[2] and Chicago and measures of journey to work travel time and region size.

We interpret chart 1, presented on page 3, as follows. The vertical line on the left side of the graph we call the "y axis." The horizontal line at the bottom of the graph we call the "x axis." Using the Portland data point for reference, we have labeled the line starting at the y axis the y axis line and the line starting at the bottom (x axis) the x axis line. The two lines meet at the Portland data point. What all this means is that Portland journey to work travel time (read from the y axis) is about 21 minutes and the size of Portland's urban area (read from the x axis) amounts to roughly 420 square miles.

In essence, the XY graph approach provides us three pieces of information: the y axis presents travel time, the x axis shows region size and since the data points are labeled, we can compare regions in terms of travel time and size of area. More subtle perhaps, we also have a fourth bit of data: the overall relationship that may or may not exist between travel time and regional size.[3]

LIST OF REGIONS

We complicated graph readability somewhat due to the necessity to shorten region names down to two or three letters. Putting on 55 full region names would render the xy graphs totally unreadable. Consequently, we used abbreviations. The chart below provides a key for those with neither the time nor patience to decipher them as you interpret the graphs.

Region name	Abbrev.	Region name	Abbrev.
Albuquerque	alb	Atlanta	atl
Austin	aus	Baltimore	bal
Boston	bos	Buffalo	buf
Charlotte	cha	Chicago	chi
Cincinnati	cin	Cleveland	cle

1 In preparing the data we have used the following data sources: US Bureau of Census, Census of Population and Housing, 1990; US Dept. of Transportation, Highway User Statistics, 1990 & 1991; US Bureau of Census, State and Metropolitan Area Data Book, 1991; Gordon, P. & Richardson, H. Trends in Congestion in Metropolitan Areas, (UCLA, School of Urban and Regional Planning, 1993). Urban Land Institute, Land Use in Transition, (ULI, 1993).

2 In this report we use the terms Metro and Portland synonymously. The actual data reporting entity in the case of Portland is usually the Portland CMSA, though in some cases PMSA, central city and urban area data are used. In general for other regions PMSA data are used.

3 Those readers with some statistical training recognize that xy graphs usually preview some exercise in correlation and/or regression analysis, both bi and multivariate. For purposes of this study we refrain from more deliberate data processing; choosing rather to keep the study descriptive and at this preliminary stage a little more open minded in nature.

Columbus .... col	Dallas .... dal
Fort Worth .... fw	Denver .... den
Detroit .... det	El Paso .... elp
Eugene .... eug	Fresno .... fre
Honolulu .... hon	Houston .... hou
Indianapolis .... ind	Jacksonville .... jac
Kansas City............ kan	Los Angeles .... la
Memphis .... mem	Miami .... mia
Milwaukee .... mil	Minneapolis .... min
Nashville .... nas	New Orleans .... nor
New York .... ny	Virginia Beach .... nrf
Oklahoma City ...... okl	Omaha .... oma
Philadelphia .... phi	Phoenix .... pho
Pittsburg .... pit	Portland .... POR
Sacramento .... sac	Salem .... sal
San Antonio .... san	San Diego .... sad
San Francisco .... sf	San Jose .... sj
Oakland .... oak	Seattle .... sea
St. Louis .... stl	Tacoma .... tac
Spokane .... spo	Toledo .... tol
Tucson .... tuc	Tulsa .... tul
Wash DC .... dc	Wichita .... wic

We report the study's factual contents in several related sections. Throughout the study we focus on transportation since much of the Region 2040 objectives, design and (implicit) implementation is directed toward or relies on transportation investment. The study is divided into the following sections: transportation, housing price, and regional and central city growth.

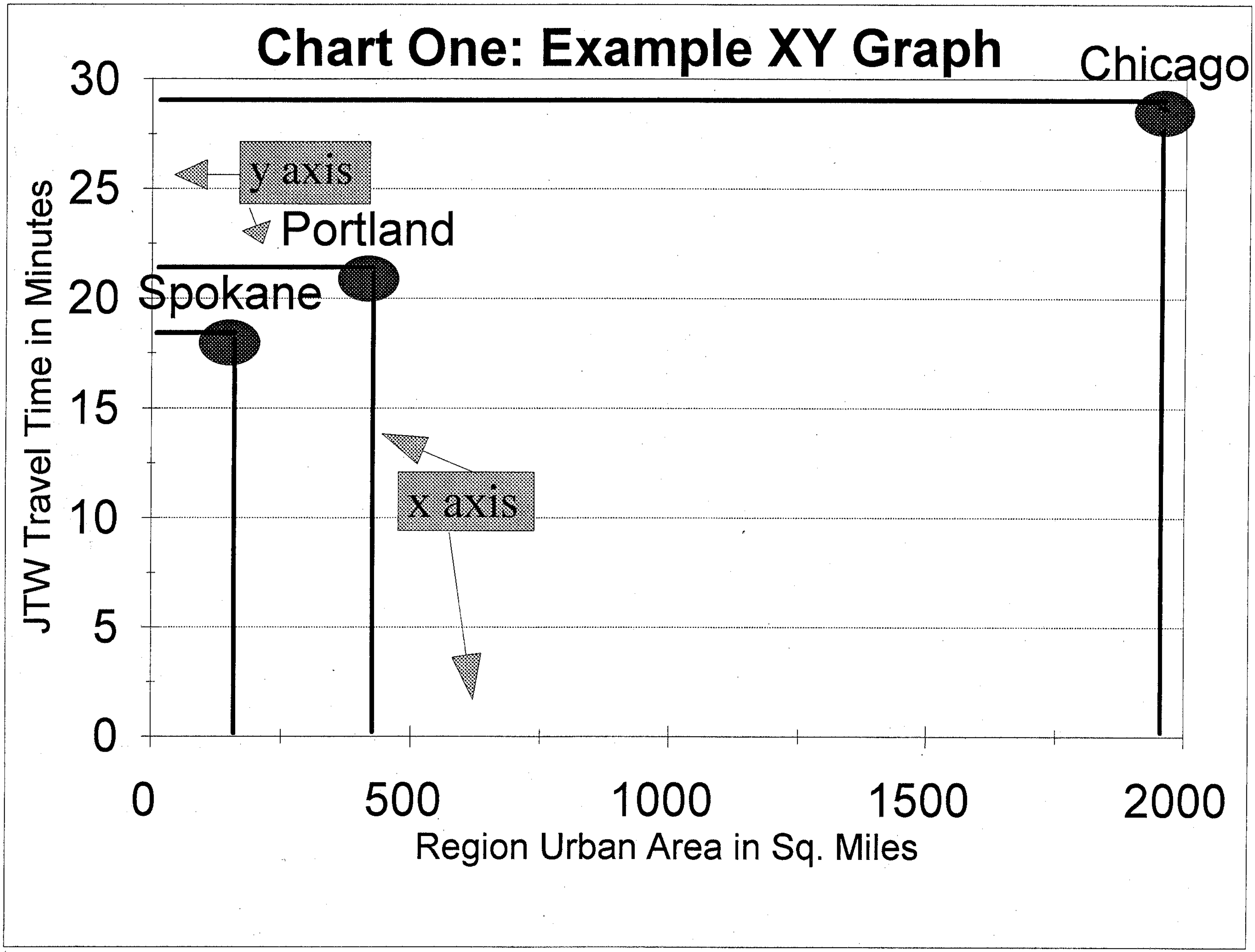
Chart One: Example XY Graph
Chicago
y axis
Portland
Spokane
x axis
30
25
20
15
10
5
0
0
500
1000
1500
2000
JTW Travel Time in Minutes
Region Urban Area in Sq. Miles

SECTION 1: TRANSPORTATION
(FIGURES 1 THROUGH 14)

Figure 1 depicts the median journey to work travel times people reported in the 1990 Census of Population and Housing.[4] Regional size varies from less than 250,000 to more than 10,000,000. With the exception of Chicago, New York and Washington, DC, journey to work travel times fall within the 17 to 25 minute window. Put more directly, Los Angeles commuters spend on average 8 minutes more per trip going to work than do commuters in Eugene. Viewing the data displayed in Figure 1 we offer the daring hypothesis that commute time may on the average be fairly constant.

The constant commute time hypothesis is not new. Gordon, Richardson and Jun report:

"The commuting paradox reflects the apparent contradiction between perceptions of worsening traffic congestion and evidence of either declining or stable commuting times. (our underline) However, not only is there no contradiction but the two phenomena are causally related. Rational commuters will, sooner or later, seek to escape congestion by changing the location of their homes and/or their jobs. This type of adjustment is easier to make in large, dispersed metropolitan areas with alternate employment subcenters and a wide variety of residential neighborhoods. The process is facilitated by the decentralizing location decisions of firms seeking to move closer to suburban labor pools.[5]"

Richardson, et. al. go on to cite additional evidence from the National Personal Transportation Surveys for 1977, 1983, 1990, the American Housing Surveys of 1985 and 1989 and the Census of Population and Housing for 1980 and 1990 in support of their findings.

Figure 2 shows the relationship between the size of a region's urban area and commute times. Figure 2 is more than it appears. It seems as regions get larger commute times increase, but is this really so? Perhaps not. Keep in mind that commute times come from a residentially based survey. Small regions almost by definition have few long trips since you do not sample people commuting in from outside the region. For instance, Portland misses folks from Hood River, Longview, Scappose, etc. By the same token, in large regions (Chicago, LA, New York) long-distance commuters are part of the region and so contribute information to the survey.

What this discussion amounts to is that at least a part of the longer commute times of larger areas is because of sample bias and not actual behavior.[6]

Figure 3 presents the relationship between population (shown on a logarithmic scale) and travel time. As expected, larger population does contribute somewhat to travel times. However, we expect the sample bias noted in Figure 2 operates here as well. So the relationship between population size and commute times is overstated.

Figure 4 presents the information on the relationship between density of the urban area and travel time. Keep in mind that urban areas are measured in terms of gross acres which include water, mountains and woodlands within the urban area so no two regions are exactly comparable. Having said that, and accounting for the possible travel time sample bias noted in Figure 2, there appears to be little or no relationship between travel time and regional densities. Travel times are about the same in Nashville and San Jose, though densities differ by a factor of 4.

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4 These times will differ slightly from those reported elsewhere as I have weighted them to include respondents working at home.
5 Gordon, Π., Richardson, H. and Jun, M., "The Commuting Paradox: Evidence from the Top Twenty," Journal of the American Planning Association, 416, pp 461-480, 1991.
6 1990 NTPS data for New York and Chicago report commute times of 23 minutes (central city), 23.4 minutes (suburbs) for New York and 27.8 minutes (central city) and 23.3 minutes (suburbs) for Chicago. (Richardson, et. al., Trends in Congestion in Metropolitan Areas, Table 10.) These times are substantially less than those reported in the 1990 Census.

Closer to home we note that Portland is slightly denser than Seattle but travel times are two to four minutes less. Notable, is that measured on a gross acre basis the urban area of LA is denser than New York. Similarly, Detroit is not much denser than Portland while Pittsburg, Phoenix, Atlanta, Houston, Dallas, Boston and Baltimore are less dense. Descriptions and impressions formed on the basis of the core areas of central cities appear to have little applicability when viewed from the perspective of the regional entity relevant to the economic behavior of the community.

Figure 5 relates the percentage of commuters not using the automobile to travel time. As travel times increase, the nonauto percentage of commuters increases. Again most of the "relationship" between travel time and nonauto use owes to relatively few regions with New York being an extreme outlier. Only six regions experience nonauto commuting above 20%. We observe that Houston, Atlanta, Baltimore and Los Angeles have commute times higher than Portland with nonauto commute percents below or roughly equal to Portland.

Figure 6 plots nonauto commute percentage against density of the urban area. (Note that nonauto percent is plotted on a logarithmic scale to reduce outlier effects such as New York). Though perhaps not as clear as we would like it, there is a fairly consistent relationship between density and nonauto commute percentage. Once densities exceed 3,500 per square mile at least 10 percent and as much as 15-25% of commutes become nonauto. Conversely, once below 2,500 per square mile, 12 of 17 regions have 90% or more commuting by auto.

Figure 7 compares regional per capita vehicle miles traveled to commute times. From Figure 7 we can at best discern only a weak relationship between commute times and per capita VMT. Tulsa, with an 18-minute commute, has a per capita VMT of almost 30 miles per day. But then so does Atlanta, with a 25-minute commute. Philadelphia, with a 24-minute commute, has a per capita VMT figure of about 13 miles per day, while Dallas, also with a 24-minute commute, records a per capita VMT of 24 miles per day. Significantly, the Portland region is already well below average and is comparable to Spokane, Memphis, Denver, Boston and Baltimore. Reducing Portland VMT 20% would result in only two regions, Philadelphia and New York, having lower VMT.

Figure 7A provides a comparison of VMT and regional density. Compared to prior graphs, we can observe a relationship between density and per capita daily VMT: denser regions generally have less VMT. However, the relationship is far from deterministic; Los Angeles with 5,500 people per square mile has a slightly higher VMT than Pittsburg with 1,500 people per square mile. Likewise, Portland and Seattle with similar densities vary widely in per capita VMT.

Figure 8 compares per capita daily VMT with road miles per 1,000 population. Here road miles includes freeways, arterials and local streets. In a statistical sense, Figure 8 displays a logical pattern – the more miles of road per person, the greater the likelihood of traveling more vehicle miles. While Figure 8 is not definitive in any causative sense, Region 2040 implementation programs that simultaneously attempt to reduce VMT and increase per capita road mileage should be regarded most skeptically.

Figure 9 examines the relationship between VMT and percent of commuting that is nonauto. In this instance we have expressed the percent nonauto on a logarithmic scale to minimize the impact of outliers (New York, San Francisco, Chicago). As we would logically expect, the lower the use of the auto for commuting the lower per capita VMT. Though again, the relationship is far from deterministic. For instance, San Francisco with 30% nonauto commuters has a VMT of 21 per day, while Omaha with 9% nonauto has about 16 miles per day. We need remember that diverting some traffic allows the remaining traffic to move farther, faster.

Figure 10 compares percent nonauto commutes with miles of road per 1,000 population. Again we express percent nonauto on a logarithmic scale to minimize the impact of outliers. Figure 10 reinforces the general rule of most transportation investment: if you build it, they will come. As far as transportation level of service goes, once we move beyond 4.5 miles of road per 1,000 population, 90% plus of commuting trips will be by auto.

Figure 11 satisfies our logical expectations. We note from Figure 11 that the more miles of road per 1,000 population, the lower the density. This is consistent with our findings on the relationships between density, VMT, road miles and percent nonauto commuting.

Also significant from Figure 11 is the cost implications for urban growth. Clearly, higher density development requires less input of road miles per unit of population added.

Figures 12, 13 and **14** present miles of road per 1,000 population for freeways, arterials and local roads respectively. In these figures, miles of road are compared to population density.

The figures for arterials and local roads essentially repeat the pattern shown for total road mileage in Figure 11. The data for freeways depicted in Figure 12 display only a very weak relationship between freeway mileage per 1,000 population and density. Los Angeles, Phoenix and Tucson all have about the same freeway mileage per capita, though Los Angeles has almost three times the density.

Despite the large variance of data displayed in Figure 12, there still remains substantial information. We note that only one region (Columbus Ohio) with freeway mileage above .125 miles per 1,000 people has densities exceeding 3,000 people per square mile. Similarly, of the eight regions with densities in excess of 4,000 people per square mile, six have freeway mileage per 1,000 population of less than .1.

Speculative, but nevertheless worthy of consideration, is the observation that the effect of freeway construction on density has not been fully realized. Regions with a relatively large amount of freeway mileage per capita may still be decreasing in density.[7] Unlike arterials and local roads, freeways are not constructed at the time urban development occurs. They are usually built before or after development; consequently, freeways are not linked to urban development in the fairly strict way that arterials and local roads are. Lack of a strict linkage with urban development means that the impact of freeway building is distributed in time with the level of impact variable depending on the degree to which an area is already developed.

Comparison of Figure 12 with Figures 13 and 14 support the above argument. Both arterial and local road per capita mileage is consistently related to regional density. Freeways, on the other hand, display a much more diverse pattern.

We could not depart Figures 12 through 14 without pointing out some apparent disparities between perception and measurement, namely, Los Angeles. When we measure the LA region, we find high densities and low per capita road and freeway mileage and travel times only slightly higher than average. By way of contrast, common perceptions of Los Angeles suggest low density, high per capita road mileage and intolerable congestion. In public discussions we gather the general impression that Los Angeles represents a future to be avoided. By the same token, with respect to density and road per capita mileage it displays an investment pattern we desire to replicate.[8]

To sum up this section, our reported data support the idea that median travel time varies little between regions despite enormous variations in regional population, size, density and transportation investment levels. In contrast, the data demonstrate that regional density, per capita

7 We do not expect regions with low freeway mileage per capita to necessarily increase density over time since the impacted areas are already developed. For densities to measurably increase would require substantial redevelopment of existing real estate. Consequently, we hypothesize that the impact of freeway building on density is mainly one way. Freeway building will act to decrease regional densities but lack of freeway building will not necessarily increase densities.

8 Looking at Figure 12 can you determine the home state of the losing 1964 presidential candidate? The home state of the winning candidate?

vehicle miles, nonauto commuting and transportation investment (road miles per 1,000 population) do vary substantially between regions and in all likelihood are interrelated. By way of policy focus for Region 2040, these data trends suggest concentration more on urban density determinants and a much lower priority on policy objectives denominated in terms of "travel time savings" or "congestion relief."

Fig 1: Travel time in minutes 1990

JTW 55 U.S. Regions

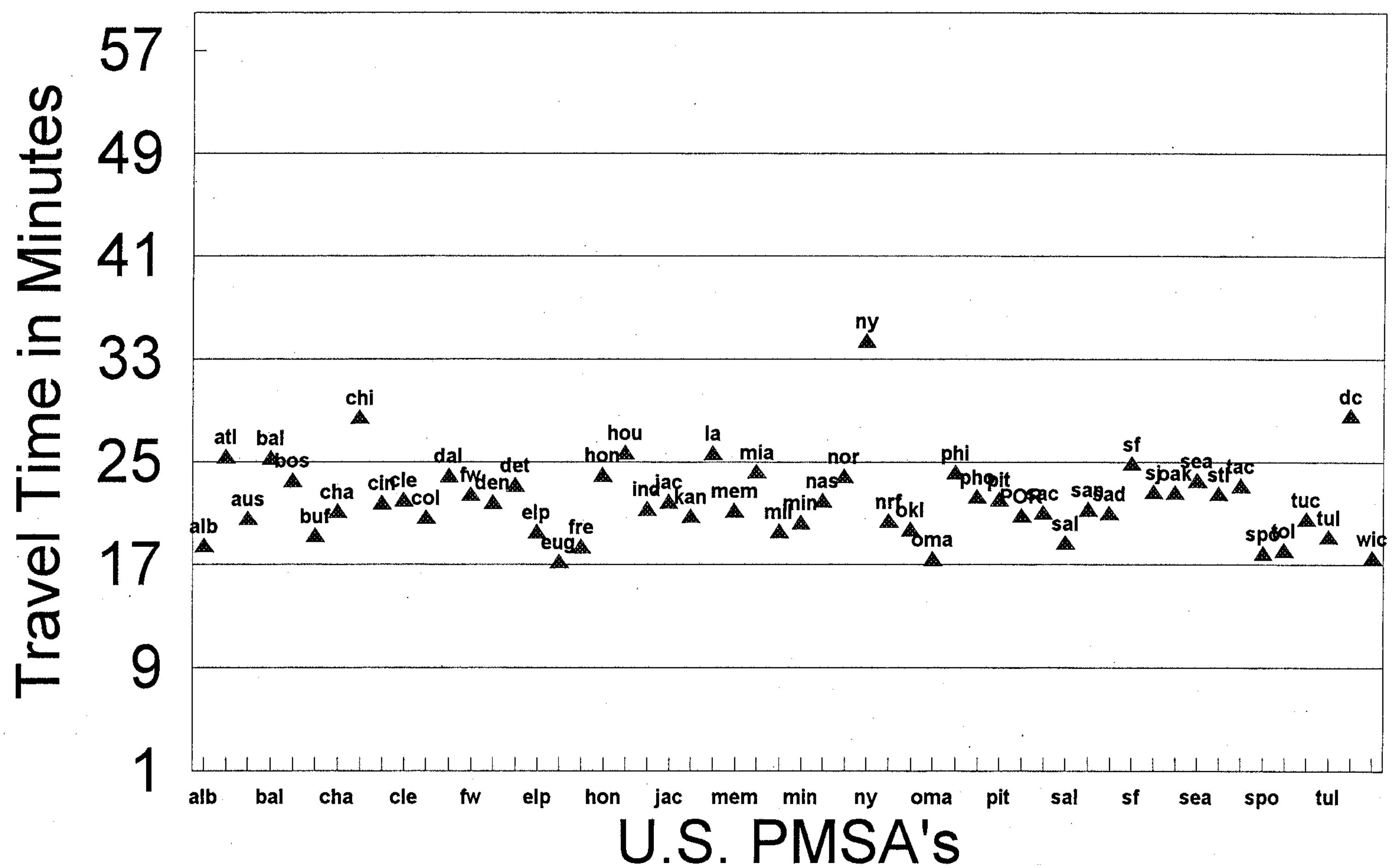


Fig 2 : Travel time and region size

55 US PMSA's 1990

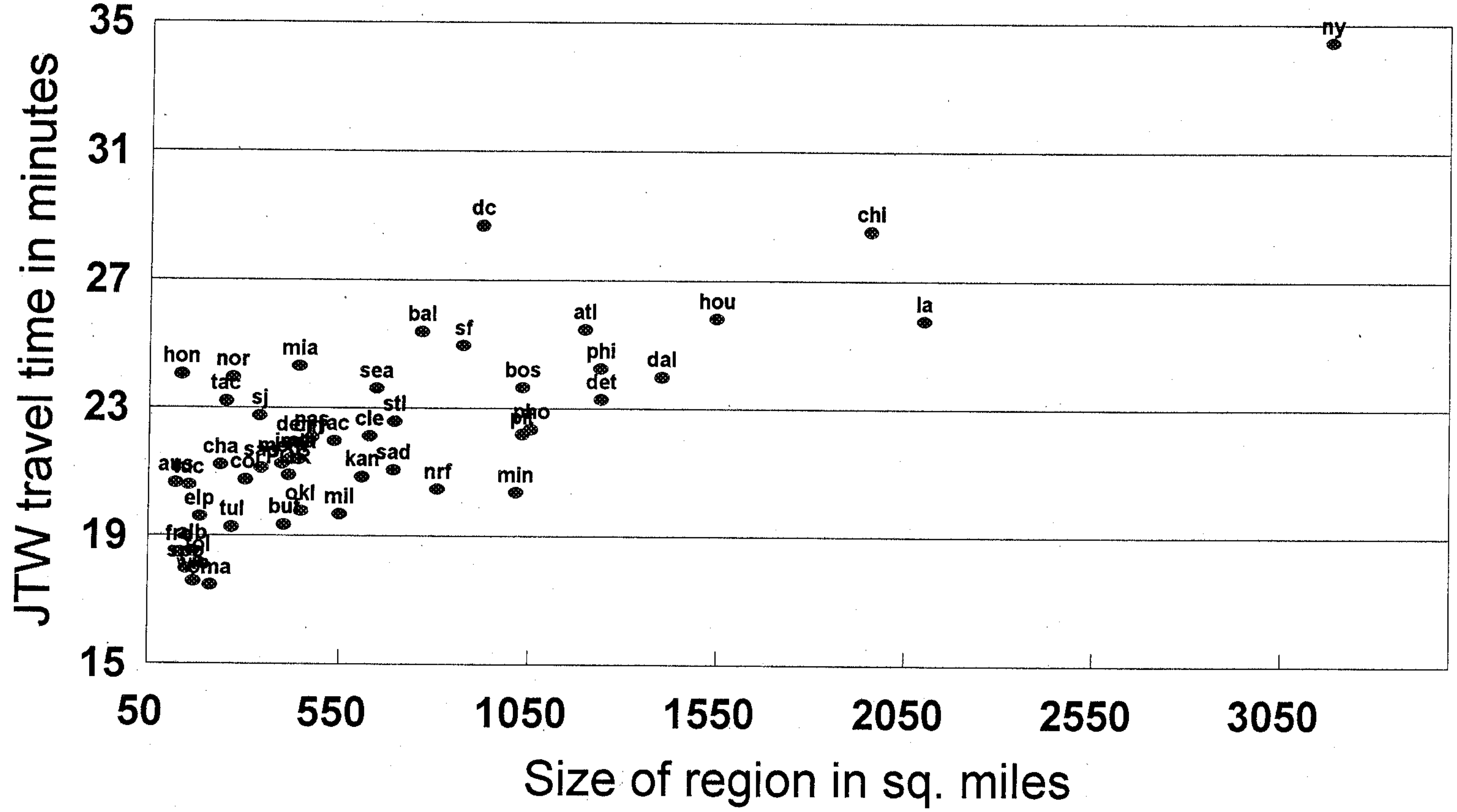


Fig 3: Travel time/region population

55 US regions 1990

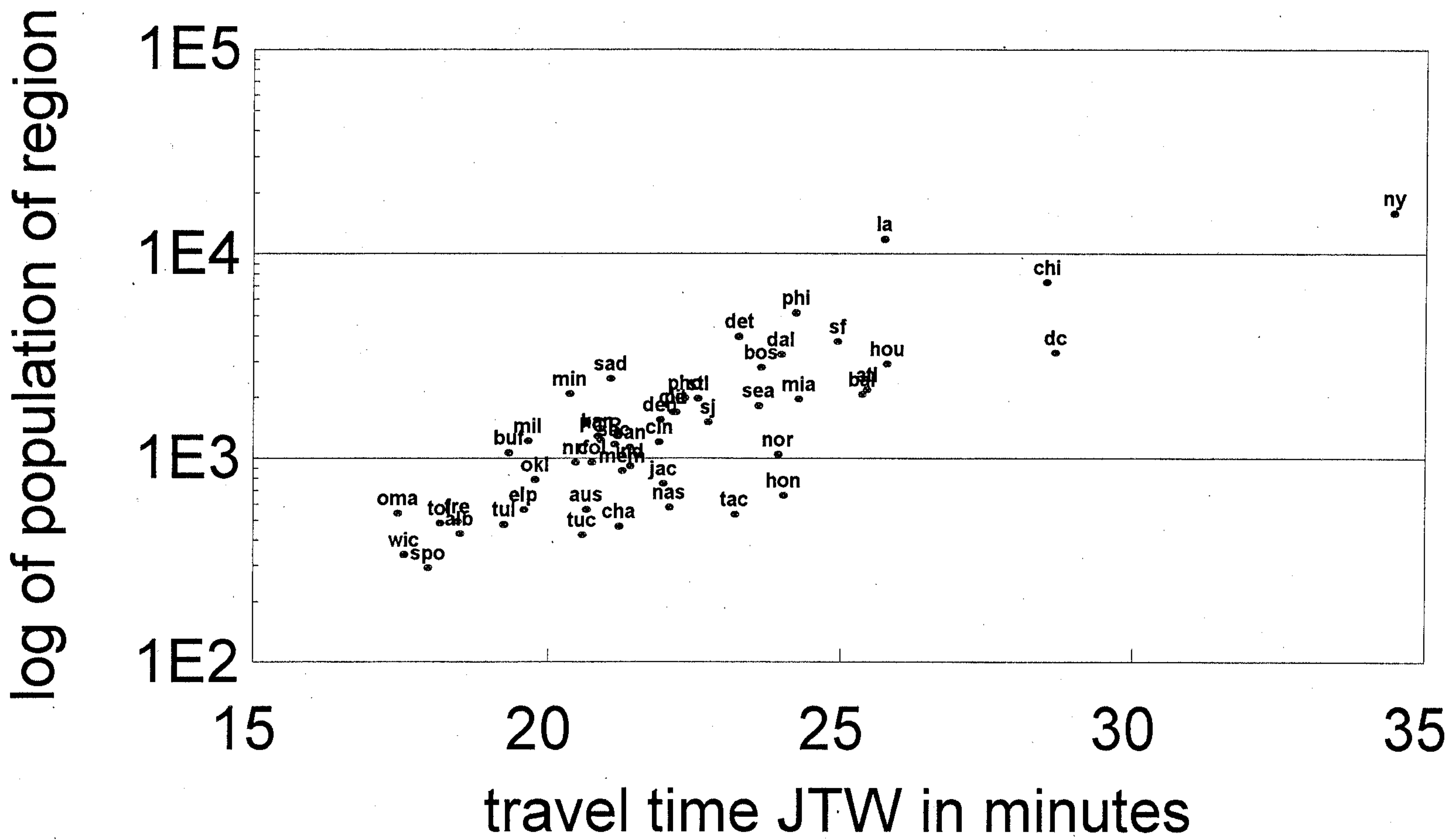


Fig 4: Travel time JTW and density

55 US regions 1990

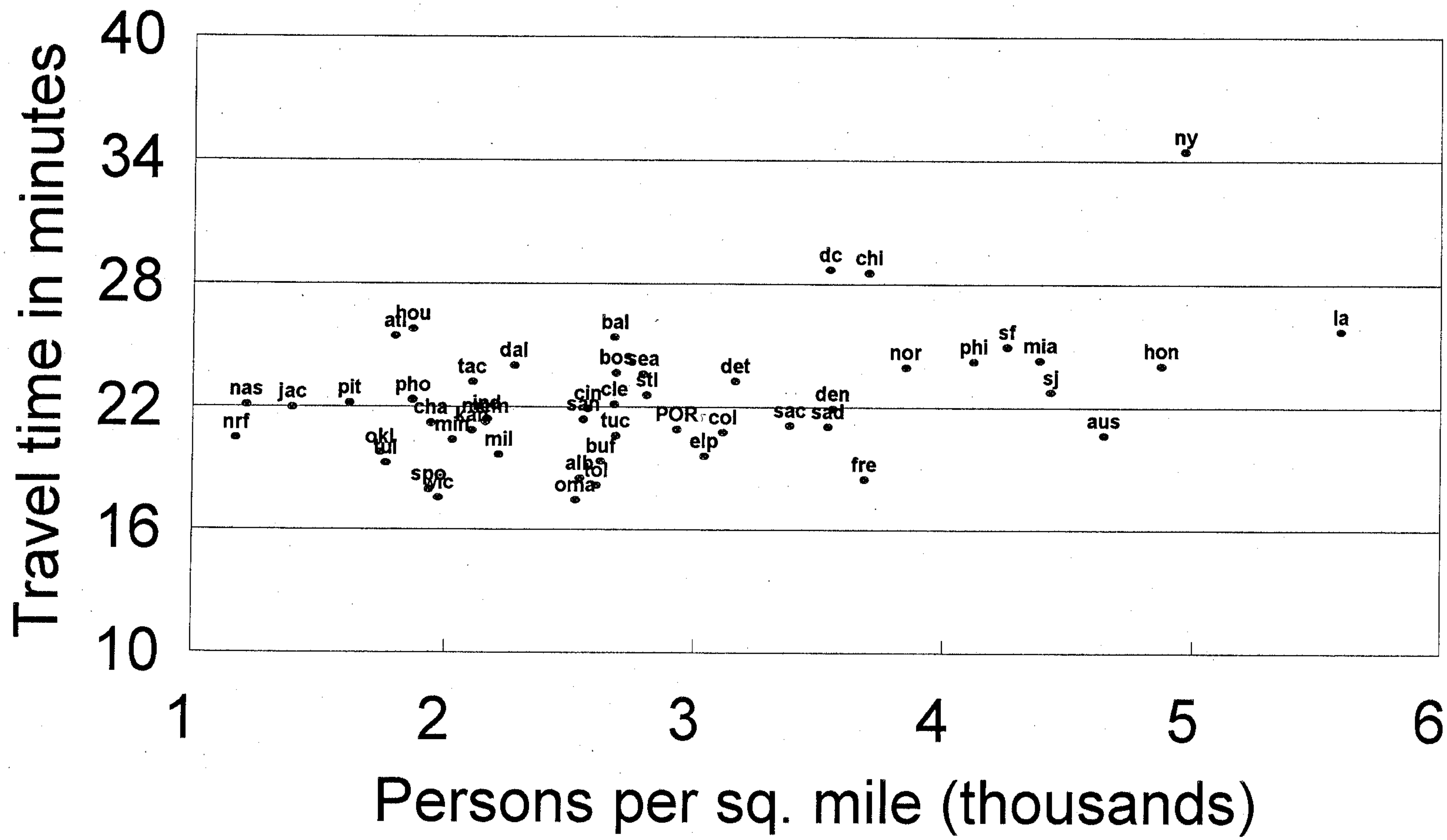


Fig 5: % JTW no vehicle/travel time

55 US PMSA's 1990

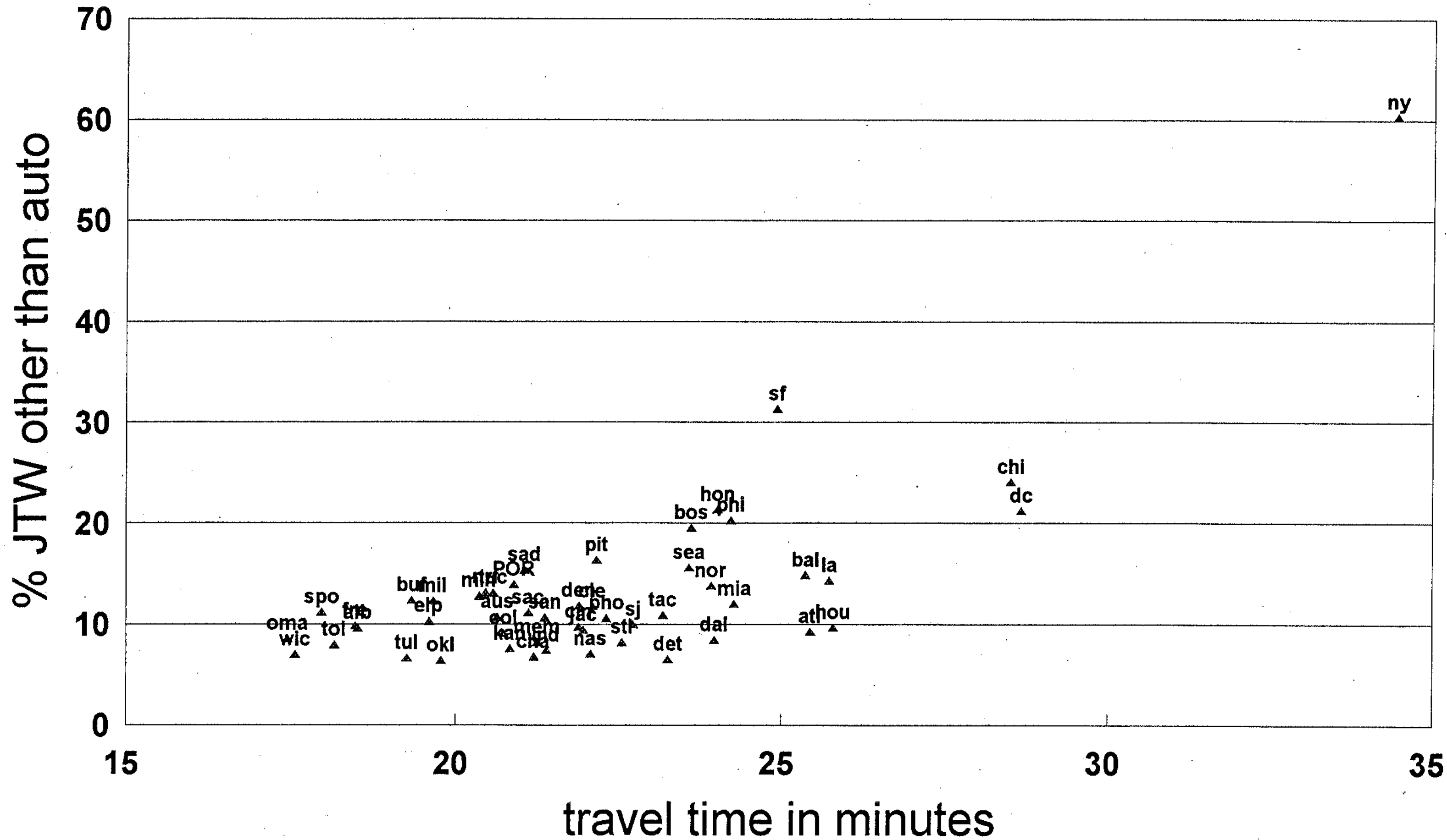
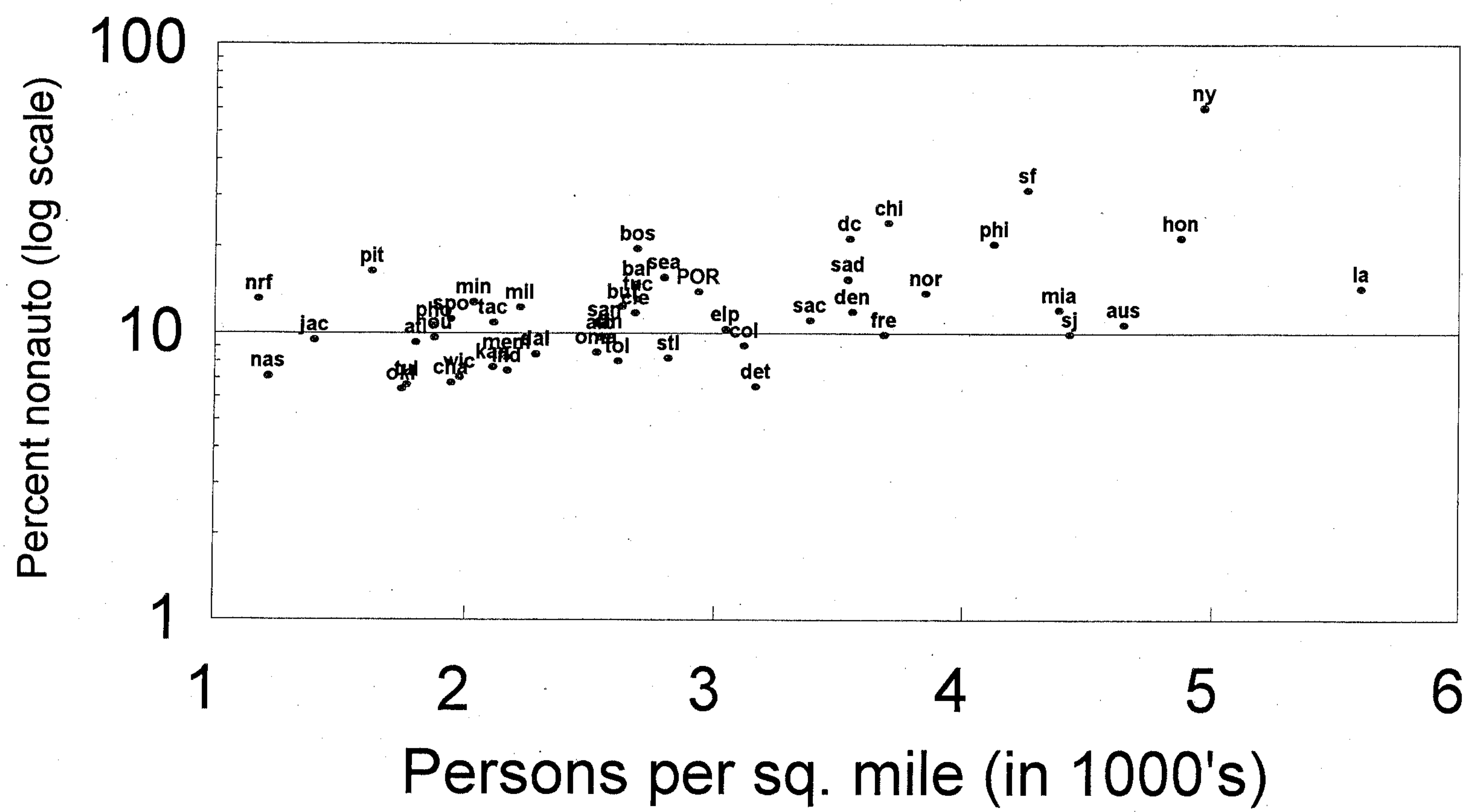


Fig 6: Region density & % nonauto JTW

55 US regions 1990



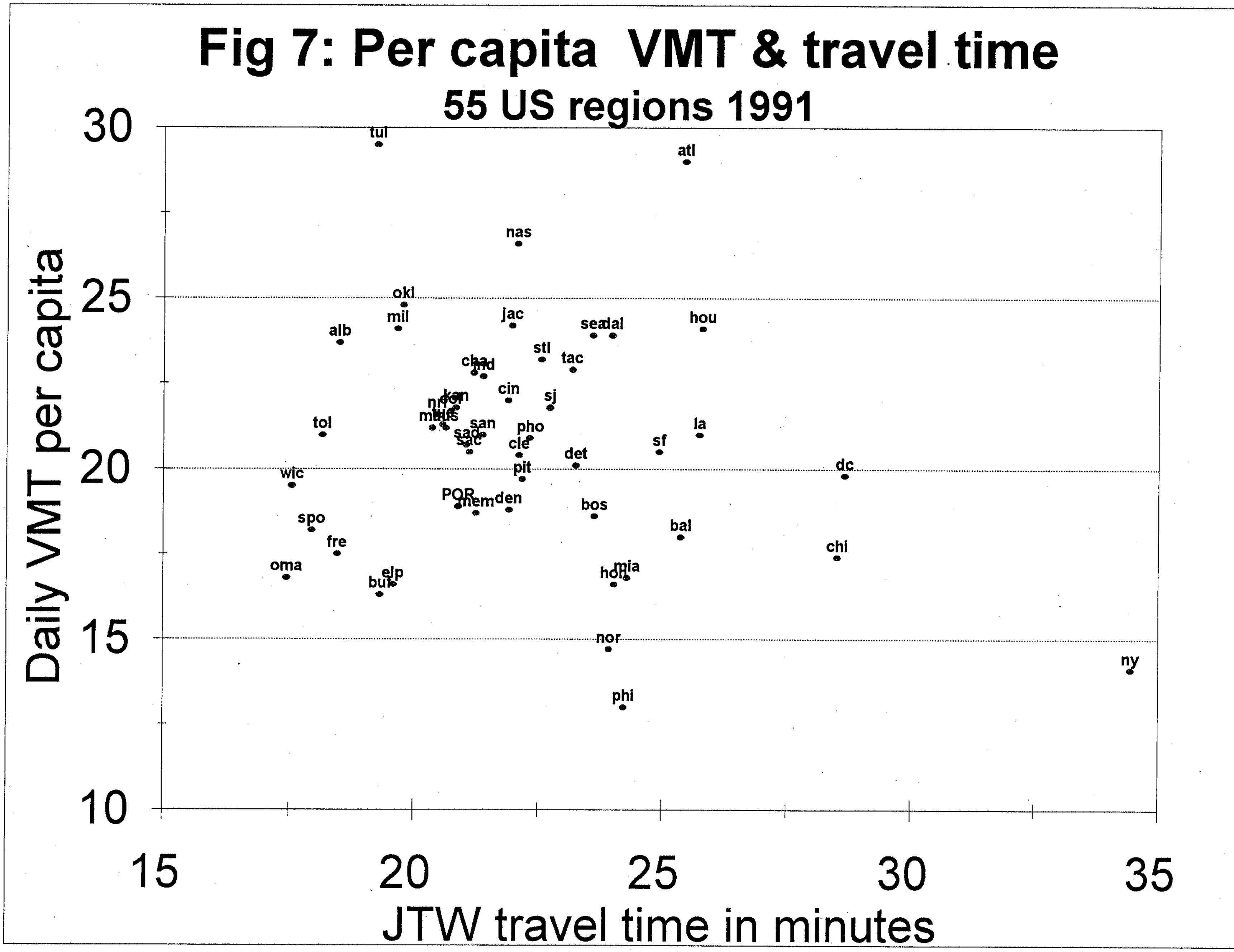


Fig 7: Per capita VMT & travel time
55 US regions 1991
Daily VMT per capita
JTW travel time in minutes
30
25
20
15
10
15
20
25
30
35
tul
atl
nas
okl
mil
alb
jac
sea
dal
hou
stl
cha
ind
tac
cin
sj
kan
nrl
mdus
tol
san
sac
pho
cle
la
sf
det
pit
dc
wic
POR
mem
den
bos
spo
bal
fre
chi
oma
elp
buf
hon
mia
nor
ny
phi

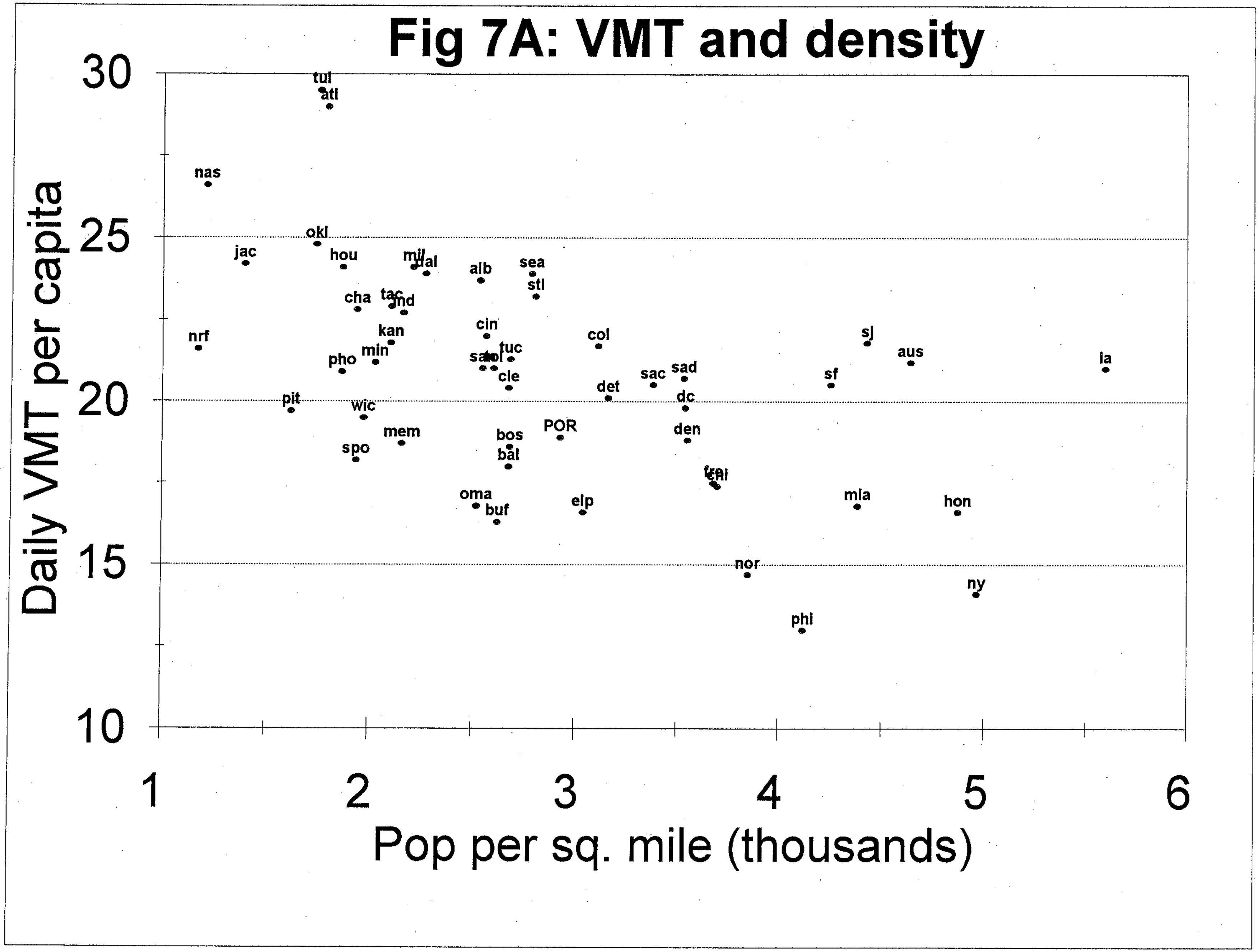


Fig 7A: VMT and density
Daily VMT per capita
Pop per sq. mile (thousands)
30
25
20
15
10
1
2
3
4
5
6
tul
atl
nas
okl
jac
hou
mil
dal
alb
sea
stl
cha
tac
ind
kan
cin
nrf
col
sj
min
tuc
pho
aus
la
sad
sac
cle
det
sf
pit
dc
wic
POR
mem
bos
den
spo
bal
fre
chi
oma
elp
mia
hon
buf
nor
ny
phi

Fig 8: Per capita VMT & road miles

55 US regions 1991

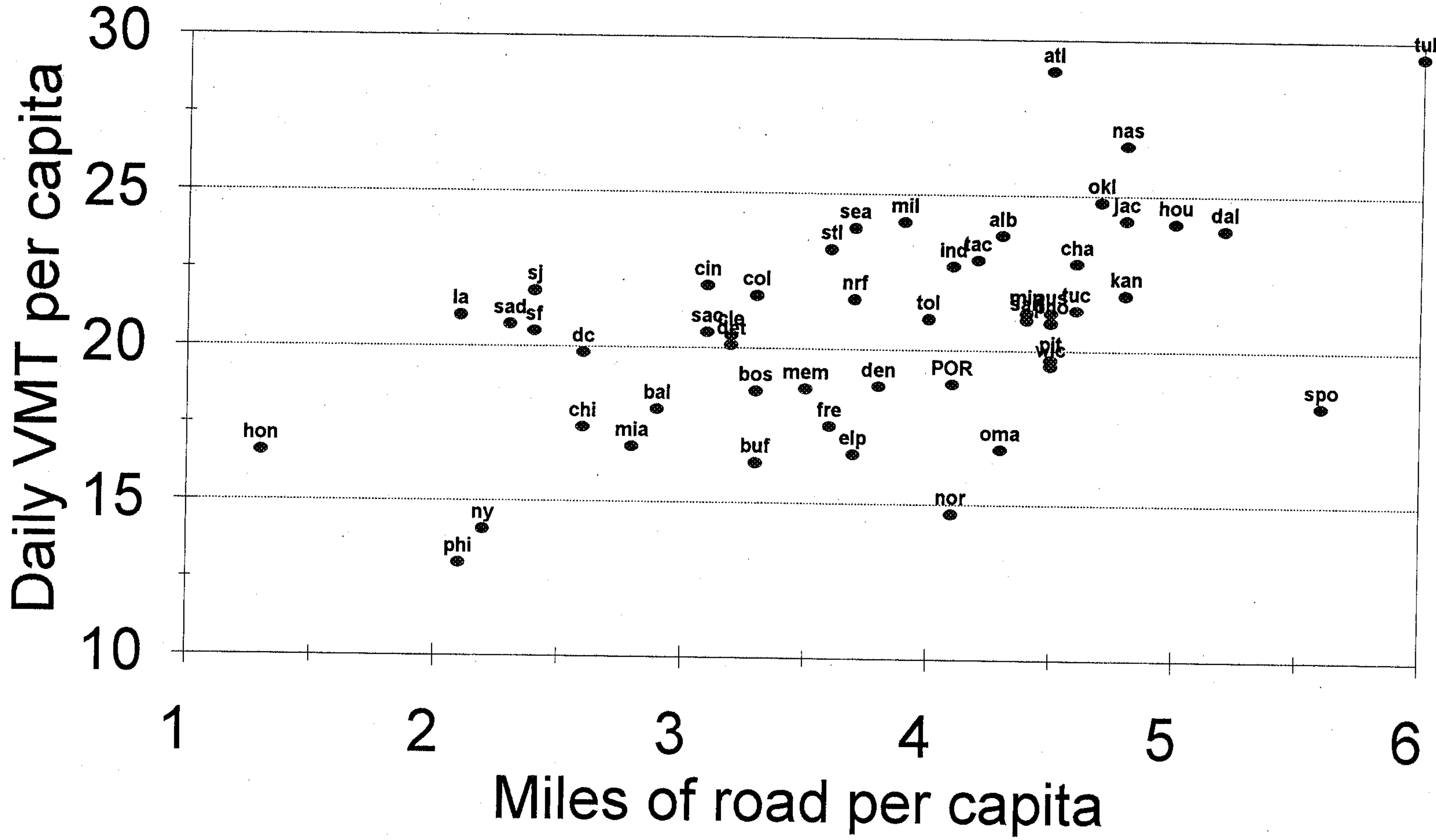


Fig 9:Per capita VMT and % nonauto

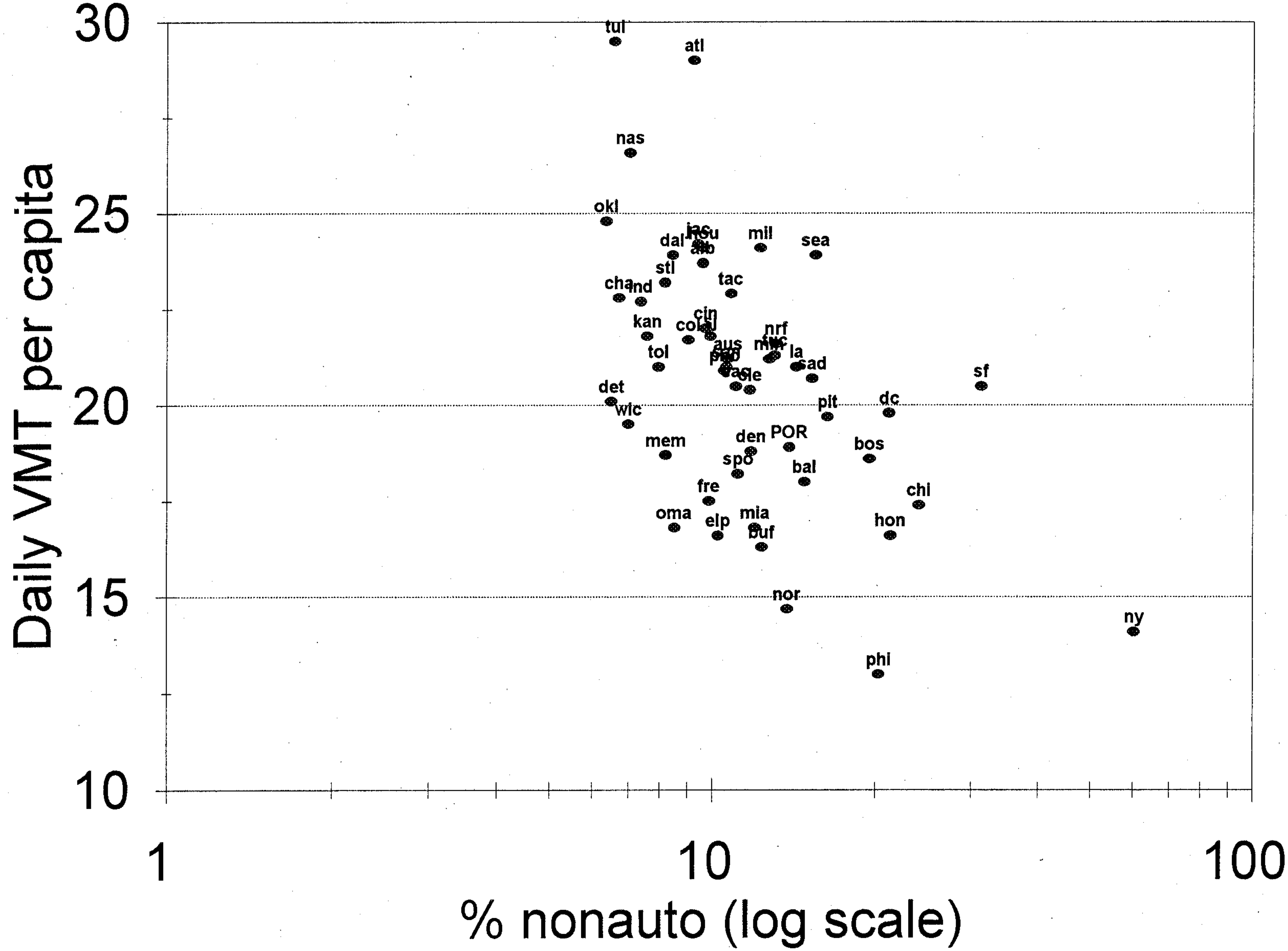


Fig 10: % nonauto and road per capita

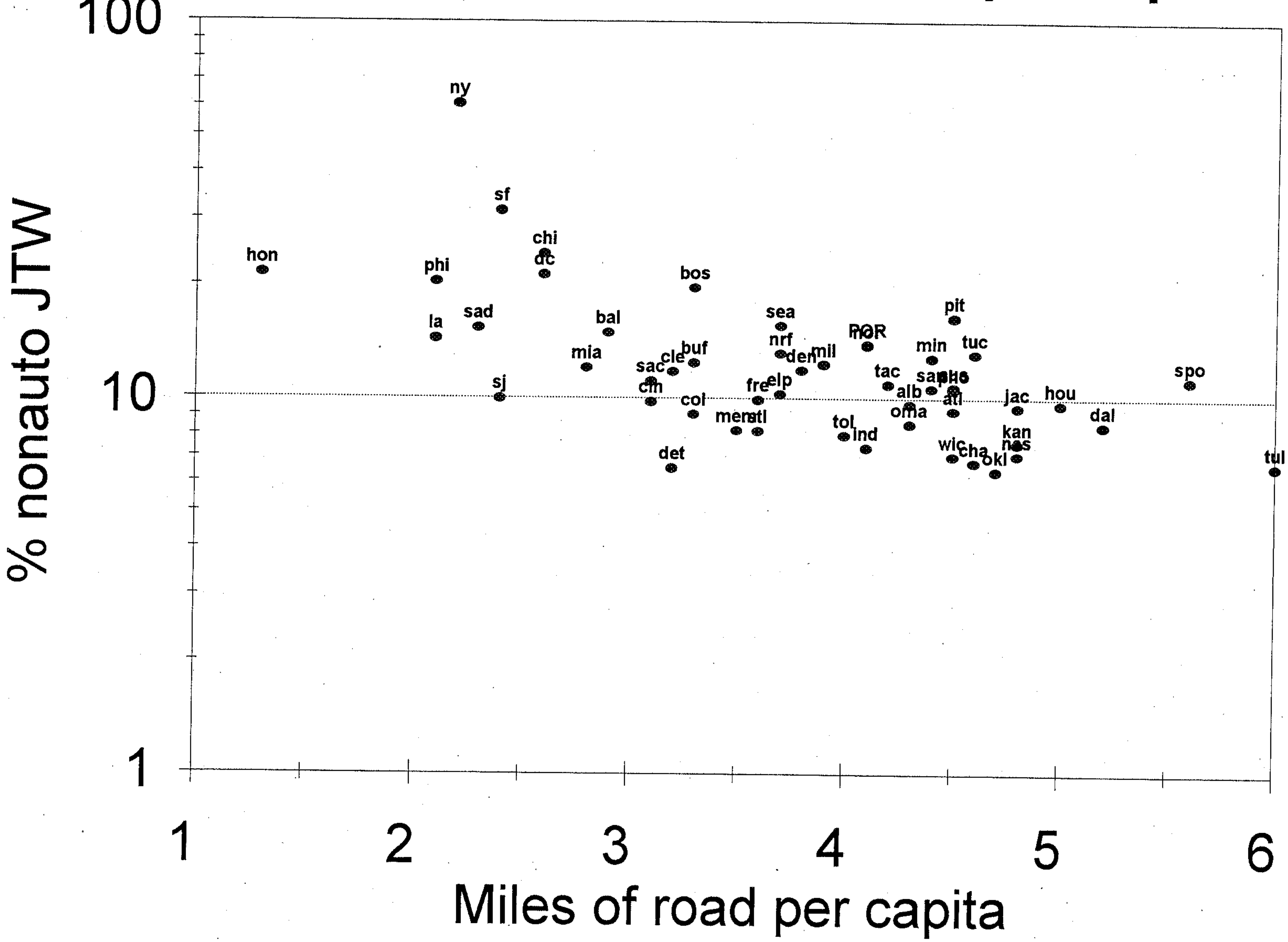


Fig 11: Road miles and density

per capita road miles 1991

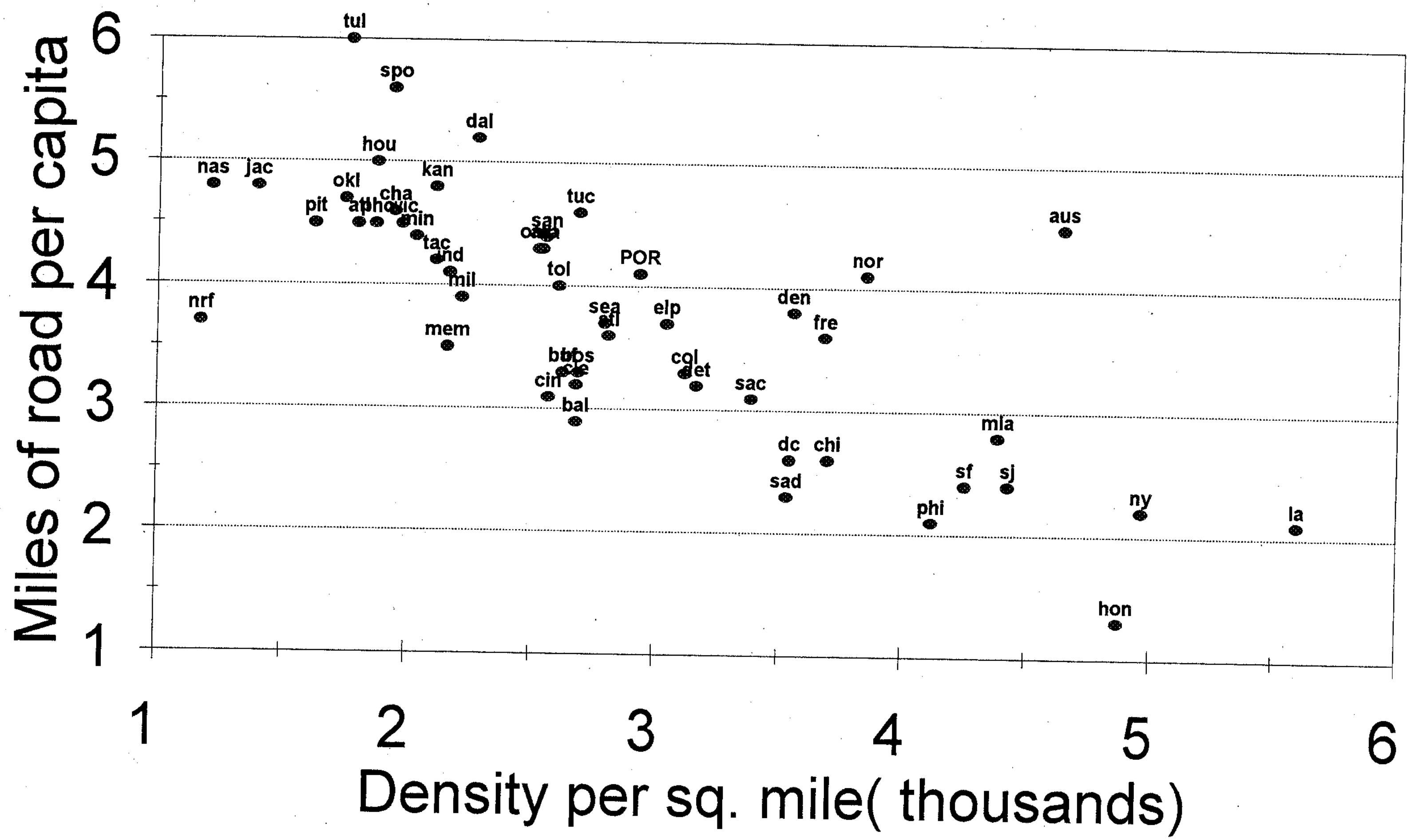
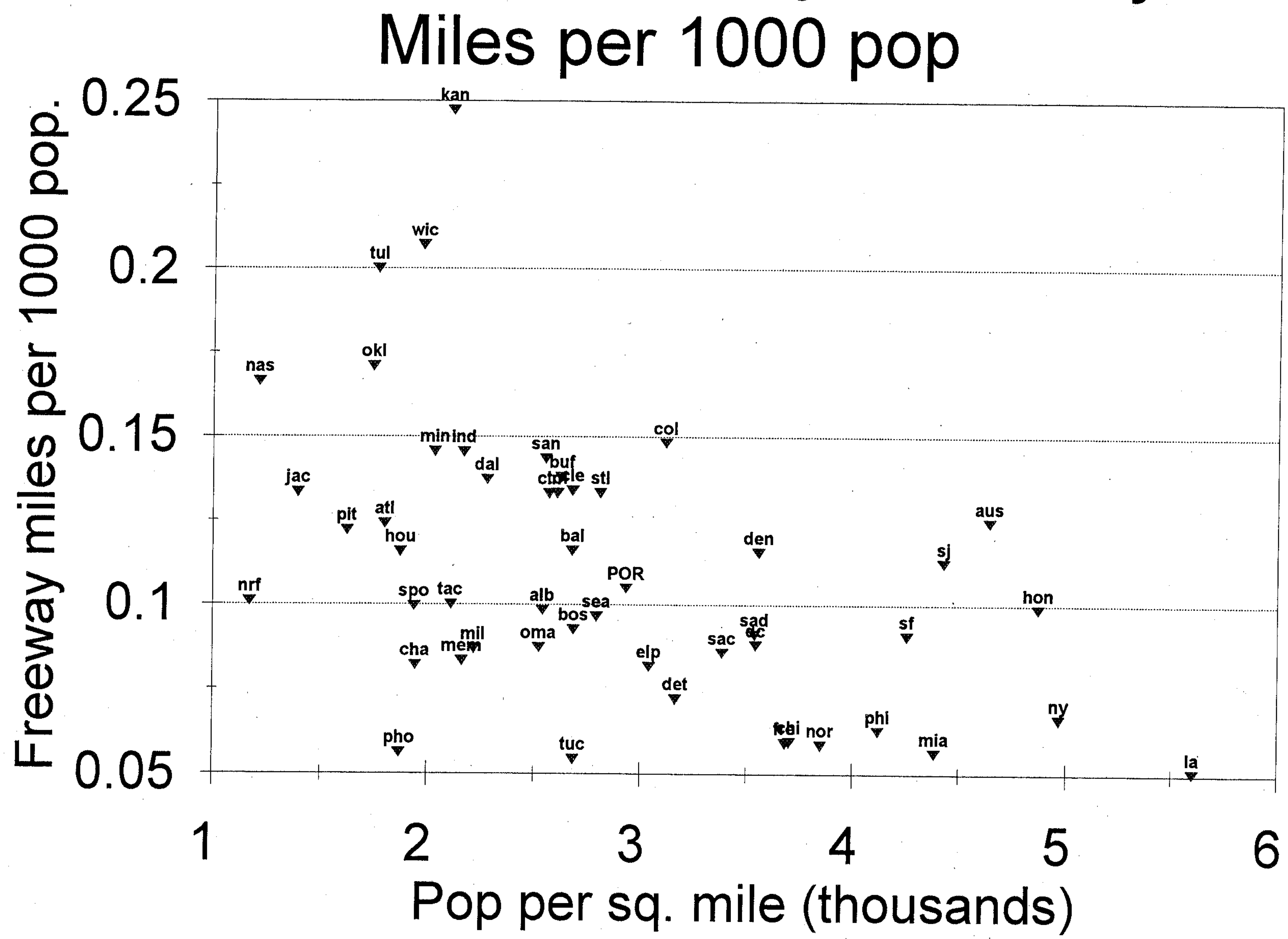


Fig 12: Miles of freeway and density



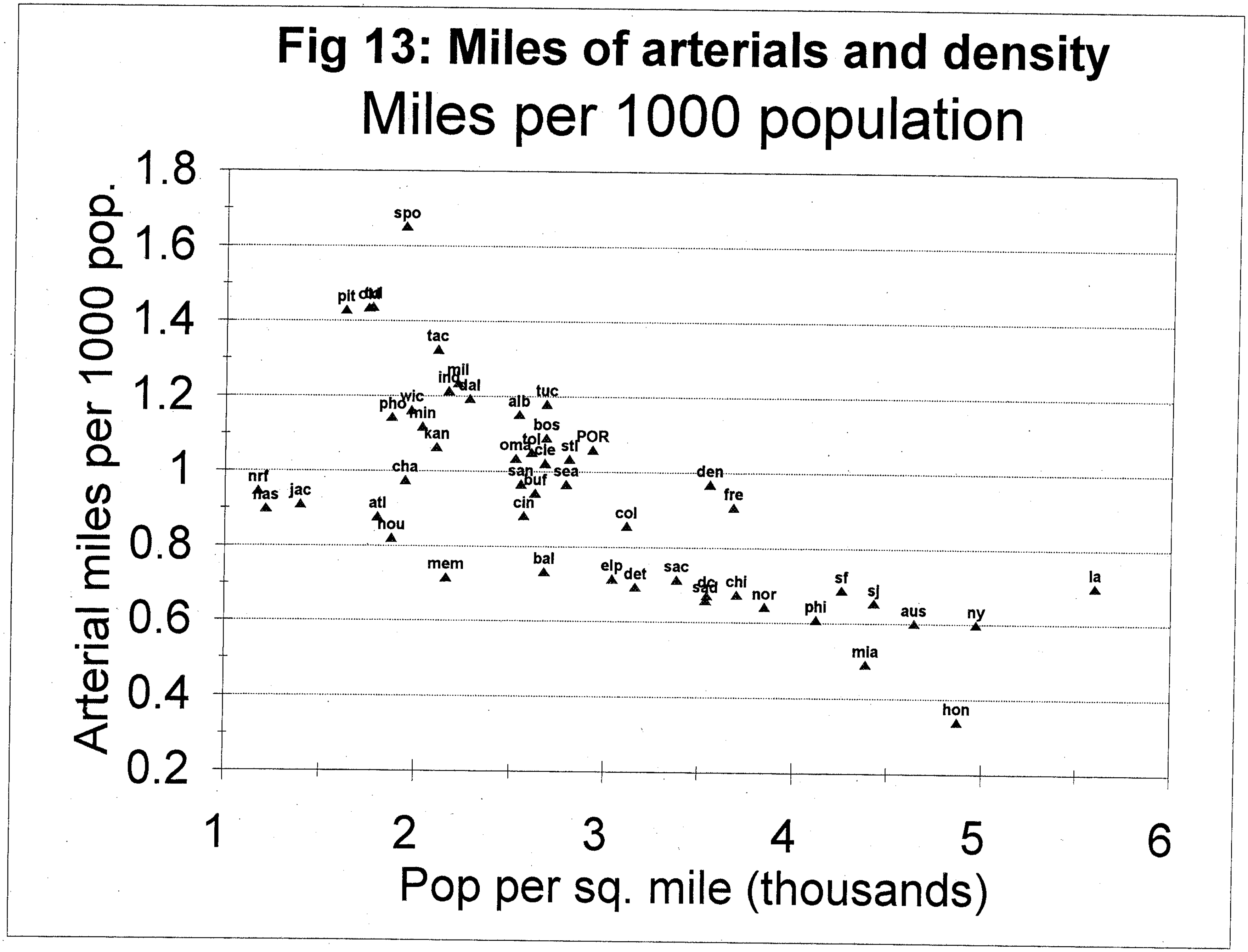
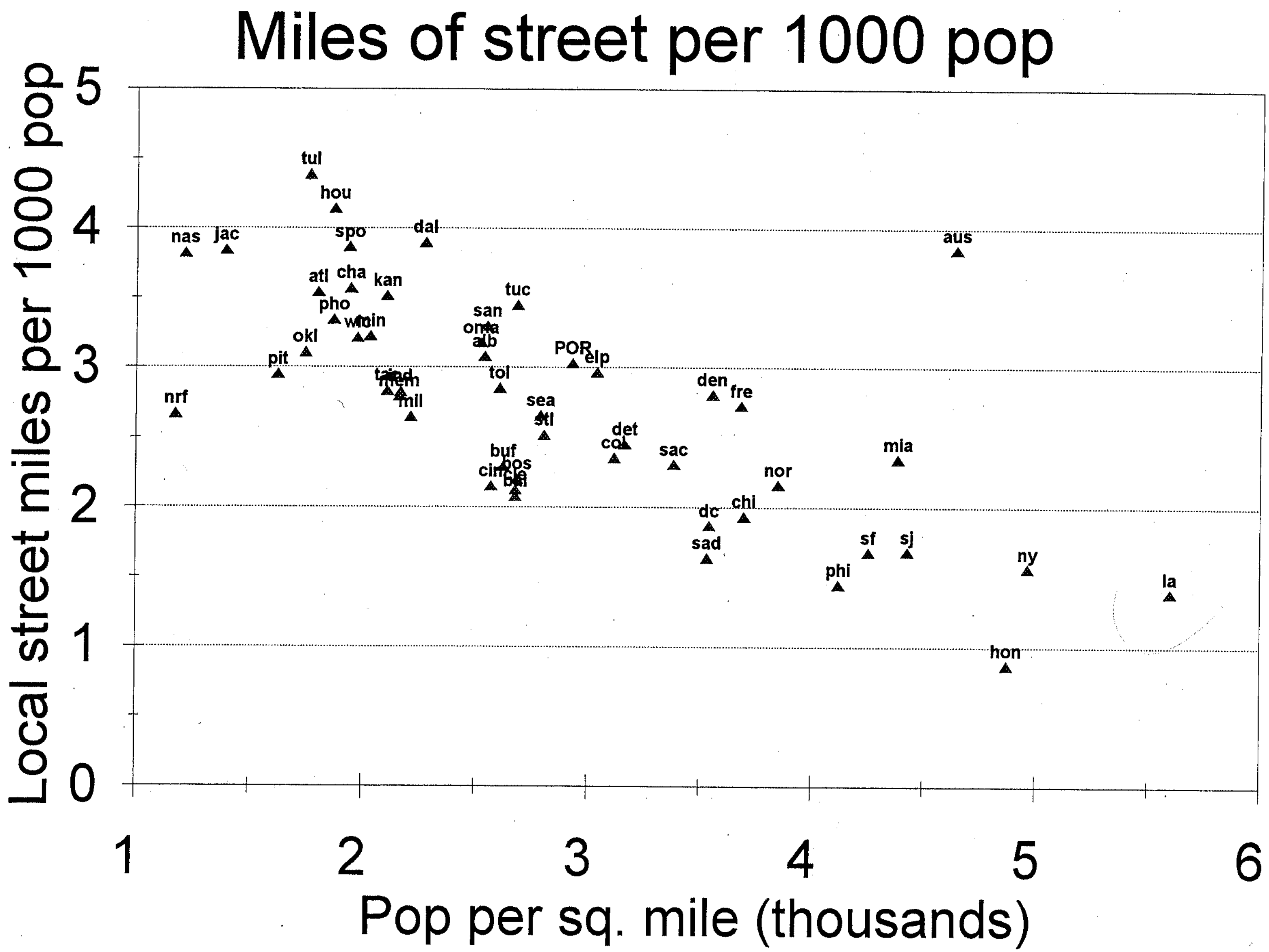


Fig 13: Miles of arterials and density
Miles per 1000 population
Arterial miles per 1000 pop.
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
1
2
3
4
5
6
Pop per sq. mile (thousands)
spo
pit
tac
mil
ind
dal
pho
wic
min
kan
alb
tuc
bos
tol
oma
cle
stl
POR
san
sea
buf
cin
cha
nrf
nas
jac
atl
hou
mem
bal
den
fre
col
elp
det
sac
dc
sad
chi
nor
phi
sf
sj
aus
ny
la
mia
hon

Fig 14: Miles of local road & density



Section 2: Housing Prices (Figures 15 - 21)

Figure 15 displays median value for owner-occupied housing units as reported in the 1990 Census of Population and Housing. In Figure 15, we compare house value to commute travel time. Since the California cities' have housing valued two to three times the national average, we again use a logarithmic scale to minimize the "outlier effect.[9]"

Ignoring New York and the California cities, there appears to be a weak relationship between house value and travel time. However, smaller regions anchor the bottom end of the relationship, while larger regions are more prevalent at the top end.[10] Given such a distribution, we should not lend much credence to the relationship taken in isolation from other data.

Figure 16 compares housing price and miles of road per capita. We discern a reasonably consistent relationship between housing price and miles of road per 1,000 population. (High California housing prices owe to a lack of road building???!) Once we drop below three miles of road per 1,000 population, only two of 10 regions are below $100,000 median value and those two are above $80,000. Above three miles of road per 1,000 population only three of 36 regions are more than $100,000.

Interpreting road miles per capita as roughly comparable to land availability, we cannot dismiss the importance of transportation investment as a factor in owner occupied housing prices.

Besides housing value we are also interested in housing output. Specifically, what are the factors that affect housing output? Figure 17 relates dwelling unit percent increase between 1980 and 1990 to road miles per capita. Though the relationship in Figure 17 is weak at best, it merits attention when one considers that income, employment and population growth affect dwelling unit output as well.

Figure 18 displays dwelling unit increase compared to per capita VMT. As in Figure 17 a weak relationship is apparent. Higher VMT areas show higher rates of dwelling unit increase. However, we need to note that older, denser eastern regions occupy the lower end of the scale and southern or western regions tend to predominate in the faster growing areas. In general, such regional groupings suggest other factors play a role in dwelling unit increase.

Figure 19 compares owner-occupied house value to population density. There appears to be a weak, but fairly consistent, relationship between house price and density. Below 2,000 people per square mile no housing prices exceed $90,000; while above 3,500 people per square mile 10 of 13 regions exceed $100,000. Nevertheless, the relationship has a large variance. For instance, Portland, slightly denser than Seattle, has a 1989 median house price of roughly $70,000, while Seattle comes in at more than $100,000.

Figure 20 depicts housing price and median per capita income (Census of Housing and Population data). As we would expect, higher incomes are associated with higher housing prices and low incomes with lower housing prices. What is somewhat surprising is that the relationship between income and housing price is not much stronger than between density and housing price.

Figure 21 depicts the relationship between housing price and percent of dwelling units built between 1980 and 1990. The most striking aspect of Figure 21 is the lack or any particular relationship. High housing prices are associated with both low and moderate growth; but

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9 Both visually and statistically a few extreme observations may bias the interpretation of the data in cases where the extreme values owe to idiosyncratic conditions not evident in the remainder of the data set. Various data transformations are also appropriate when substantial theoretical and/or empirical evidence suggest a relationship between variables is not strictly linear.
10 Due to sample bias we expect smaller regions to report lower travel times.

then so are low housing prices. Growth per se does not appear to increase or reduce housing prices. Conversely, high or low housing prices seem to have little or no effect on growth.

Figure 22 compares the percent of dwelling units built between 1980 and 1990 to the birth rate per 1,000 population observed in 1987. Figure 22 indicates a substantial amount of dwelling unit growth may owe to the indigenous birth rate. Figure 22 underscores the significant role of demographics in determining regional indicators otherwise thought to reflect economic conditions or policy decisions.

The results of Section 2, though by no means definitive, suggest welfare tradeoffs for higher density, less VMT and fewer per capita road miles. These tradeoffs appear to take the form of higher housing prices and perhaps lower housing output. Again we emphasize the data suggest rather than inform. In all cases, the relationships are weak and may with equal or greater likelihood arise due to unspecified underlying factors.

Fig 15: House price and travel time

1989 median SFD price

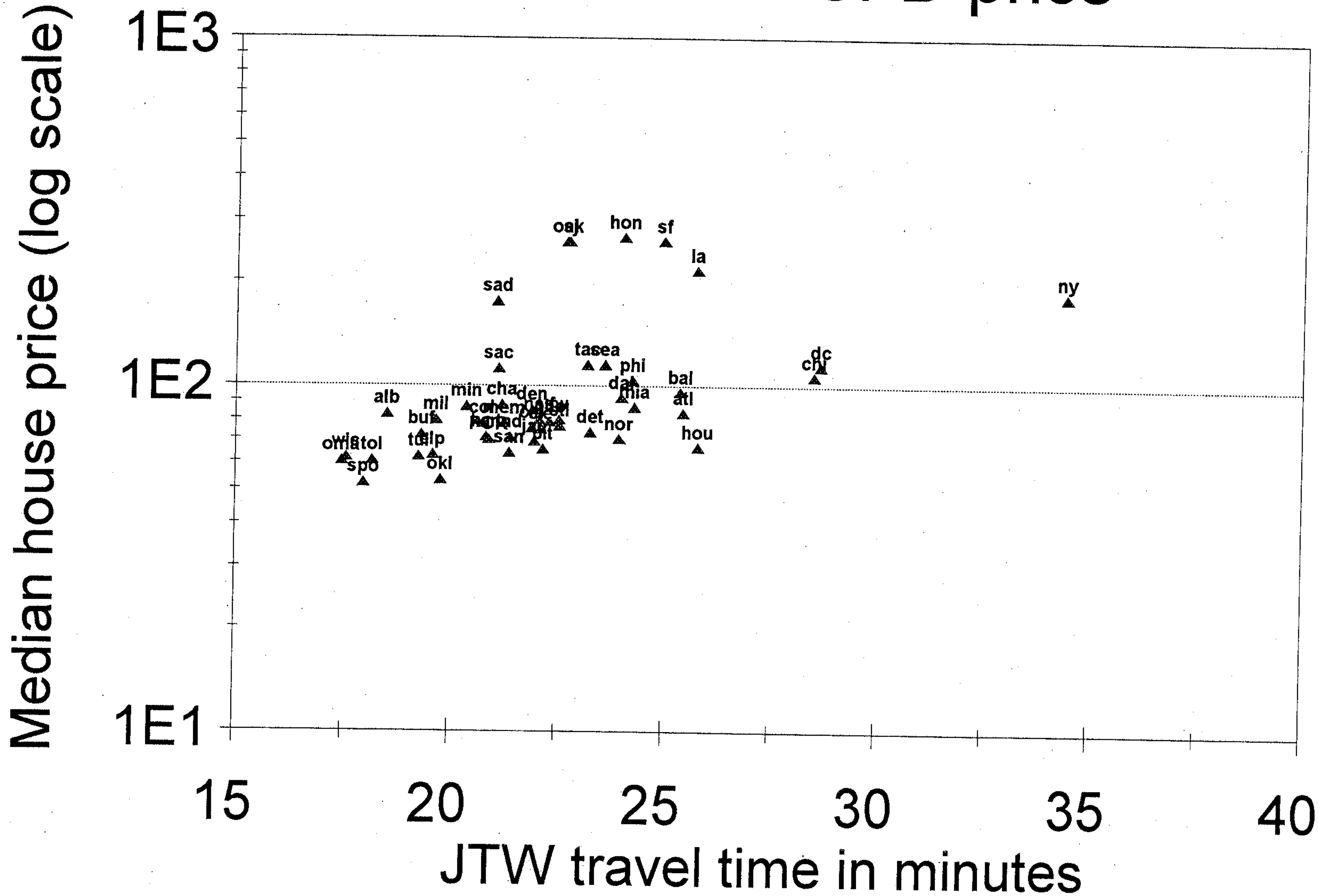


Fig 16: House price & road per capita

1989 SFD median price

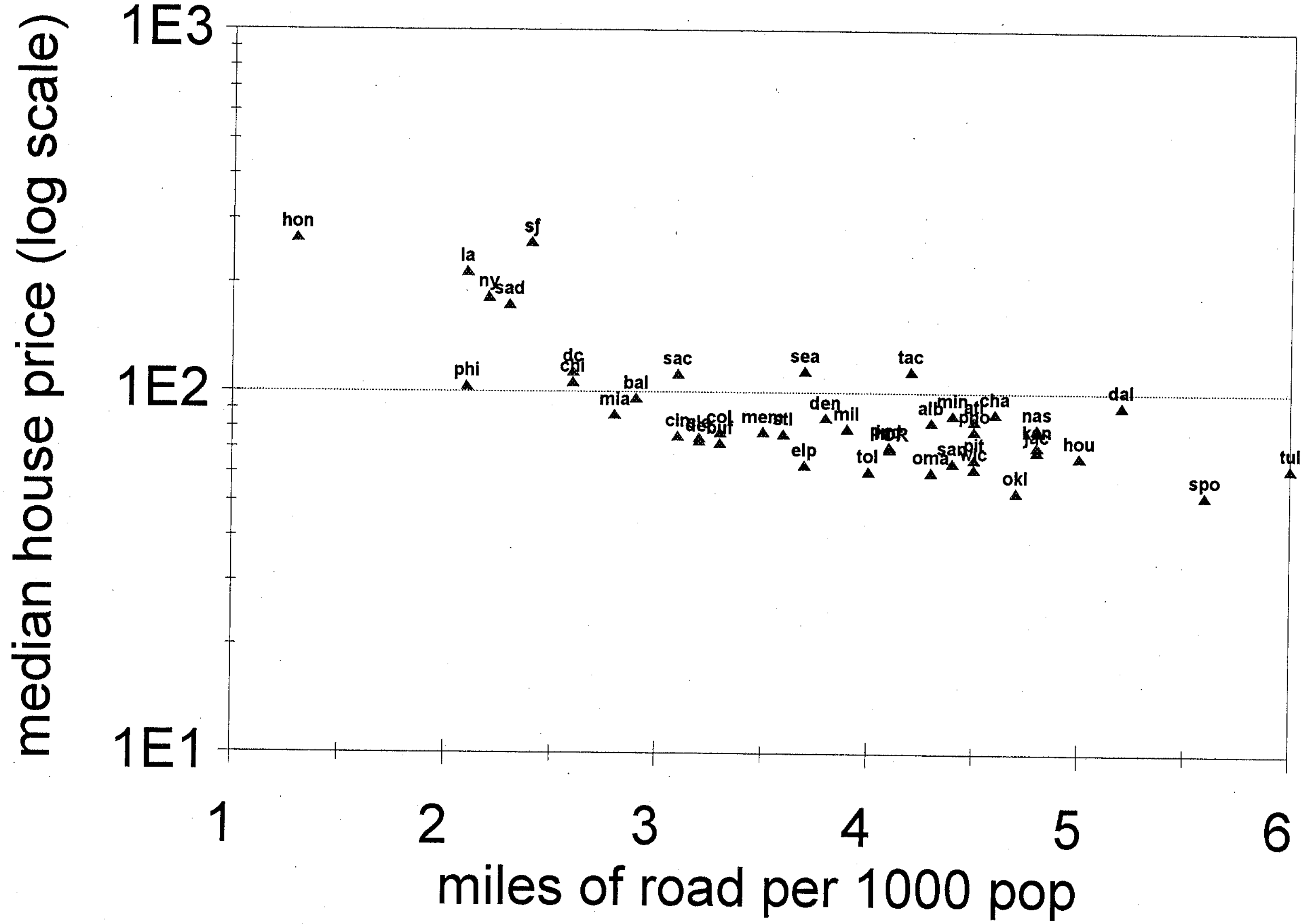


Fig 17: % DU increase and road miles

Dwelling units & miles per 1000 pop

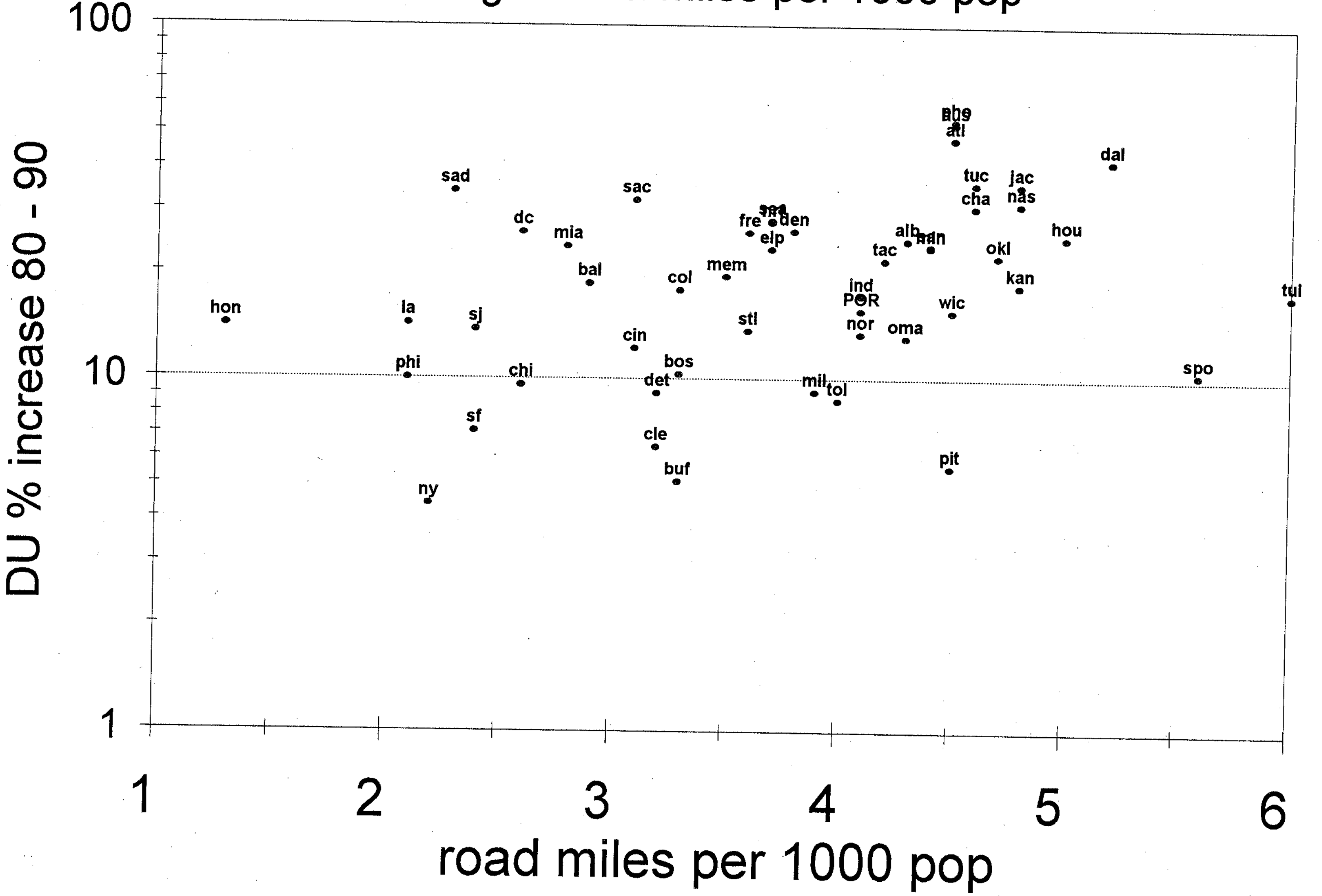
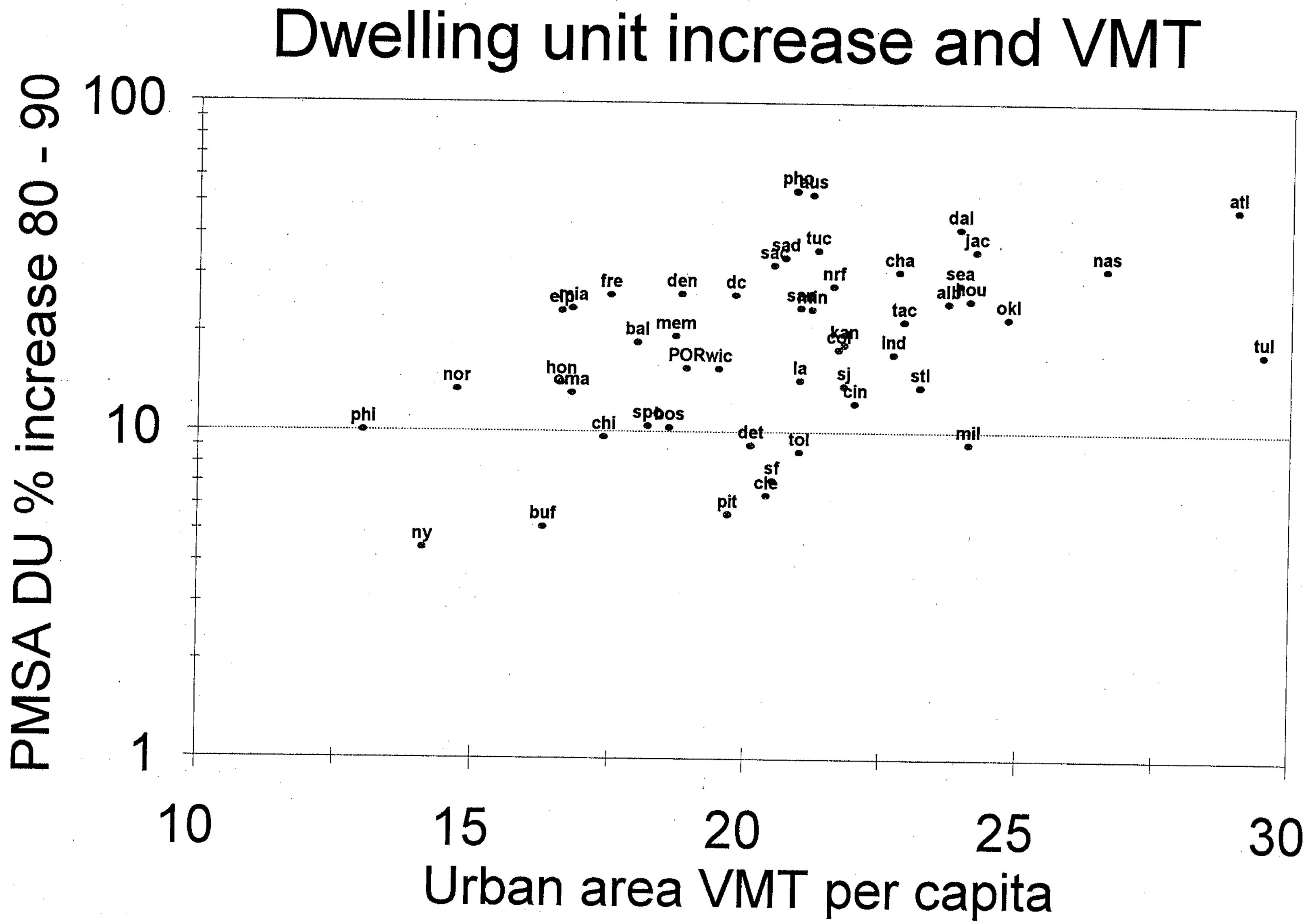


Fig 18: % du increase & per cap VMT 91



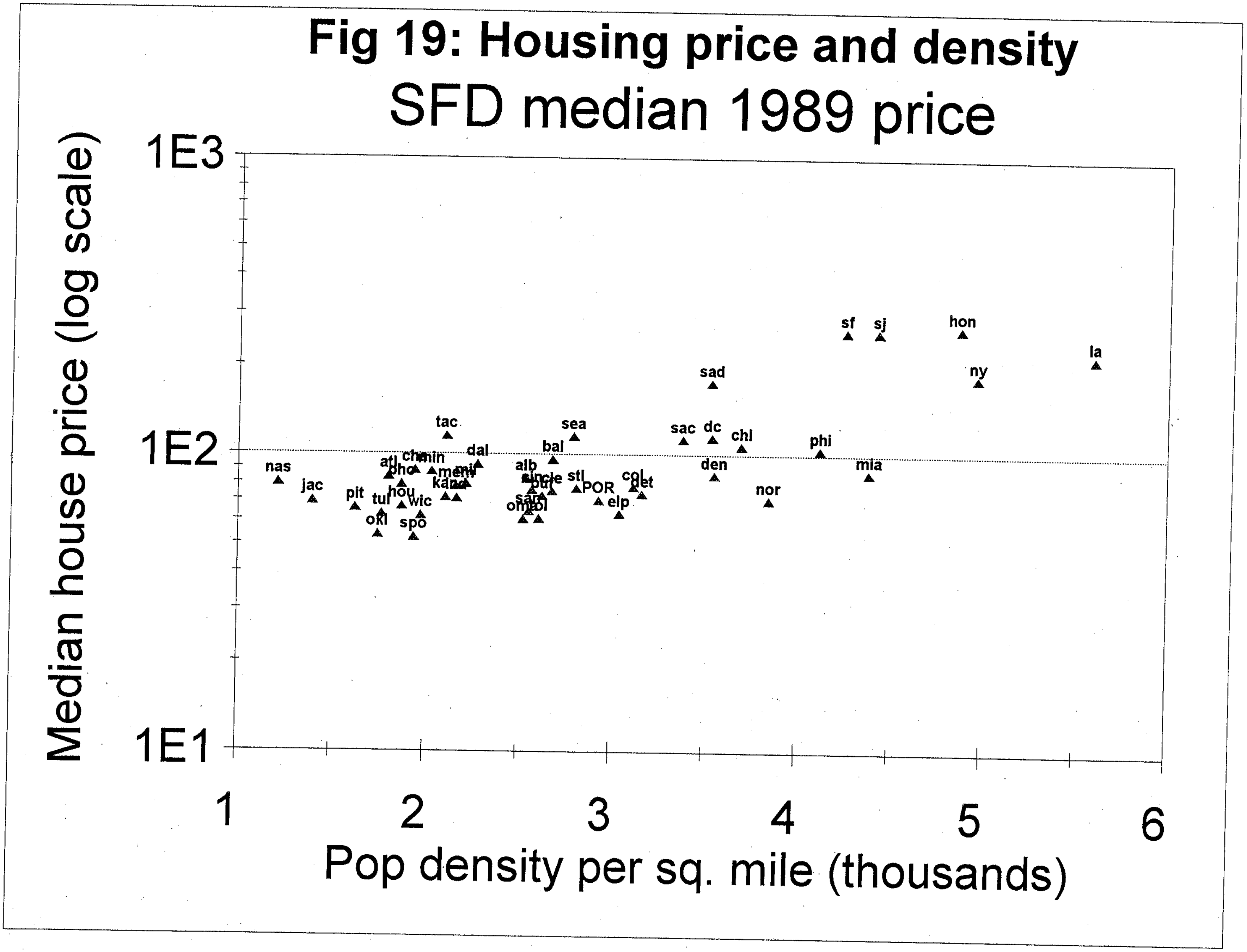


Fig 19: Housing price and density
SFD median 1989 price
Median house price (log scale)
1E3
1E2
1E1
1
2
3
4
5
6
Pop density per sq. mile (thousands)
sf
sj
hon
la
sad
ny
tac
sea
sac
dc
chi
phi
bal
dal
nas
den
mia
jac
pit
nor
POR
elp
spo

Fig 20: House price and income (90)

SFD median price & income by PMSA

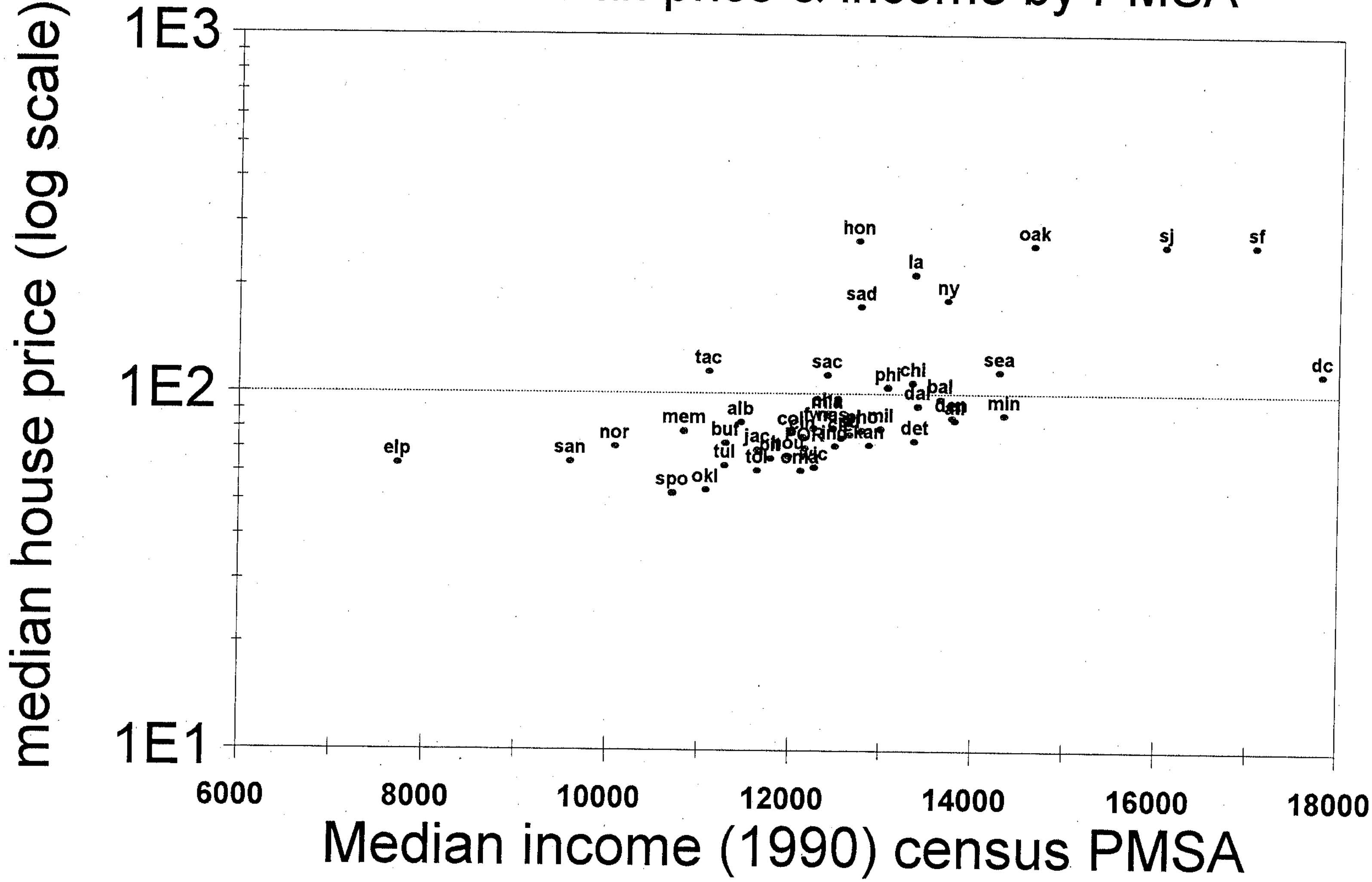


Fig 21: House price and % new housing

New units 90 compared to 80 (PMSA's)

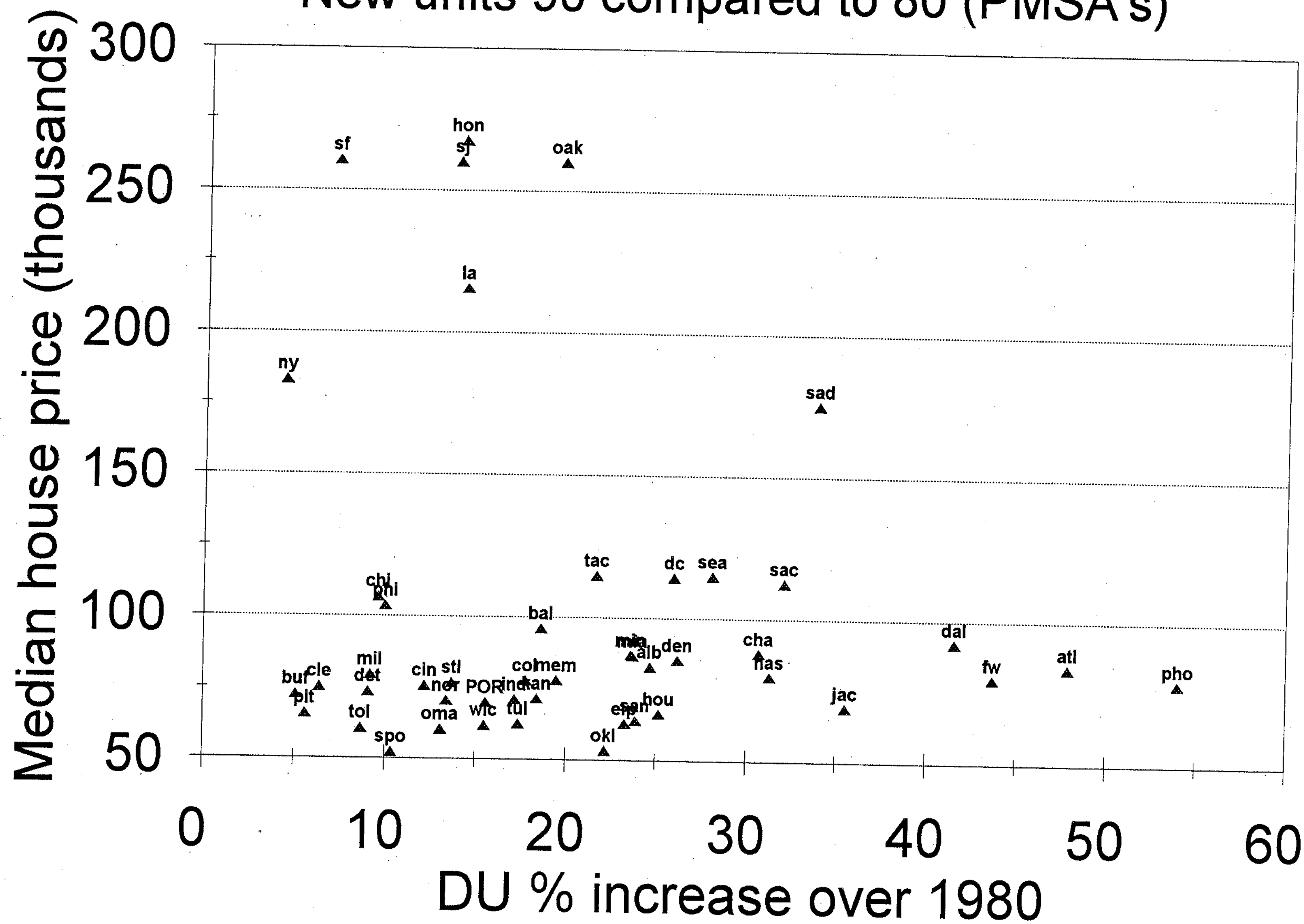
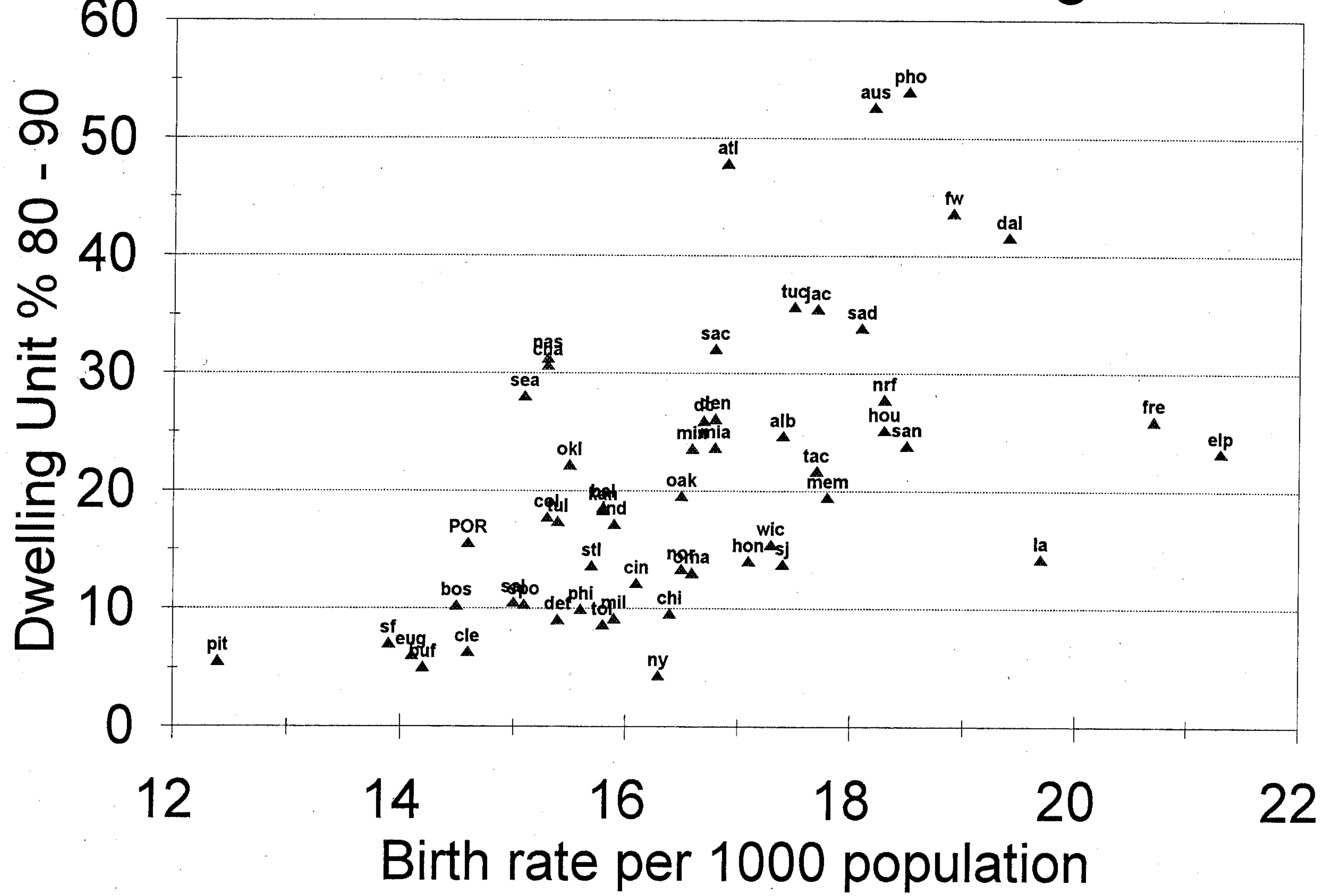


Fig 22: % d.u. growth & birth rate

87 birth rate & 80 - 90 d.u. growth



Section 3: PMSA and Central City Growth

(Figures 22 - 30)

Figure 22A shows regional growth rate compared to regional birth rate. Figure 22A indicates that much of regional growth can be related to the regional birth rate. While it is common to focus on interregional migration, economic and policy factors to explain regional growth, the birth rate data point to the importance of demographic factors in regional growth.

Figure 23 indicates that density has no relationship to regional growth. Policy options that increase or decrease density by themselves should not impact regional growth rates.

Figure 24 relates violent crime rate per 100,000 population to regional growth rate. There appears to be little or no relationship between violent crime rates and regional growth. In terms of interregional comparisons, we note the Portland occupies a spot in the middle for both crime rate and growth. We should emphasize that interregional comparisons of crime rates[11] are unreliable and really provide us with little or no useful information.

Figure 24A compares violent crime to percent of births to mothers under 20 years of age. Here we may note a weak relationship. As the percentage of mothers under 20 goes up, crime rates edge upward. However, the relationship has a large variance. For instance, San Francisco with 6% of births to under 20-year-olds reports a substantially higher crime rate than San Antonio with more than 16% of births occurring to under 20-year-olds.

In Figure 24A we note that the Metro region reports a fairly low percentage of births in the under 20-year-old category. This indicator is probably far more reliable of socio-economic condition than crime rate.

Finally, we move to the issue of central city compared to regional growth. **Figure 25** compares the growth between 1980 and 1990 of the central city of the region to overall regional growth.

As could be reasonably anticipated, there is a consistent relationship between regional growth and central city growth. In general, a growing region is associated with a growing central city. In Figure 25, 49 regions show positive growth. Thirtysix of the associated central cities show positive growth while 11 do not. Six regions display negative growth and 100% of the associated central cities also show negative growth. There is no instance of a growing central city and a declining region.

We can also look at Figure 25 from a central city perspective. Of the 19 central cities that show negative growth; only six (32%) were in declining regions. Conversely, in the 49 regions that grew, 36 (74%) of the central cities also grew. A growing region has a much higher probability of producing a growing central city than a declining central city has of producing a declining region.

We offer the comparison to make the point that there is a much stronger argument for regional growth determining central city growth than the other way around. This conclusion runs contrary to a National League of Cities Study that, based on the association between central city growth and regional growth, came to the conclusion that lack of central city growth resulted in little or no regional growth.

Figure 26 displays a comparison of central city growth rate and median house price. We note little or no relationship between price of housing and central city growth. Though not displayed in a graph, roughly the same relationship holds for regional growth as well.

11 We deliberately chose to use violent crime (crimes against persons plus armed robbery) as an indicator since these crimes are more consistently reported. However, crime data are best used comparing one region or city over time rather than comparing between regions on a one time basis.

Fig 22A: % PMSA growth & birth rate

87 birth rate & 80 - 90 growth

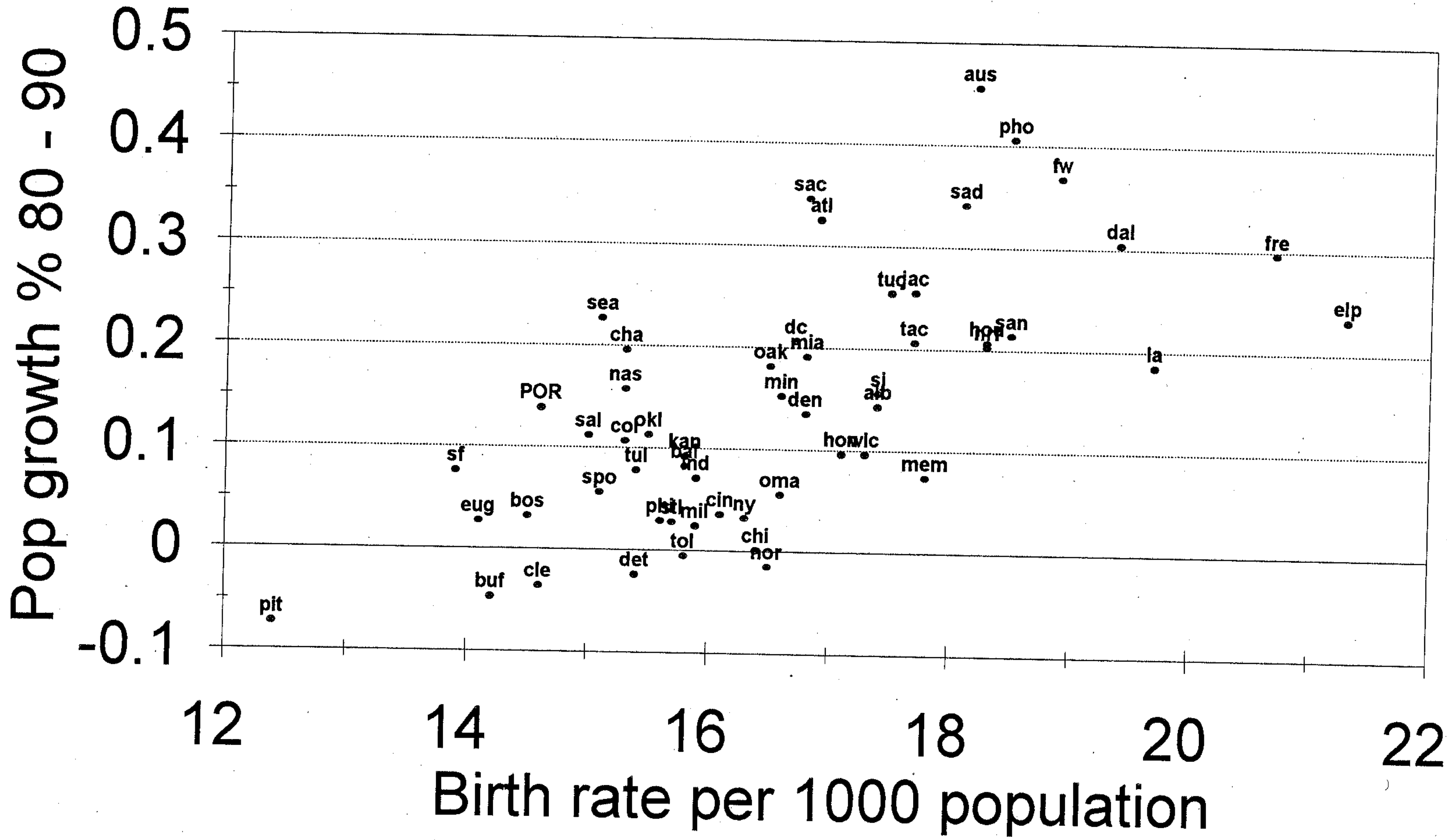


Figure 27 relates central city growth to PMSA birth rate. The pattern is much the same as in the comparison of PMSA growth rate and birth rate; namely, higher birth rates are associated with more growth.

Figure 28 presents the data on central city growth compared to commute travel times. Figure 28 shows a slight tendency for low or negative rates of growth to be associated with longer travel times. However, we should be very skeptical of this when considering the likely travel time sample bias. Also, significantly detrimental to the finding is that older, larger eastern cities clump near the low or negative end and smaller, western or southern cities concentrate on the high end of the growth scale.

Figure 29 compares central city growth to central city share of regional population. There is a slight tendency for central cities comprising a larger share of their region to have positive growth rates. The opposite is true for cities comprising a small share of their region.

Though there are some exceptions, eastern cities comprise small shares of their regions and western and southern cities comprise larger shares. For the most part, eastern cities tend to be older areas, totally contained within much larger suburban regions. Southern and western cities, on the other hand tend, to be younger, with room to expand into suburban areas. What this means is that eastern cities occupy relatively small, older sections of their respective regions; while southern and western central cities occupy larger, new sections and so much more resemble the region as a whole.

Figure 30 presents "adjusted" central city growth and commute time. Figure 30 represents the one case in the presentation where the data have been statistically manipulated. In this case, we expressed central city growth as a function of PMSA growth and then subtracted the predicted central city growth rate from the actual growth rate to arrive at an "adjusted" growth rate.

Comparing commute time in Figure 30 with the adjusted growth rate, there appears a fairly consistent association between shorter travel times and positive adjusted growth rates. Central cities in regions characterized by shorter travel times have a tendency toward higher growth rates than those in regions with longer travel times after we account for overall regional growth rates.

Excepting for a moment our earlier cautions regarding sample bias and the spatial clumping of regions about similar values, the data in Figure 30 agree with Gordon and Richardson's hypothesis on adjustment to congestion through suburban dispersal of both jobs and housing. Given an increase in travel times, the majority of firms and households are willing to trade deteriorating access to the entire region for increased access to but one sector of the region.[12] In sum, the region functionally quits being monocentric and becomes polycentric with a number of all but functionally separate centers.

12 Theoretically and empirically, the central city retains a relative access advantage over the remainder of the region under conditions of regionwide increasing travel times. However, polycentric theory suggests it may be the case that as absolute access decreases throughout the region, the importance of access to subregional markets becomes the dominant location factor. When access to subregional markets is maximized, the CBD no longer retains the inherent geometric advantage of centrality and may indeed be embedded in a subregional market inferior in income and size.

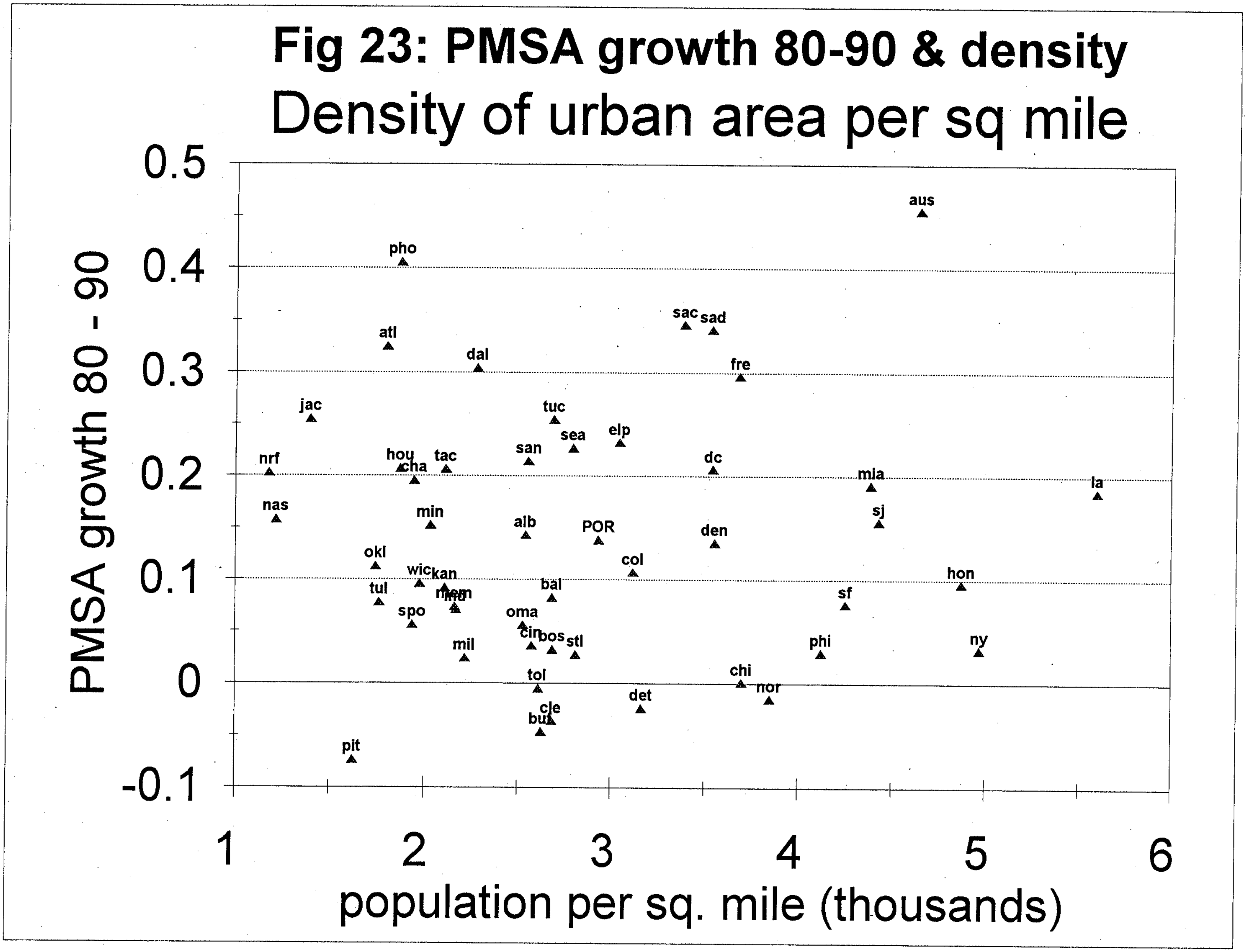


Fig 23: PMSA growth 80-90 & density
Density of urban area per sq mile
PMSA growth 80 - 90
population per sq. mile (thousands)
0.5
0.4
0.3
0.2
0.1
0
-0.1
1
2
3
4
5
6
aus
pho
sac
sad
atl
dal
fre
jac
tuc
sea
elp
nrf
hou
tac
san
dc
cha
mia
la
nas
min
sj
alb
POR
den
okl
col
wic
kan
hon
tul
mem
bal
sf
spo
oma
cin
bos
stl
phi
ny
mil
chi
tol
nor
det
cle
pit

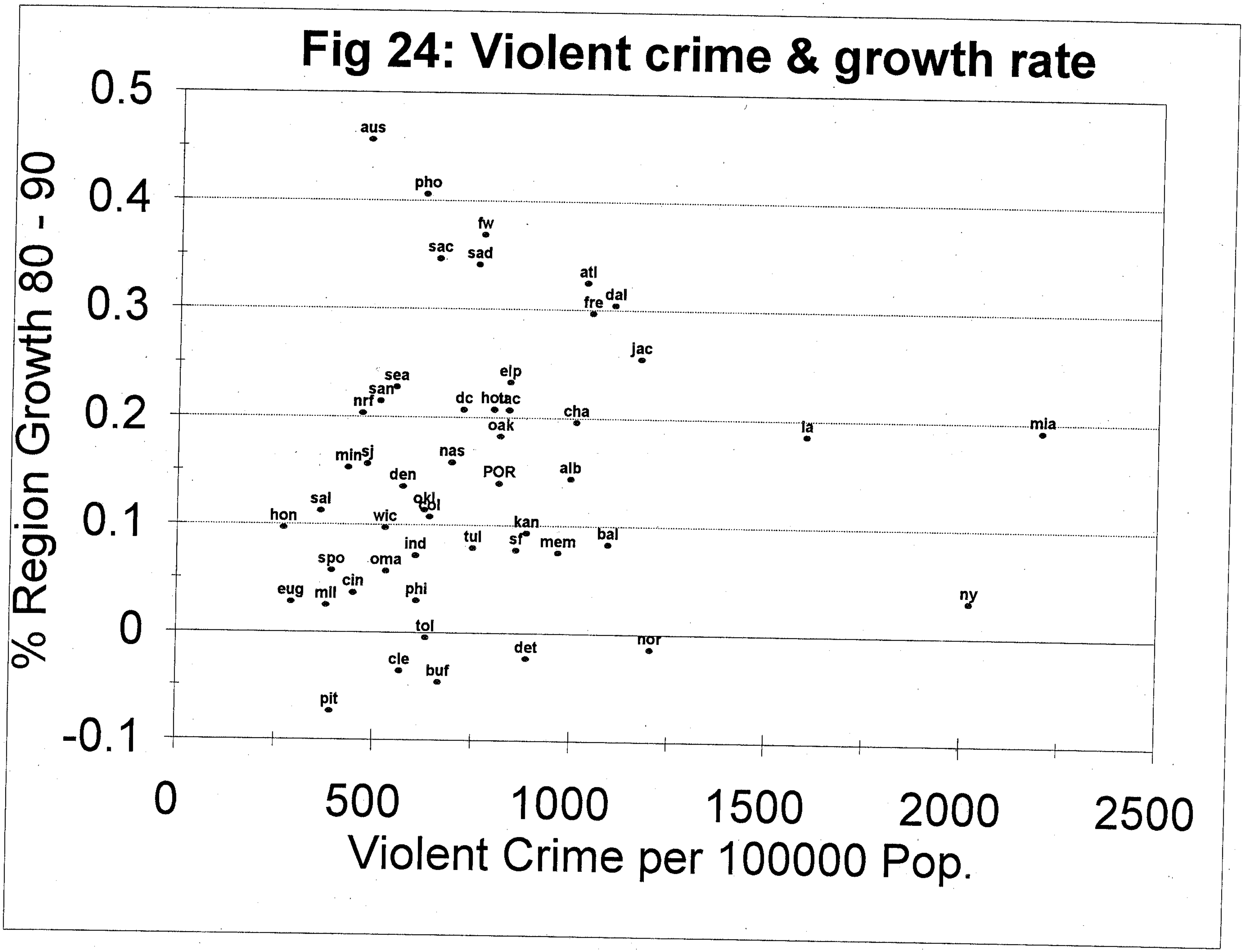
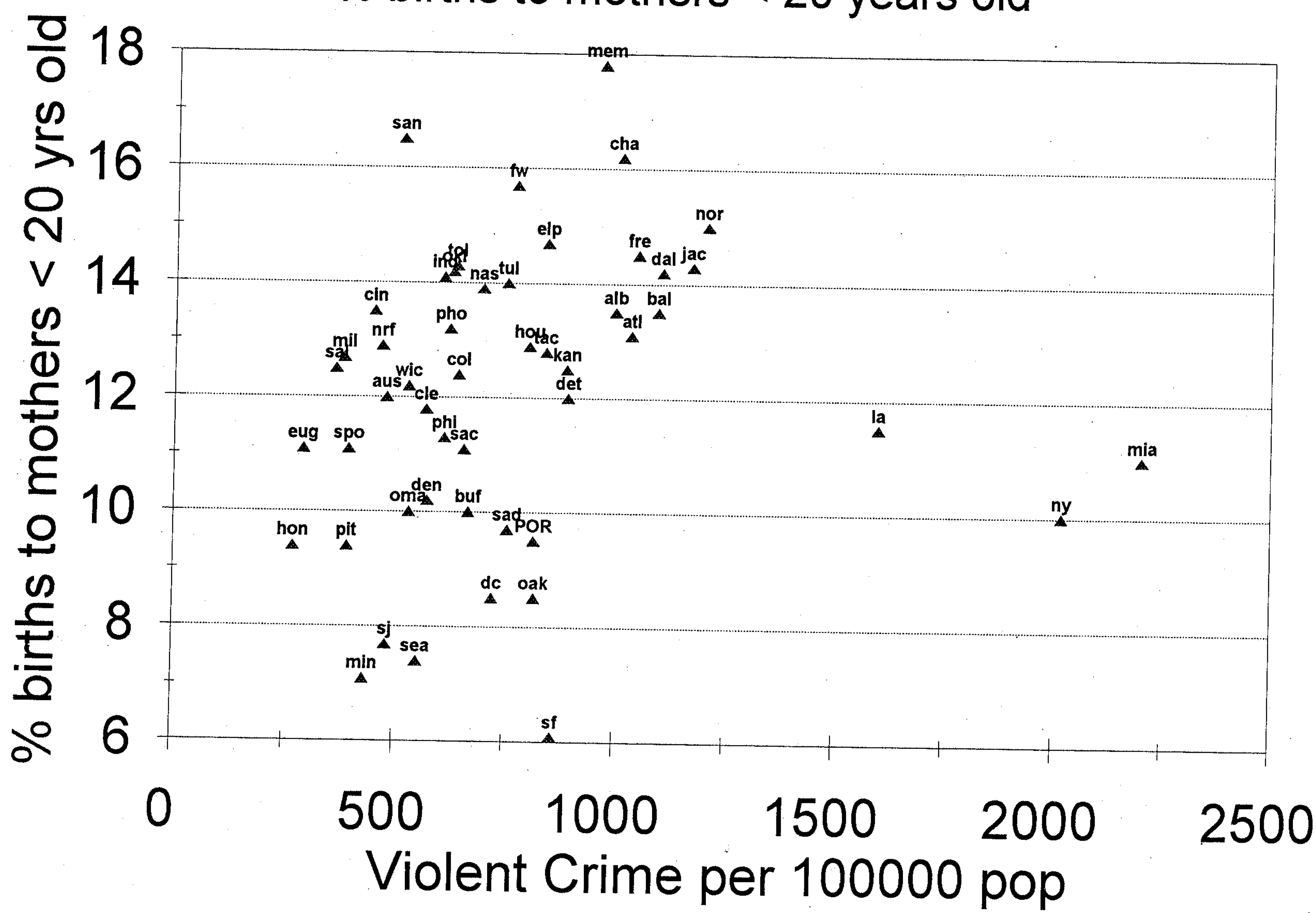


Fig 24: Violent crime & growth rate
% Region Growth 80 - 90
Violent Crime per 100000 Pop.
0.5
0.4
0.3
0.2
0.1
0
-0.1
0
500
1000
1500
2000
2500
aus
pho
fw
sac
sad
atl
dal
fre
jac
sea
san
nrf
elp
dc
hou
tac
oak
cha
la
mia
min
sj
nas
den
POR
alb
sal
hon
okl
col
wic
kan
tul
sf
mem
bal
ind
spo
oma
cin
eug
mil
phi
ny
tol
nor
det
cle
buf
pit

Fig 24A: Violent crime & social stress

% births to mothers < 20 years old



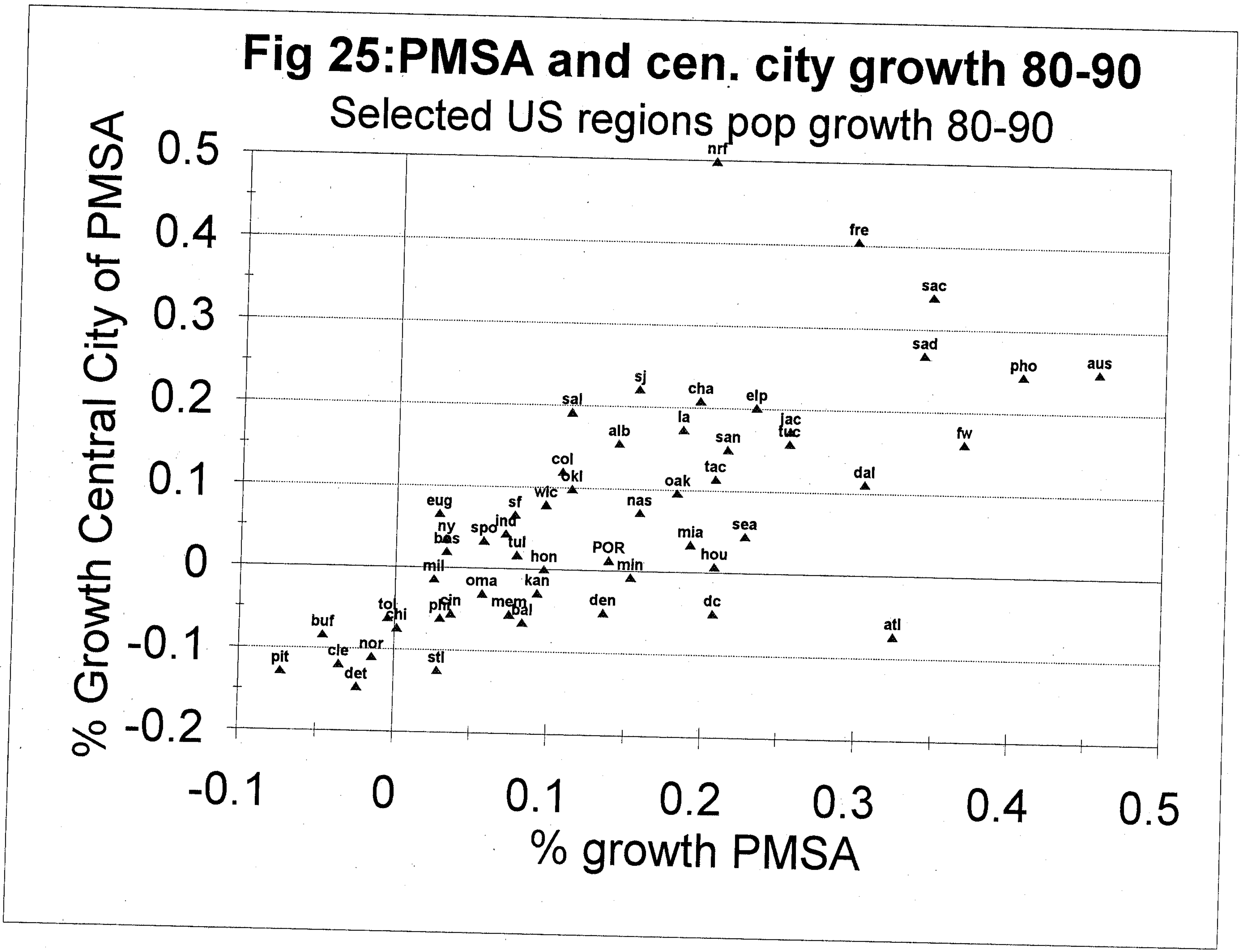


Fig 25:PMSA and cen. city growth 80-90
Selected US regions pop growth 80-90
% Growth Central City of PMSA
% growth PMSA
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
nrf
fre
sac
sad
pho
aus
sj
cha
elp
sal
la
jac
tuc
alb
san
fw
col
tac
okl
oak
dal
wic
eug
sf
nas
ind
spo
ny
bos
tul
sea
mia
POR
hon
hou
mil
min
oma
kan
tol
chi
cin
phi
mem
bal
den
dc
buf
atl
nor
cle
pit
stl
det

Fig 26:Central city growth/house price

Growth 80-90 & PMSA median price(89)

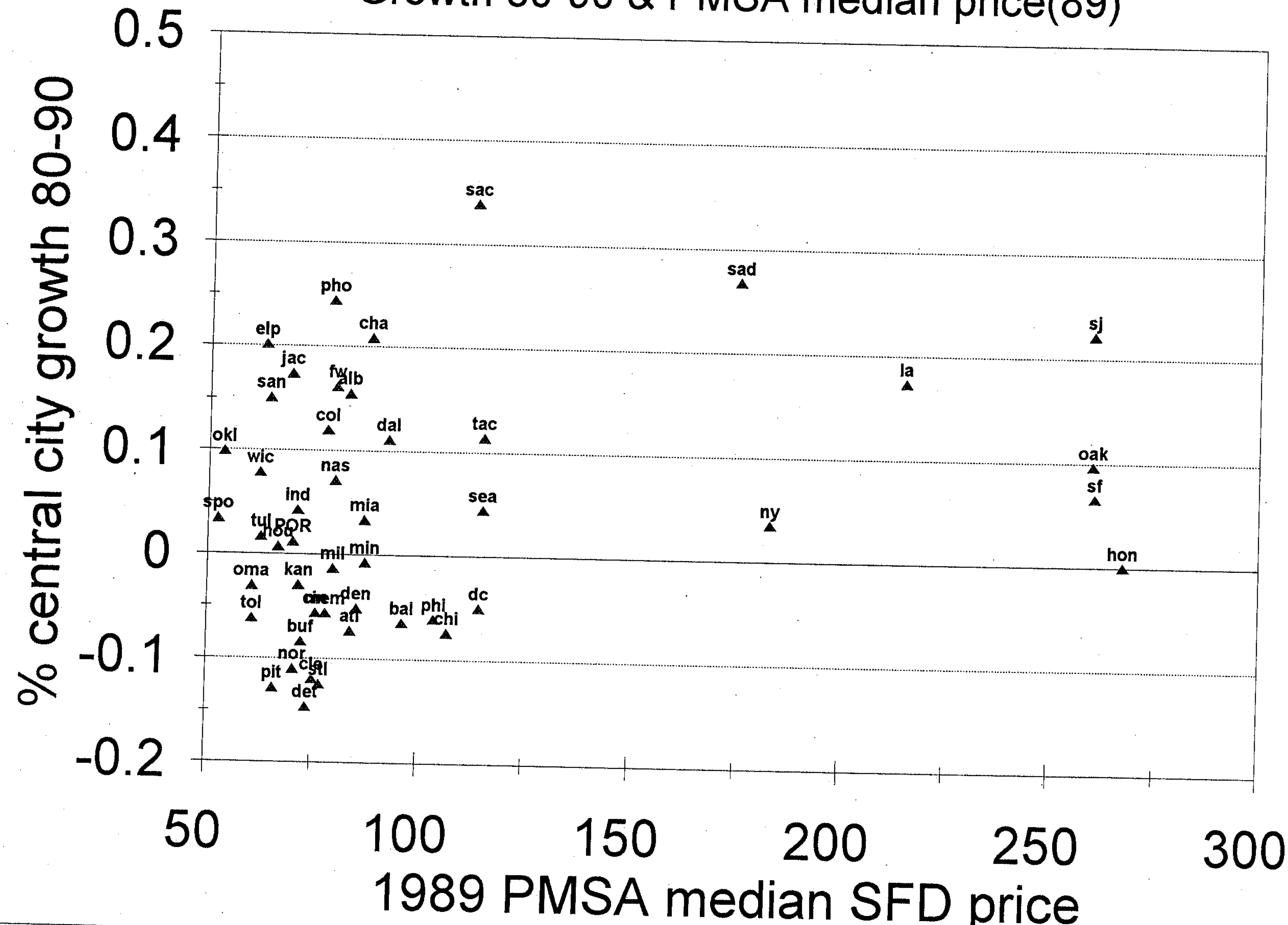
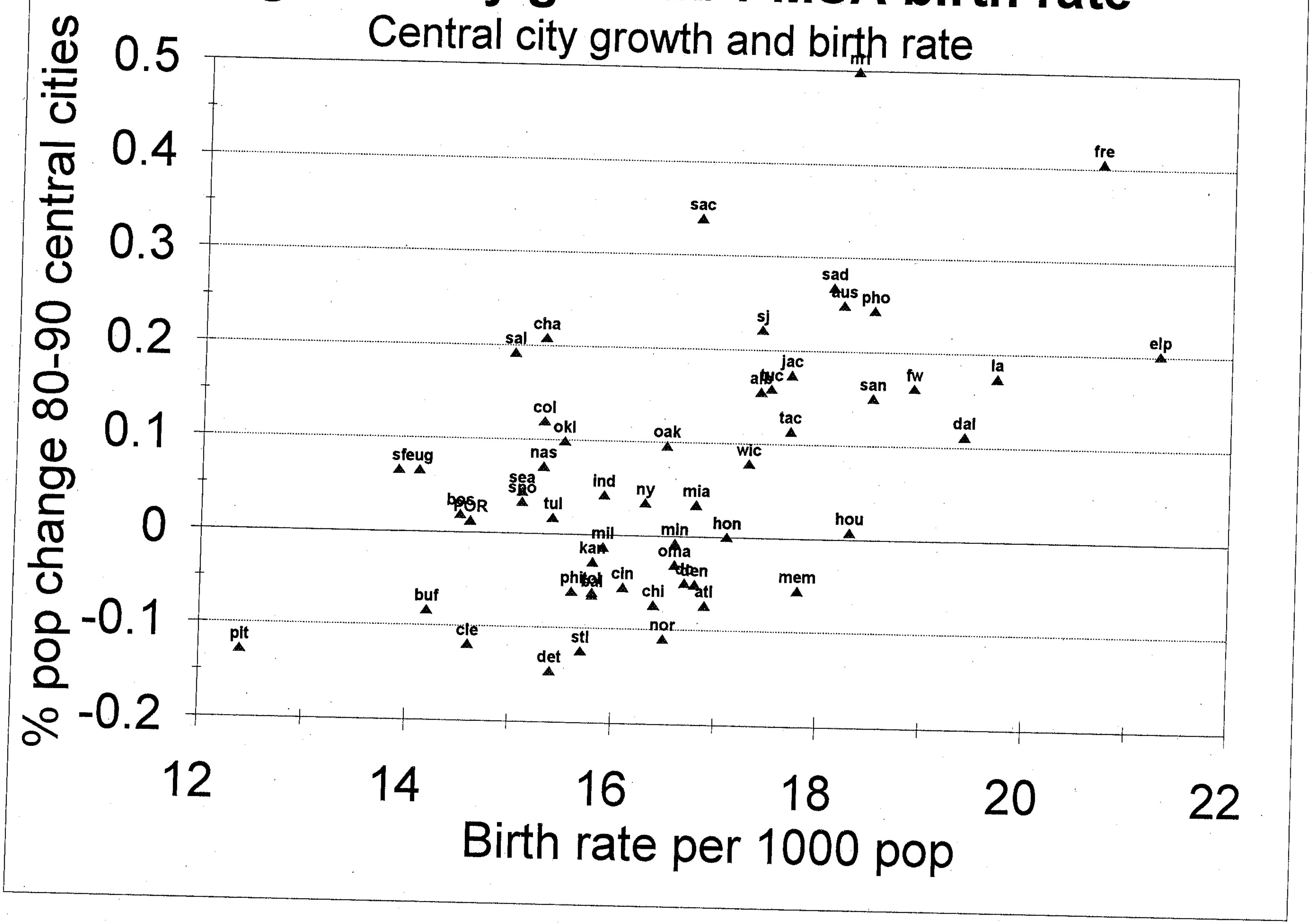


Fig 27: City growth/ PMSA birth rate



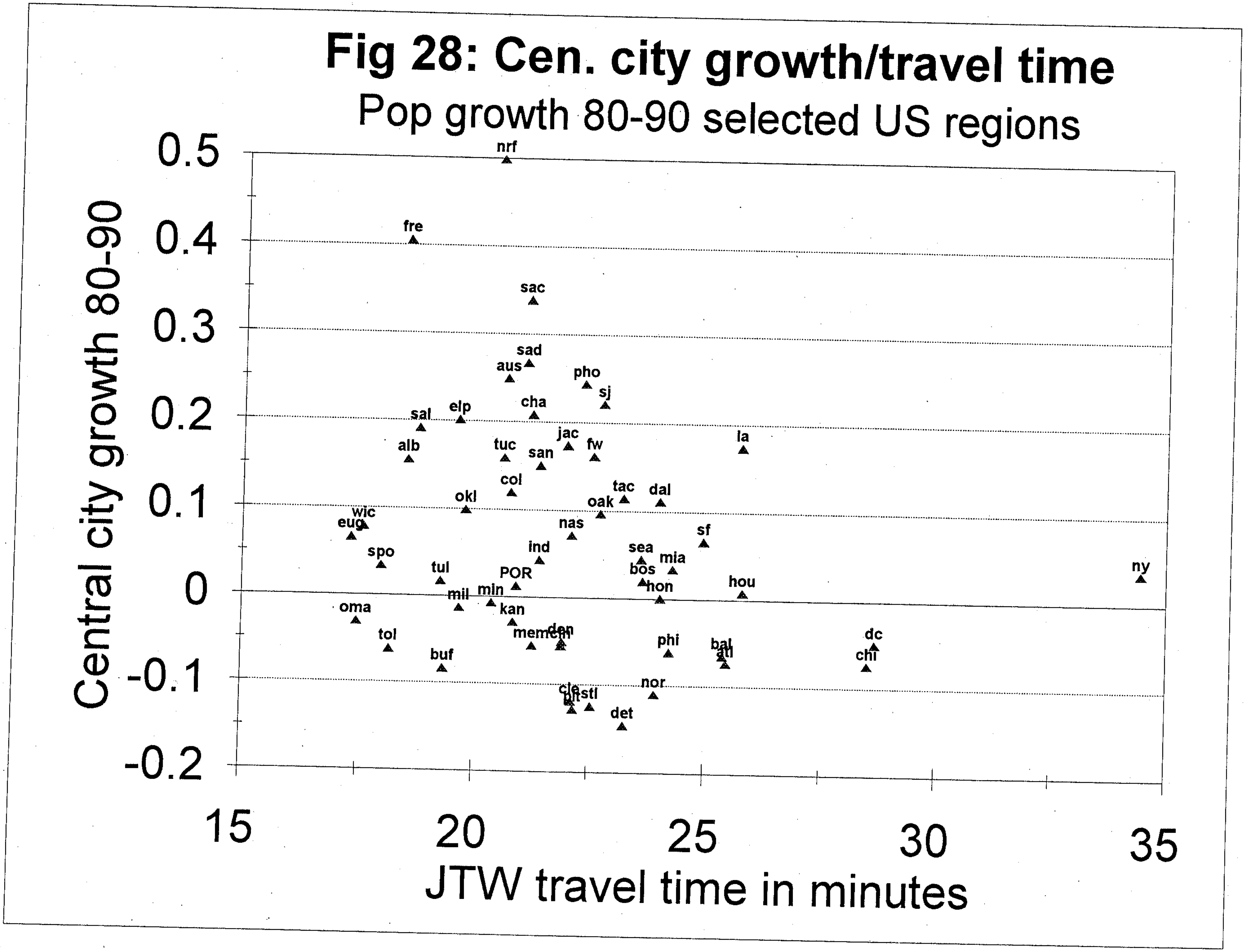
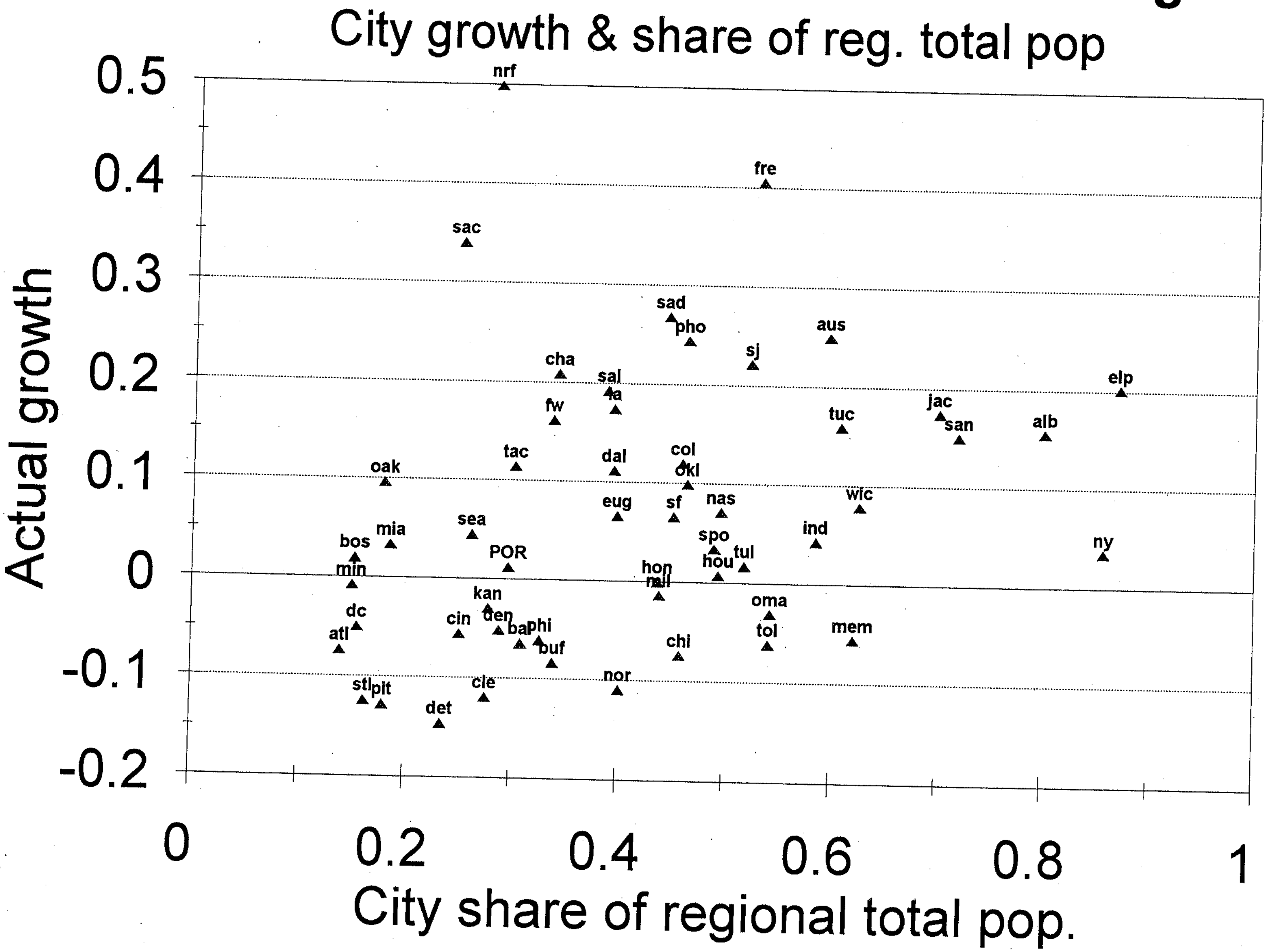


Fig 28: Cen. city growth/travel time
Pop growth 80-90 selected US regions

Fig 29: Cen. city growth/share of reg.



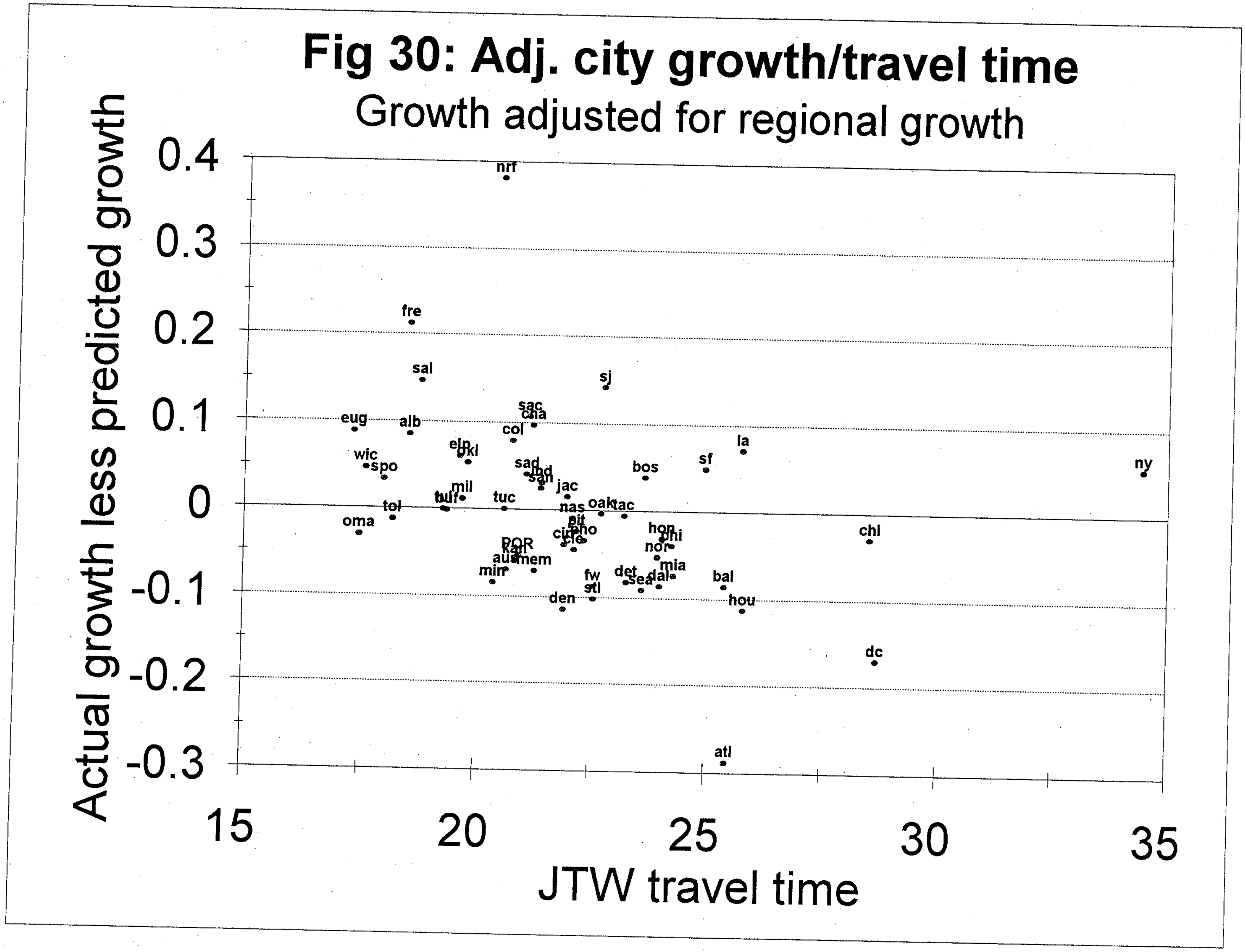


Fig 30: Adj. city growth/travel time
Growth adjusted for regional growth
Actual growth less predicted growth
JTW travel time
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
15
20
25
30
35
nrf
fre
sal
sj
sac
cha
eug
alb
col
la
elp
okl
wic
spo
sf
ny
sad
ind
san
bos
jac
mil
tuc
tol
oak
tac
nas
oma
pit
pho
hon
phi
chi
cin
cle
nor
POR
kan
aus
mem
mia
min
fw
det
sea
dal
bal
stl
den
hou
dc
atl

WELL . . . SO WHAT?

Low-fat diets and descriptive statistics share a profound sense of incompleteness once we have finished. We do not except the present exercise and indeed feel compelled at least to offer up a few tidbits of summary. Here we run the risk of being more conclusive than our humble data merit. However, humble data generally support alternative conclusions as well. Readers are welcome to make their own interpretations.

The data in these figures leave us with the following general impressions and substantive conclusions:

1. The Metro region is really average. In almost every comparison (except VMT and percent births under 20), Metro is almost in the middle. Though the local media characterize us as varying between ecotopia and "tax hell," what we are in reality is just "regular people"; pretty much the Ozzie and Harriet of U.S. regions.

2. In terms of moving toward the objectives of reduced VMT, less reliance on the auto and reduced infrastructure costs, increasing density seems to be the key. In general, emphasis on transportation investment will move us in a direction opposite our objectives.

3. By the same token, the data suggest a public welfare tradeoff for increased density, reduced VMT and higher nonauto travel. The downside of pursuing such objectives appears to be higher housing prices and reduced housing output.

4. Objectives couched in terms of "congestion relief" or transportation cost savings have no meaning outside a land-use context. The impacts of transportation investment show up elsewhere; in terms of land supply, real estate output levels, urban population, employment densities and income levels. In a statistical sense, we have substantial evidence to regard travel time as roughly a constant in the household time budget. Reducing travel time allows us to be more competitive over a larger regional activity space.

5. Regional growth is consistently associated with birth rates. There is little or no correlation between regional growth, density, road miles, housing price and income.

6. Central city growth depends heavily on regional growth. After we account for regional growth, it appears that central city growth is also negatively impacted by increasing travel time. There is a tendency under conditions of increasing travel time, for regions to "disassociate," forming multiple economic centers rather than a dominant CBD.

In conclusion, we reiterate that we intend the data to be mainly descriptive in nature with the reader left to interpret results and make conclusions. We expect that the data allow a much wider range of conclusions than those we have suggested above.

Supplemental Graphs

(Figures 31 - 34)

Fig 31: region growth & road miles

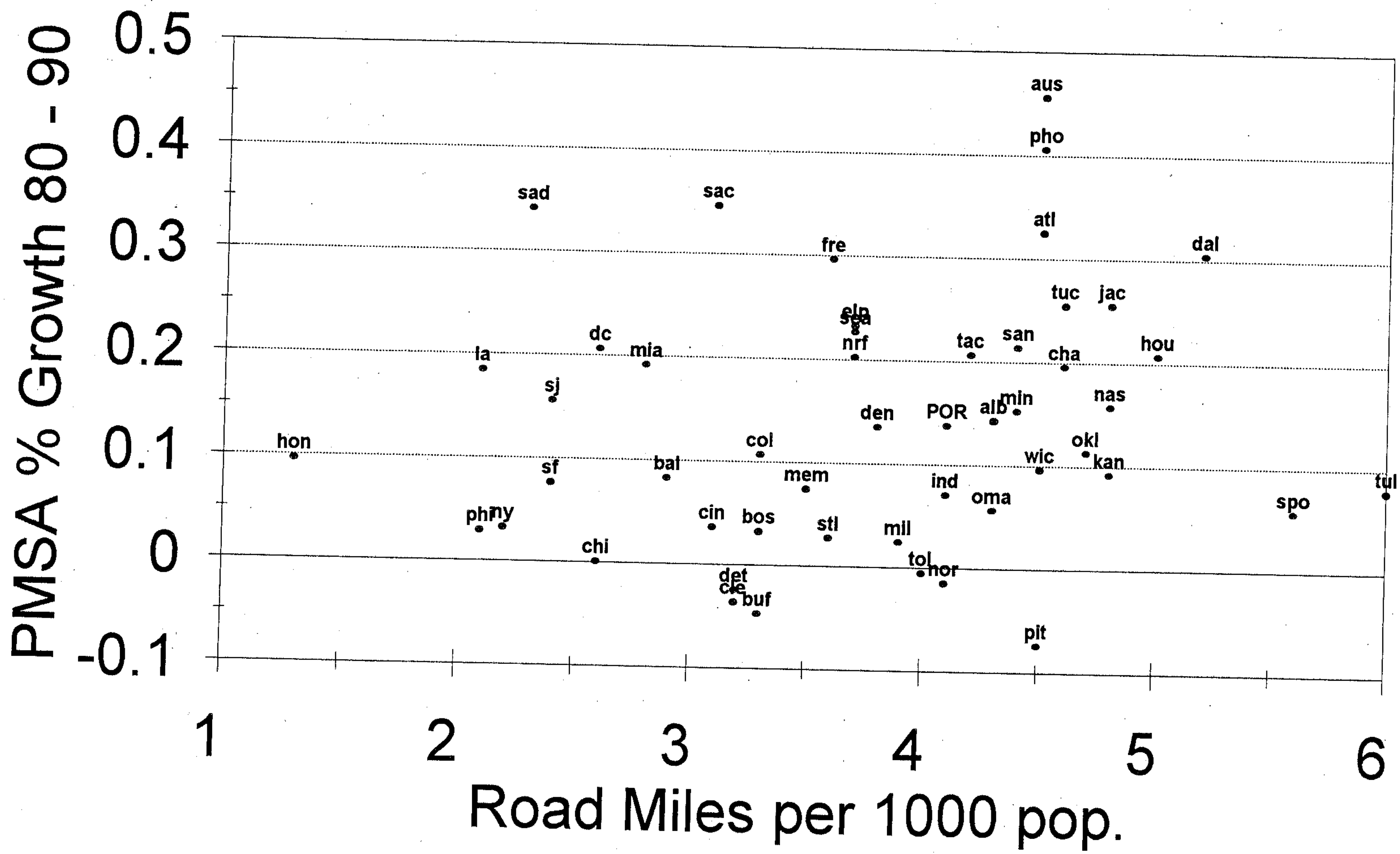


Fig 32: income and road miles

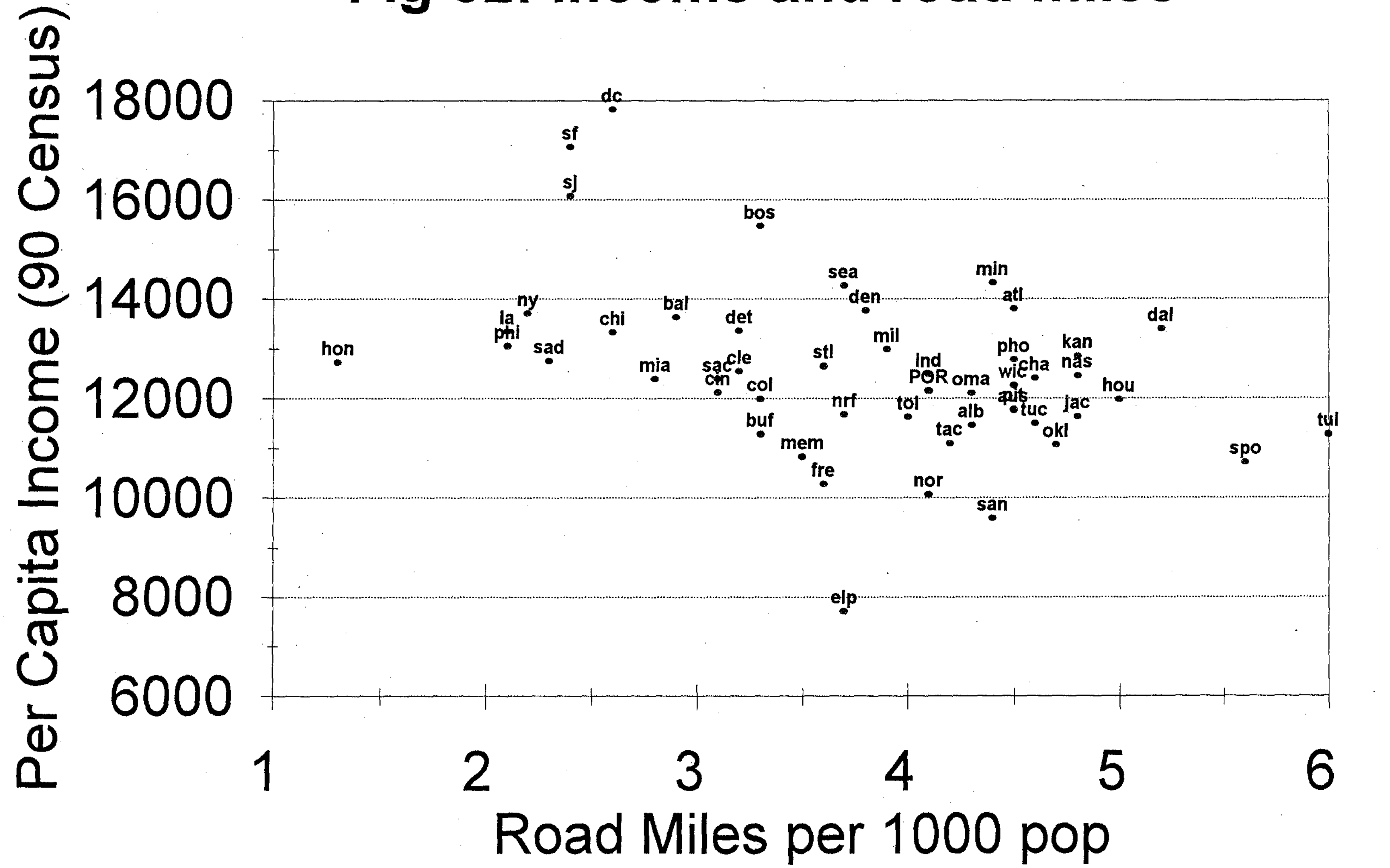


Fig 33: Income and VMT per capita

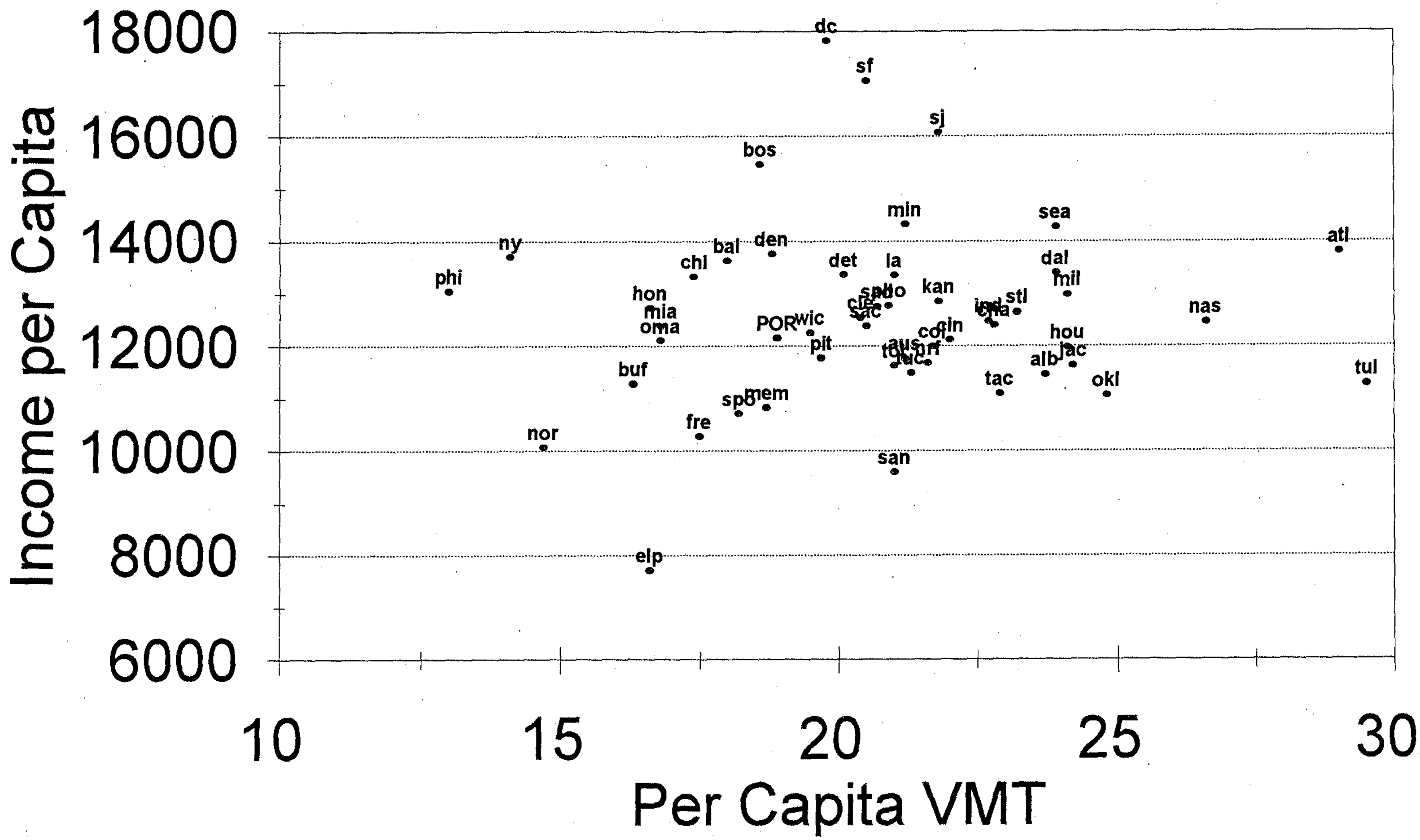
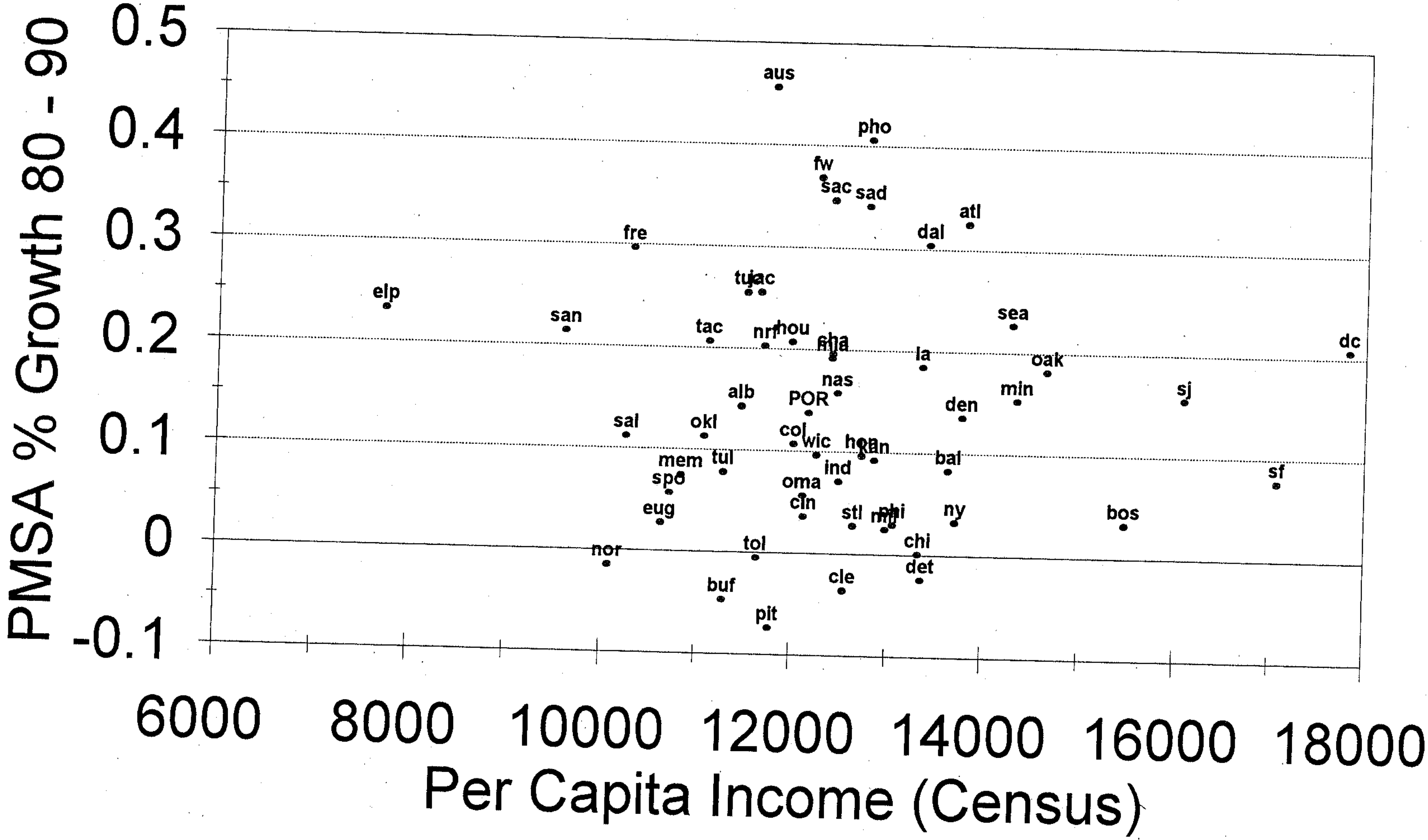


Fig 34: Region growth & income



Raw Data

Exhibit AA: National Data on Central Cities, Central Counties and PMSA/MSA's

Area	Central City Pop 1990	Central City Pop 1980	Size in Sq. Miles	Pmsa/msa size sq. miles	Pmsa/msa 90 po	Pmsa/msa 80 po	Central County pop - 90	Central County pop - 80	Central County pop - 70	County size in miles
Albuquerque	384736	332920	132.2	1166.2	480577	420262	480577	420262	315774	1166.2
Atlanta	394017	425022	131.8	5121.5	2833511	2138143	648951	589904	605210	528.7
Austin	465622	372536	217.8	2791.7	781572	536688	576407	419573	295516	989.4
Baltimore	736014	786741	80.8	2609.3	2382172	2199497	736014	786741	905787	80.8
Boston	574283	562994	48.4	2440.3	3783817	3662888	663906	650142	735190	58.5
Buffalo	328123	357870	40.6	1044.7	968532	1015472	968532	1015472	1113491	1044.7
Charlotte	395934	327448	174.3	3378.6	1162093	971447	511433	404270	354656	527.4
Chicago	2783726	3005072	227.2	1884.3	6069974	6060401	5105067	5253628	5493766	945.7
Cincinnati	364040	385410	77.2	2125	1452645	1401471	866228	873203	925944	407.4
Cleveland	505616	573822	77	1512.2	1831122	1898825	1412140	1498400	1720835	458.3
Columbus	632910	565021	190.9	3578.9	1377419	1243827	961437	869126	833249	540
Dallas	1006877	905751	342.4	4471	2553362	1957430	1852810	1556419	1327695	879.9
Fort Worth	447619	385164	281.1	2496.5	1332053	973138	1170103	860880	715587	863.5
Denver	467610	492694	153.3	3760.9	1622980	1428836	467610	492686	514678	153.3
Detroit	1027974	1203369	138.7	4465.6	4382299	4488024	2111687	2337843	2670368	614.1
El Paso	515342	428770	245.4	1013.1	591610	479899	591610	479899	359291	1013.1
Eugene	112669	105662	38	4554.2	282912	275226	282912	275226	215401	4554.2
Fresno	354202	252031	99.1	5963.2	667490	514621	667490	514621	413329	5963.2
Honolulu	365272	365058	82.8	600.2	836231	762565	836231	762565	630528	600.2
Houston	1630553	1617966	539.9	5321.8	3301937	2734617	2818199	2409547	1741912	1729
Indianapolis	731327	700974	361.7	3071.2	1249822	1166575	797159	765233	793769	396.4
Jacksonville	635230	540920	758.7	2635.7	906727	722252	672971	571003	528865	773.9
Kansas City	435146	448031	311.5	4987.9	1566280	1433464	633232	629266	654178	604.8
Los Angeles	3485398	2968528	469.3	4060	8863164	7477239	8863164	7477239	7041980	4060
Memphis	610337	646170	256	2303	981747	913472	826330	777113	722111	754.9
Miami	358548	346681	35.6	1944.5	1937094	1625509	1937094	1625509	1267792	1944.5
Milwaukee	628088	636298	96.1	1460	1432149	1397020	959275	964988	1054249	241.6
Minneapolis	368383	370951	54.9	5041.4	2464124	2137133	1032431	941411	960080	556.6
Nashville	488374	455651	473.3	4073.1	985026	850505	510784	477811	447877	502.3
New Orleans	496938	557927	180.7	2308.8	1238816	1256668	496938	557927	593471	180.7
New York	7322564	7071639	309	1147.6	8546846	8274961	8546846	8274961	9176568	1147.6
Virginia Beach	393069	262199	248.3	1685.4	1396107	1160311	393069	262199	172106	248.3
Oklahoma City	444719	404551	608.2	4247.4	958839	860969	599611	568933	527717	709.2
Omaha	335795	346238	100.7	1916.5	618262	585122	416444	397038	389455	331
Philadelphia	1585577	1688210	135.1	3518.1	4856881	4716559	1585577	1688210	1949996	135.1
Phoenix	983403	790183	419.9	9204.1	2122101	1509175	2122101	1509175	971228	9204.1
Pittsburg	369879	423960	55.6	3400	2056705	2218870	1336449	1450195	1605133	730.2
Portland	437319	431747	124.7	4370.9	1477895	1297977	583887	562647	554668	435.3
Sacramento	369365	275741	96.3	5094	1481102	1099814	1041219	783381	634373	965.7
Salem	107786	90402	41.5	1926.1	278024	249895	228483	204692	151309	1185
San Antonio	935933	813118	333	2519.6	1302099	1072125	1185394	988971	830460	1246.9
San Diego	1110549	875538	324	4204.5	2498016	1861846	2498016	1861846	1357854	4204.5
San Francisco	723959	678974	46.7	1015.6	1603678	1488895	723959	678974	715674	46.7
San Jose	782248	640225	171.3	1291.2	1497577	1295071	1497577	1295071	1065313	1291.2
Oakland	372242	339337	56.1	1457.8	2082914	1761710	1279182	1105379	1071446	737.5
Seattle	516259	493846	83.9	4216.3	1972961	1607618	1507319	1269898	1159369	2126.1
St. Louis	396685	452804	61.9	5330.8	2444099	2376971	396685	452801	622236	61.9
Tacoma	176664	158501	48.1	1675.6	586203	485667	586203	485667	412344	1675.6
Spokane	177196	171300	55.9	1763.8	361364	341835	361364	341835	287487	1763.8
Toledo	332943	354635	80.6	1364.6	614128	616864	462361	471741	483551	340.4
Tucson	405390	349698	156.3	9187	666880	531443	666880	531443	351667	9187
Tulsa	367302	360919	183.5	5014.9	708954	657173	503341	470593	399982	570.3
Wash DC	606900	638432	61.4	3966.7	3923574	3250921	606900	638432	756668	61.4
Wichita	304011	281747	115.1	2967.6	485270	442401	403662	367088	350694	1000.3

Exhibit AA: National Data on Central Cities, Central Counties and PMSA/MSA's

Area	metro infant death rate Pmsa/msa	metro fed income transfers per cap Pmsa/msa	Central City Pop density 90 per Sq. mile	Central City Pop density 80 per Sq. mile	Central County pop density 90	Central County pop density 80	Central County pop density 70	central city size as percent of Central County	Central City 90 pop as percent of Pmsa pop	Central County 9 pop as percent of Pmsa pop	Central City 90 pop as percent of Central Count pop	Central City pop growth %80 -90	Central County pop growth %80 - 90	Pmsa/msa pop growth %80 - 90	Personal income central city as % of Pmsa
Albuquerque	8.4	1826	2910.3	2518.3	412.1	360.4	270.8	11.34%	80.06%	100.00%	80.06%	15.56%	14.35%	14.35%	104.58%
Atlanta	11.7	1211	2989.5	3224.7	1227.4	1115.8	1144.7	24.93%	13.91%	22.90%	60.72%	-7.29%	10.01%	32.52%	84.67%
Austin	7.3	1253	2137.8	1710.4	582.6	424.1	298.7	22.01%	59.58%	73.75%	80.78%	24.99%	37.38%	45.63%	100.82%
Baltimore	12.6	1861	9109.1	9736.9	9109.1	9736.9	11210.2	100.00%	30.90%	30.90%	100.00%	-6.45%	-6.45%	8.31%	73.22%
Boston	7.2	1765	11865.4	11632.1	11348.8	11113.5	12567.4	82.74%	15.18%	17.55%	86.50%	2.01%	2.12%	3.30%	83.91%
Buffalo	11.5	2121	8081.8	8814.5	927.1	972.0	1065.8	3.89%	33.88%	100.00%	33.88%	-8.31%	-4.62%	-4.62%	82.85%
Charlotte	12.8	1364	2271.6	1878.6	969.7	766.5	672.5	33.05%	34.07%	44.01%	77.42%	20.92%	26.51%	19.62%	112.61%
Chicago	13	1656	12252.3	13226.5	5398.2	5555.3	5809.2	24.02%	45.86%	84.10%	54.53%	-7.37%	-2.83%	0.16%	81.02%
Cincinnati	9.1	1642	4715.5	4992.4	2126.2	2143.4	2272.8	18.95%	25.06%	59.63%	42.03%	-5.54%	-0.80%	3.65%	92.52%
Cleveland	10.7	1995	6566.4	7452.2	3081.3	3269.5	3754.8	16.80%	27.61%	77.12%	35.80%	-11.89%	-5.76%	-3.57%	69.20%
Columbus	8.8	1457	3315.4	2959.8	1780.4	1609.5	1543.1	35.35%	45.95%	69.80%	65.83%	12.02%	10.62%	10.74%	90.01%
Dallas	9.3	1161	2940.6	2645.3	2105.7	1768.9	1508.9	38.91%	39.43%	72.56%	54.34%	11.16%	19.04%	30.44%	100.68%
Fort Worth	9.7	1313	1592.4	1370.2	1355.1	997.0	828.7	32.55%	33.60%	87.84%	38.25%	16.22%	35.92%	36.88%	90.44%
Denver	10.4	1438	3050.3	3213.9	3050.3	3213.9	3357.3	100.00%	28.81%	28.81%	100.00%	-5.09%	-5.09%	13.59%	94.23%
Detroit	11.9	1783	7411.5	8676.1	3438.7	3806.9	4348.4	22.59%	23.46%	48.19%	48.68%	-14.58%	-9.67%	-2.36%	72.28%
El Paso	10	1548	2100.0	1747.2	584.0	473.7	354.6	24.22%	87.11%	100.00%	87.11%	20.19%	23.28%	23.28%	103.94%
Eugene	9.6	1771	2965.0	2780.6	62.1	60.4	47.3	0.83%	39.82%	100.00%	39.82%	6.63%	2.79%	2.79%	109.49%
Fresno	8.6	1408	3574.2	2543.2	111.9	86.3	69.3	1.66%	53.06%	100.00%	53.06%	40.54%	29.71%	29.71%	98.57%
Honolulu	9.6	1685	4411.5	4408.9	1393.3	1270.5	1050.5	13.80%	43.68%	100.00%	43.68%	0.06%	9.66%	9.66%	113.73%
Houston	9.4	1086	3020.1	2996.8	1630.0	1393.6	1007.5	31.23%	49.38%	85.35%	57.86%	0.78%	16.96%	20.75%	100.22%
Indianapolis	12.5	1585	2021.9	1938.0	2011.0	1930.5	2002.4	91.25%	58.51%	63.78%	91.74%	4.33%	4.17%	7.14%	96.97%
Jacksonville	10.9	1866	837.3	713.0	869.6	737.8	683.4	98.04%	70.06%	74.22%	94.39%	17.44%	17.86%	25.54%	98.92%
Kansas City	11.4	1618	1396.9	1438.3	1047.0	1040.5	1081.6	51.50%	27.78%	40.43%	68.72%	-2.88%	0.63%	9.27%	93.90%
Los Angeles	9.8	1408	7426.8	6325.4	2183.0	1841.7	1734.5	11.56%	39.32%	100.00%	39.32%	17.41%	18.54%	18.54%	101.76%
Memphis	15.3	1637	2384.1	2524.1	1094.6	1029.4	956.6	33.91%	62.17%	84.17%	73.86%	-5.55%	6.33%	7.47%	95.50%
Miami	10.3	1946	10071.6	9738.2	996.2	836.0	652.0	1.83%	18.51%	100.00%	18.51%	3.42%	19.17%	19.17%	79.27%
Milwaukee	9.5	1817	6535.8	6621.2	3970.5	3994.2	4363.6	39.78%	43.86%	66.98%	65.48%	-1.29%	-0.59%	2.51%	81.53%
Minneapolis	8.7	1316	6710.1	6756.8	1854.9	1691.4	1724.9	9.86%	14.95%	41.90%	35.68%	-0.69%	9.67%	15.30%	91.30%
Nashville	9.9	1445	1031.8	962.7	1016.9	951.2	891.7	94.23%	49.58%	51.85%	95.61%	7.18%	6.90%	15.82%	100.95%
New Orleans	12.3	1558	2750.1	3087.6	2750.1	3087.6	3284.3	100.00%	40.11%	40.11%	100.00%	-10.93%	-10.93%	-1.42%	92.63%
New York	12.1	1829	23697.6	22885.6	7447.6	7210.7	7996.3	26.93%	85.68%	100.00%	85.68%	3.55%	3.29%	3.29%	94.25%
Virginia Beach	13.1	1810	1583.0	1056.0	1583.0	1056.0	693.1	100.00%	28.15%	28.15%	100.00%	49.91%	49.91%	20.32%	112.39%
Oklahoma City	10.8	1728	731.2	665.2	845.5	802.2	744.1	85.76%	46.38%	62.54%	74.17%	9.93%	5.39%	11.37%	104.25%
Omaha	9.3	1649	3334.6	3438.3	1258.1	1199.5	1176.6	30.42%	54.31%	67.36%	80.63%	-3.02%	4.89%	5.66%	103.00%
Philadelphia	11.7	1975	11736.3	12496.0	11736.3	12496.0	14433.7	100.00%	32.65%	32.65%	100.00%	-6.08%	-6.08%	2.98%	76.56%
Phoenix	10	1736	2342.0	1881.8	230.6	164.0	105.5	4.56%	46.34%	100.00%	46.34%	24.45%	40.61%	40.61%	96.83%
Pittsburg	10	2357	6652.5	7625.2	1830.3	1986.0	2198.2	7.61%	17.98%	64.98%	27.68%	-12.76%	-7.84%	-7.31%	93.24%
Portland	10.4	1753	3507.0	3462.3	1341.3	1292.5	1274.2	28.65%	29.59%	39.51%	74.90%	1.29%	3.78%	13.86%	97.27%
Sacramento	9.9	1775	3835.6	2863.4	1078.2	811.2	656.9	9.97%	24.94%	70.30%	35.47%	33.95%	32.91%	34.67%	93.39%
Salem	11.3	1864	2597.3	2178.4	192.8	172.7	127.7	3.50%	38.77%	82.18%	47.17%	19.23%	11.62%	11.26%	105.75%
San Antonio	8.6	1946	2810.6	2441.8	950.7	793.1	666.0	26.71%	71.88%	91.04%	78.96%	15.10%	19.86%	21.45%	91.49%
San Diego	9.4	1795	3427.6	2702.3	594.1	442.8	323.0	7.71%	44.46%	100.00%	44.46%	26.84%	34.17%	34.17%	101.68%
San Francisco	6.7	1881	15502.3	14539.1	15502.3	14539.1	15324.9	100.00%	45.14%	45.14%	100.00%	6.63%	6.63%	7.71%	88.68%
San Jose	8.5	1192	4566.5	3737.4	1159.8	1003.0	825.1	13.27%	52.23%	100.00%	52.23%	22.18%	15.64%	15.64%	85.24%
Oakland	8.2	1607	6635.3	6048.8	1734.5	1498.8	1452.8	7.61%	17.87%	61.41%	29.10%	9.70%	15.72%	18.23%	83.38%
Seattle	9.6	1545	6153.3	5886.1	709.0	597.3	545.3	3.95%	26.17%	76.40%	34.25%	4.54%	18.70%	22.73%	101.09%
St. Louis	9.9	1825	6408.5	7315.1	6408.5	7315.0	10052.3	100.00%	16.23%	16.23%	100.00%	-12.39%	-12.39%	2.82%	76.79%
Tacoma	11.3	1898	3672.8	3295.2	349.8	289.8	246.1	2.87%	30.14%	100.00%	30.14%	11.46%	20.70%	20.70%	93.37%
Spokane	11.9	2002	3169.9	3064.4	204.9	193.8	163.0	3.17%	49.04%	100.00%	49.04%	3.44%	5.71%	5.71%	99.38%
Toledo	8.3	1740	4130.8	4399.9	1358.3	1385.8	1420.5	23.68%	54.21%	75.29%	72.01%	-6.12%	-1.99%	-0.44%	93.41%
Tucson	7.8	1998	2593.7	2237.4	72.6	57.8	38.3	1.70%	60.79%	100.00%	60.79%	15.93%	25.48%	25.48%	88.74%
Tulsa	8.8	1504	2001.6	1966.9	882.6	825.2	701.4	32.18%	51.81%	71.00%	72.97%	1.77%	6.96%	7.88%	113.74%
Wash DC	10.8	2035	9884.4	10397.9	9884.4	10397.9	12323.6	100.00%	15.47%	15.47%	100.00%	-4.94%	-4.94%	20.69%	82.93%
Wichita	9.8	1710	2641.3	2447.8	403.5	367.0	350.6	11.51%	62.65%	83.18%	75.31%	7.90%	9.96%	9.69%	101.82%

Exhibit AA: National Data on Central Cities, Central Counties and PMSA/MSA's

Area	Pmsa hse prc 8	Pmsa hse prc 8	Pmsa hse prce	pmsa inc	Central city inc	1987 birth rate Central county	1987 birth rate Pmsa/msa		1987 birth % mother > 20 yrs Central County	1987 birth % mother > 20 yrs Pmsa/msa	Hse stock new 80-89 % of 80 to Central County	Hse stock new 80-89 % of 80 to Pmsa/msa	Fed funds & gra per cap 1989 Central County	Fed funds & gra per cap 1989 Pmsa/msa	violent metro crime rate Pmsa/msa
Albuquerque	83	80.4	76.8	11463	11988	17.4	17.4	-525	13.5	13.5	24.7	24.7	6831	6831	997
Atlanta	84			13806	11689	17.6	16.9	2117	16.6	13.1	27.3	47.9	4872	2703	1034
Austin				11764	11860	18.5	18.2	-96	12.2	12	56	52.7	4734	4064	478
Baltimore	96.3	88.7	72.6	13642	9989	18	15.8	3653	22.9	13.5	2.6	18.6	5782	4338	1096
Boston				15474	12984	16	14.5	2490	11.7	7.2	5.7	10.3	6465	4784	
Buffalo	72.5	65.6	46.7	11290	9354	14.2	14.2	1936	10	10	5.1	5.1	3225	3225	666
Charlotte	88.1		69.4	12406	13970	16.6	15.3	-1564	14	16.2	44.9	30.7	2089	1937	1010
Chicago	107	98.9	81.1	13338	10806	16.7	16.4	2532	13.9	12.2	5.8	9.6	2814	2551	
Cincinnati	75.8	69.7	60.2	12130	11223	16.1	16.1	907	13.8	13.5	8.1	12.2	5411	4061	449
Cleveland	75.2	69.2	64.4	12557	8690	14.8	14.6	3867	13.3	11.8	4.7	6.4	3634	3187	568
Columbus	77.9	72.6	62.2	12011	10811	16.1	15.3	1200	12.4	12.4	20.2	17.8	3363	3196	641
Dallas	92.4	89	94	13398	13489	19.6	19.4	-91	15.6	14.2	40	41.6	2906	2762	1105
Fort Worth	79.9	73.3		12254	11082	19.4	18.9	1172	13.7	15.7	47.5	43.7	5577	5076	769
Denver	85.5	81.8	84.3	13775	12980	17.7	16.8	795	14.4	10.2	9	26.2	8997	4528	571
Detroit	73.7	73.1	51.7	13367	9662	16.6	15.4	3705	16	12	3.2	9.1	3074	2673	891
El Paso	63.1	59.6	57.6	7723	8027	21.3	21.3	-304	14.7	14.7	23.3	23.3	3468	3468	841
Eugene				10627	11636	14.1	14.1	-1009	11.1	11.1	6.1	6.1	2503	2503	291
Fresno				10298	10151	20.7	20.7	147	14.5	14.5	26	26	2331	2331	1048
Honolulu	267.6	215.1		12734	14483	17.1	17.1	-1749	9.4	9.4	14.1	14.1	5706	5706	271
Houston	66.7	61.8	78.6	11981	12007	18.4	18.3	-26	13.1	12.9	26.4	25.2	2344	2223	801
Indianapolis	71.2	66.1	55	12490	12111	17	15.9	379	16	14.1	15.6	17.2	4263	3314	606
Jacksonville	69.3	67.7	58.4	11640	11514	18.7	17.7	126	14.4	14.3	28.9	35.5	4406	3929	1173
Kansas City	71.6	70.5	61.4	12861	12077	16.6	15.8	784	15.2	12.5	15.3	18.4	4764	3423	887
Los Angeles	215.5	179.4	125.2	13357	13592	19.7	19.7	-235	11.5	11.5	14.3	14.3	3498	3498	1601
Memphis	78.1	76.3	64.6	10834	10347	18.1	17.8	487	17.4	17.8	18.9	19.5	3242	3040	968
Miami	86.9	82.9	80.5	12401	9830	16.8	16.8	2571	11	11	23.7	23.7	2965	2965	2204
Milwaukee	79.6	74.5	67.5	12992	10593	17.3	15.9	2399	15.7	12.7	5	9.2	3343	2817	381
Minneapolis	87.2	85.2	75.2	14340	13092	16	16.6	1248	7.4	7.1	18.5	23.6	3684	3068	432
Nashville	79.9	77.6	66.1	12465	12583	16.1	15.3	-118	13.9	13.9	28.8	31.3	2631	2196	695
New Orleans	70.6	73.1		10083	9340	17.4	16.5	743	18.7	15	6.4	13.4	5988	3691	1207
New York	183.2	183.8	134	13714	12926	16.3	16.3	788	10	10	4.4	4.4	3456	3456	2021
Virginia Beach				11692	13141	19.4	18.3	-1449	8.6	12.9	61	27.8	3991	6926	467
Oklahoma City	53.5	56.2	64.7	11076	11547	16.3	15.5	-471	15.3	14.2	24.3	22.2	4459	3709	626
Omaha	60.6	59.5	58.3	12117	12480	16.8	16.6	-363	10.8	10	11.8	13.1	3044	3485	531
Philadelphia	103.9	102.4	74	13064	10002	17.2	15.6	3062	17.1	11.3	2.2	10	4931	3566	609
Phoenix	78.8	80	74.8	12780	12375	18.5	18.5	405	13.2	13.2	54	54	3273	3273	620
Pittsburg	65.8	63.2		11785	10988	13	12.4	797	8.7	9.4	5.4	5.6	3986	3586	392
Portland	70.1	64.4	61.5	12162	11830	15.1	14.6	332	10.5	9.5	6.8	15.6	3790	2804	816
Sacramento	112.6	95.8	77.9	12399	11580	17.7	16.8	819	11.9	11.1	30.5	32.1	6940	5592	656
Salem				10255	10845	15.3	15	-590	12.9	12.5	11.7	10.6	3770	3669	363
San Antonio	64.2	65	67.7	9596	8779	18.8	18.5	817	16.6	16.5	23.7	23.9	4386	4221	512
San Diego	175.3	147.8	107.4	12764	12978	18.1	18.1	-214	9.7	9.7	33.9	33.9	4865	4865	756
San Francisco	260.6	212.8	145.1	17069	15137	13.2	13.9	1932	7.6	6.1	4.8	7.1	4888	3570	861
San Jose	260.2	212.6		16086	13711	17.4	17.4	2375	7.7	7.7	13.8	13.8	5146	5146	481
Oakland	260.2	212.8		14649	12215	17.2	16.5	2434	8.7	8.5	14.8	19.6	4328	3600	818
Seattle	115	88.7		14283	14438	14.6	15.1	-155	6.8	7.4	26.3	28.1	4414	3886	551
St. Louis	76.9	78.1	65.7	12655	9718	19.4	15.7	2937	20.7	12.7	2.6	13.7	20111	5236	
Tacoma	115	88.7		11103	10367	17.7	17.7	736	12.8	12.8	21.7	21.7	4403	4403	840
Spokane	52.4	51.1		10718	10652	15.1	15.1	66	11.1	11.1	10.4	10.4	3239	3239	393
Toledo	60.8	58.4	51.9	11639	10872	16.4	15.8	767	15.5	14.3	5.3	8.7	2544	2359	634
Tucson				11499	10204	17.5	17.5	1295	12.6	12.6	35.7	35.7	4830	4830	
Tulsa	62.6	65	66.7	11279	12829	16.3	15.4	-1550	13.1	14	21.3	17.4	2458	2245	751
Wash DC	114.4	132.5	97.1	17820	14778	16.4	16.7	3042	16.3	8.5	3	26	23640	9815	722
Wichita	62	60.1		12260	12483	18.5	17.3	-223	12.6	12.2	17.1	15.5	4324	3980	527

Exhibit BB: National Data on Central Cities, Central Counties and PMSA/MSA's

Region	PMSA pop 1990	JTW drove alone	JTW carpool	JTW bus	JTW streetcar	JTW subway	JTW railroad	JTW ferryboat	JTW taxicab	JTW motorcycle	JTW bicycle	JTW walk	JTW other	JTW at home
Albuquerque, NM MSA	480577	177602	29245	3905	7	4	0	11	54	1351	2387	6257	1357	6775
Atlanta, GA MSA	2833511	1155206	188844	52024	447	14645	842	45	1819	1695	1296	21537	10160	33221
Austin, TX MSA	781572	304416	56224	12913	26	6	21	21	628	1725	2166	11564	2382	11924
Baltimore, MD MSA	2382172	844766	169695	73739	848	9654	3808	38	3089	1556	1828	48225	7291	27276
Boston--Lawrence--Salem, MA--NH CMSA	4171643	1501235	220185	87019	17242	90203	27012	1821	4651	1473	9148	117082	10954	53692
Buffalo, NY PMSA	968532	330113	49174	20337	143	2025	32	8	626	192	905	18995	2281	8052
Charlotte--Gastonia--Rock Hill, NC--SC M	1162093	476376	87667	10195	56	38	8	42	847	586	809	12491	4351	11390
Chicago, IL PMSA	6069974	1844295	347379	250437	3344	117189	111993	98	9769	1422	6674	121565	16614	58005
Cincinnati, OH--KY--IN PMSA	1452645	532900	78948	27920	106	60	38	19	776	460	533	18768	3148	14445
Cleveland, OH PMSA	1831122	640252	86436	45397	1720	2899	488	28	588	386	922	24147	4014	16407
Columbus, OH MSA	1377419	538995	77347	17847	78	63	17	0	582	588	1616	22033	3064	15629
Dallas, TX PMSA	2553362	1017804	183209	40375	214	94	24	37	1496	2094	1781	25486	8907	30652
Fort Worth--Arlington, TX PMSA	1332053	537800	89828	3830	26	53	8	7	340	1718	875	11288	4196	14464
Denver, CO PMSA	1622980	636981	106037	36020	87	86	47	12	486	1499	3378	24947	4528	28962
Detroit, MI PMSA	4382299	1609792	195425	43285	303	146	69	85	2151	868	2219	36429	8549	31832
El Paso, TX MSA	591610	164572	38687	6165	60	9	0	0	148	824	806	8260	2132	4926
Eugene--Springfield, OR MSA	282912	92843	14470	2952	0	20	0	8	76	461	3659	5717	822	5543
Fresno, CA MSA	667490	199461	39650	3841	42	30	33	8	19	1175	2188	8452	2604	7894
Honolulu, HI MSA	836231	252207	91632	39416	75	23	8	297	824	3168	5460	26622	3711	14075
Houston, TX PMSA	3301937	1193233	230396	62824	128	278	63	18	1693	2877	4204	35437	12169	32758
Indianapolis, IN MSA	1249822	498312	80393	12049	152	48	16	21	713	464	903	13592	3319	14989
Jacksonville, FL MSA	906727	338354	63547	8555	40	26	129	11	697	1308	2946	11429	5319	11521
Kansas City, MO--KS MSA	1566280	616148	96537	15513	93	46	53	8	791	732	753	14611	4687	21337
Los Angeles--Long Beach, CA PMSA	8863164	2884615	639570	262732	1320	574	403	344	1837	19838	25966	133927	31325	112797
Memphis, TN--AR--MS MSA	981747	350613	60742	12188	109	29	0	9	326	392	482	13254	3453	6640
Miami--Hialeah, FL PMSA	1937094	642669	138328	42964	340	6359	1155	21	1323	1408	4263	22454	8621	18091
Milwaukee, WI PMSA	1432149	529349	75713	35455	117	72	111	19	448	785	1806	27793	2837	15497
Minneapolis--St. Paul, MN--WI MSA	2464124	993400	146892	67701	163	114	27	29	1091	1190	5476	42069	5047	44425
Nashville, TN MSA	985026	392161	68543	7908	46	0	7	20	616	543	450	9637	3044	12742
New Orleans, LA MSA	1238816	364978	78718	34078	1204	60	15	491	1489	862	2571	15916	5467	8877
New York, NY PMSA	8546846	1166069	338790	431696	8133	1174720	113958	16687	53183	2017	10426	368156	19866	95113
Norfolk--Virginia Beach--Newport News, V	1396107	508414	98754	14151	36	137	45	99	851	1859	3661	25661	8030	37301
Oklahoma City, OK MSA	958839	361454	59867	2397	35	31	0	38	548	924	1100	9482	2985	11261
Omaha, NE--IA MSA	618262	250016	36908	6127	35	0	19	34	211	322	410	8629	1498	9587
Philadelphia, PA--NJ PMSA	4856881	1545143	271619	144001	9748	62076	47324	239	1819	2181	7340	124054	12970	52045
Phoenix, AZ MSA	2122101	747818	143170	19897	65	75	41	35	1071	7298	13930	26403	7383	29309
Pittsburgh, PA PMSA	2056705	623150	114093	67978	4335	1899	18	20	710	494	1058	45310	4473	18086
Portland--Vancouver, OR--WA CMSA	1477895	534543	88975	36278	1518	396	645	37	385	2364	4409	23725	3951	27306
Sacramento, CA MSA	1481102	515966	93834	12451	2068	658	973	40	272	3143	12440	18401	4361	21338
Salem, OR MSA	278024	88347	18374	1646	23	2	8	0	59	422	991	4791	929	5015
San Antonio, TX MSA	1302099	424366	84011	20492	36	0	44	24	274	1287	891	20349	4260	13115
San Diego, CA MSA	2498016	872325	169326	36317	2543	143	373	113	889	8309	10785	55749	12289	61285
San Francisco, CA PMSA	1603678	481119	104564	116425	12607	25981	7178	3040	1616	6390	7158	50208	5489	32173
San Jose, CA PMSA	1497577	618995	98163	19438	373	420	3194	71	231	3821	11675	16509	3729	19986
Oakland, CA PMSA	2082914	709529	136261	40174	758	48680	3944	526	400	4881	9852	32507	8313	38539
Seattle, WA PMSA	1972961	755832	120039	75182	169	165	49	1028	606	3293	5896	34355	5966	35169
St. Louis, MO--IL MSA	2444099	912509	137883	32149	169	52	37	31	1556	794	1425	24556	6023	27152
Tacoma, WA PMSA	586203	205417	35670	5170	27	2	17	84	120	875	848	11770	1779	8810
Spokane, WA MSA	361364	123128	17336	4293	5	9	21	6	61	337	1021	5974	677	5335
Toledo, OH MSA	614128	225357	25581	4753	7	13	12	22	177	109	458	9381	1347	5528
Tucson, AZ MSA	666880	209537	43833	9045	10	7	7	7	119	2483	5486	9391	2237	9391
Tulsa, OK MSA	708954	267957	41572	2709	16	21	3	10	296	739	438	7464	1834	8472
Washington, DC--MD--VA MSA	3923574	1393842	349273	146107	1323	143034	4982	39	6866	2638	6633	85292	11443	62878
Wichita, KS MSA	485270	194256	25783	1819	5	14	7	0	211	847	560	5432	971	6785

Exhibit BB: National Data on Central Cities, Central Counties and PMSA/MSA's

Region	JTW < 5 min	JTW 5 - 9 min	JTW 10 - 14 min	JTW 15 - 19 min	JTW 20 - 24 min	JTW 25 - 29 min	JTW 30 - 34 min	JTW 35 - 39 min	JTW 40 - 44 min	JTW 45 - 59 min	JTW 60 - 89 min	JTW 90 and > 90 min	JTW at home	JTW aggregate travel time	Mean JTW with work at home	Percent transit other JTW
Albuquerque, NM MSA	5444	23765	40516	52237	46758	13785	23942	2319	2351	4624	3639	2800	6775	4240151	18.5	9.656
Atlanta, GA MSA	28627	104694	169004	215409	215647	94754	254104	54184	62569	159241	77370	12957	33221	37718234	25.5	9.295
Austin, TX MSA	11164	41601	61823	78237	67616	23977	56699	7602	9809	19603	8715	5246	11924	8342918	20.6	10.736
Baltimore, MD MSA	24213	88118	142234	173037	180812	85518	183853	41264	50675	109409	71922	13482	27276	30244652	25.4	14.881
Boston--Lawrence--Salem, MA--NH CMSA	61882	226912	304385	310995	286832	117518	305235	66958	87224	183107	116156	20821	53692	50628166	23.6	19.624
Buffalo, NY PMSA	14226	52154	71149	78640	78960	31812	54192	9602	9012	14818	7372	2894	8052	8371798	19.3	12.381
Charlotte--Gastonia--Rock Hill, NC--SC MS	15266	60878	92631	110291	99643	37816	87701	16368	16038	37181	16278	3375	11390	12825283	21.2	6.748
Chicago, IL PMSA	56318	223961	313486	351383	363907	154495	460671	98036	143701	334944	261274	68603	58005	82410084	28.5	24.132
Cincinnati, OH--KY--IN PMSA	16602	63981	91290	114442	119568	56090	98491	21603	20952	38156	15081	7420	14445	14850066	21.9	9.773
Cleveland, OH PMSA	20285	77212	111937	132724	142666	63570	126197	27727	27919	49291	20460	7289	16407	18221510	22.1	11.776
Columbus, OH MSA	19186	70076	99924	123982	122696	50909	88804	16963	17259	30824	13854	7753	15629	14065092	20.7	9.075
Dallas, TX PMSA	27074	111806	162802	207642	197794	83922	225422	38863	46718	112171	49438	17869	30652	31474741	24.0	8.471
Fort Worth--Arlington, TX PMSA	15378	60570	91040	116366	109541	44336	100736	18154	19463	45139	21247	7999	14464	14980204	22.5	nd
Denver, CO PMSA	18273	74241	112165	137389	150757	64292	127152	25610	28625	47266	18492	9846	28962	18473838	21.9	11.868
Detroit, MI PMSA	43737	179391	259246	305880	314736	141310	288791	66536	72024	140201	63038	24431	31832	44928620	23.3	6.521
El Paso, TX MSA	5465	23007	35032	50677	42875	14161	31559	2677	2707	7099	3861	2543	4926	4442773	19.6	10.296
Eugene--Springfield, OR MSA	5187	18387	27876	26016	17821	5286	9875	1383	1557	3140	2415	2085	5543	2193053	17.3	nd
Fresno, CA MSA	10965	34585	46892	55053	44800	13893	28053	2763	3469	7554	6156	3320	7894	4905924	18.5	9.904
Honolulu, HI MSA	10818	39546	56960	67513	61865	22004	70383	10098	16390	38578	23675	5613	14075	10513429	24.0	21.411
Houston, TX PMSA	32694	120324	182277	234248	226546	89792	276462	48699	60768	156766	86280	28464	32758	40670140	25.8	9.673
Indianapolis, IN MSA	17832	65209	84478	104898	111340	51190	89146	17778	16951	29542	12927	8691	14989	13372627	21.4	7.403
Jacksonville, FL MSA	10959	39628	58026	77198	74601	29279	72656	12670	13386	28491	12863	2604	11521	9750827	22.0	9.458
Kansas City, MO--KS MSA	21002	81865	112125	132715	134041	54335	110902	20492	20890	38471	15541	7593	21337	16077467	20.8	7.601
Los Angeles--Long Beach, CA PMSA	71218	314913	510338	616719	582804	229594	685112	117254	164875	364773	267429	77422	112797	105969963	25.8	14.363
Memphis, TN--AR--MS MSA	10238	40769	62126	84447	84483	33243	74405	9528	9809	18838	8843	4868	6640	9529706	21.3	8.228
Miami--Hialeah, FL PMSA	15114	59700	105868	142831	142001	53995	177128	24183	31783	71088	39023	7191	18091	21571903	24.3	12.049
Milwaukee, WI PMSA	20252	80130	113229	128480	125674	50714	81254	15646	14849	25581	12053	6643	15497	13573211	19.7	12.310
Minneapolis--St. Paul, MN--WI MSA	34381	135716	198773	226027	230413	100990	163366	37047	38248	63257	25221	9760	44425	26643132	20.4	12.797
Nashville, TN MSA	13223	46097	69295	88077	81798	30414	73465	12015	14494	33521	15040	5536	12742	10943989	22.1	7.063
New Orleans, LA MSA	11860	43178	68777	92586	80838	28073	84145	12284	14035	36408	23218	10447	8877	12322474	23.9	13.800
New York, NY PMSA	58173	187096	319956	378675	382369	145739	593644	110071	190201	535746	635886	166145	95113	130881421	34.5	60.386
Norfolk--Virginia Beach--Newport News, VA	17120	66629	98206	126043	115399	44562	98484	16092	17652	38775	18730	4006	37301	14309413	20.5	13.138
Oklahoma City, OK MSA	14517	51199	70676	85223	80440	28889	60297	7824	8631	18685	7492	4988	11261	8905800	19.8	6.398
Omaha, NE--IA MSA	9628	39631	59691	66467	57961	20109	30811	3794	3613	6512	3880	2112	9587	5482036	17.5	8.564
Philadelphia, PA--NJ PMSA	65030	218706	310814	329739	313125	137326	323217	74021	93010	210494	131225	21807	52045	55280674	24.2	20.337
Phoenix, AZ MSA	24214	96171	139587	160516	158934	65745	152656	28112	35508	65075	27256	13412	29309	22247698	22.3	10.588
Pittsburgh, PA PMSA	27364	96992	131787	139373	133020	55579	115094	25157	31761	65322	36681	5408	18086	19550961	22.2	16.377
Portland--Vancouver, OR--WA CMSA	21729	76146	106962	123801	121212	51405	93729	17630	19951	37835	17693	9133	27306	15144006	20.9	13.942
Sacramento, CA MSA	19981	74124	105143	119208	112595	45770	89718	15888	18246	35220	19015	9699	21338	14488865	21.1	11.101
Salem, OR MSA	6051	17091	22712	22815	16762	5144	10202	2072	2259	4900	3772	1812	5015	2262197	18.8	nd
San Antonio, TX MSA	16602	50314	77831	107487	102558	42008	89733	11714	11955	24962	12185	8685	13115	12168573	21.4	10.678
San Diego, CA MSA	31274	118433	175527	210776	200789	81544	173829	31053	34461	62859	32997	15619	61285	25918924	21.1	15.344
San Francisco, CA PMSA	16192	62417	103940	127829	125989	49161	137715	24894	36155	77292	48932	11259	32173	21305588	24.9	31.415
San Jose, CA PMSA	14602	69066	107161	138187	139726	52879	120636	19751	25791	50322	29178	9320	19986	18115414	22.7	9.973
Oakland, CA PMSA	20439	87354	136013	148033	125244	51262	141228	33615	46904	106436	80007	19290	38539	27069807	22.7	nd
Seattle, WA PMSA	23467	85014	131017	158885	164601	71699	154338	35387	45030	80331	40452	12359	35169	24491609	23.6	15.599
St. Louis, MO--IL MSA	29200	109870	151223	182286	183242	81470	174886	38413	42904	78704	33908	11078	27152	25817091	22.6	8.209
Tacoma, WA PMSA	9914	26964	36939	43013	40326	16139	33087	7145	9200	20564	14389	4099	8810	6275986	23.2	10.903
Spokane, WA MSA	5517	19447	28666	32545	28094	9698	16124	2354	2564	4400	2264	1195	5335	2843572	18.0	11.213
Toledo, OH MSA	11485	36538	50250	55166	49425	17136	24651	3778	3744	7065	5058	2921	5528	4957742	18.2	7.995
Tucson, AZ MSA	8214	29303	46334	54830	50648	19824	38229	5923	6067	11456	6265	5069	9391	6002953	20.6	13.096
Tulsa, OK MSA	10073	40441	55264	66651	58302	20001	38928	5256	5579	13107	5919	3538	8472	6385446	19.3	6.636
Washington, DC--MD--VA MSA	37372	135626	213371	267374	283385	134134	359856	84683	117869	281980	202459	33363	62878	63511510	28.7	21.281
Wichita, KS MSA	8569	30359	42738	49583	44451	13989	24307	2990	3165	5409	2628	1717	6785	4160482	17.6	7.035

Exhibit CC: National Data on Central Cities, Central Counties and PMSA/MSA's

region	urban area pop	urban area size	urban area gross density sq mile	per capita vmt 1991 urban area	miles of road per capita urban area	freeway miles	arterial/collector miles	local miles	freeway miles per capita	arterial/collector miles per capita	local miles per capita
alb	427.000	168	2.5	23.7	4.3	42.0	492.0	1316.0	0.098	1.152	3.082
atl	2158.000	1198	1.8	29.0	4.5	268.0	1897.0	7652.0	0.124	0.879	3.546
aus	562.000	121.0	4.6	21.2	4.5	70.0	338.0	2165.0	0.125	0.601	3.852
bal	2051.000	765.0	2.7	18.0	2.9	238.0	1504.0	4269.0	0.116	0.733	2.081
bos	2775.000	1033.0	2.7	18.6	3.3	257.0	3026.0	6115.0	0.093	1.090	2.204
buf	1064.000	405.0	2.6	16.3	3.3	147.0	1004.0	2439.0	0.138	0.944	2.292
cha	463.000	238.0	1.9	22.8	4.6	38.0	452.0	1654.0	0.082	0.976	3.572
chi	7246.000	1958.0	3.7	17.4	2.6	432.0	4891.0	14013.0	0.060	0.675	1.934
cin	1201.000	467.0	2.6	22.0	3.1	160.0	1059.0	2587.0	0.133	0.882	2.154
cle	1686.000	629.0	2.7	20.4	3.2	226.0	1724.0	3587.0	0.134	1.023	2.128
col	951.000	305.0	3.1	21.7	3.3	141.0	815.0	2238.0	0.148	0.857	2.353
dal	3198.000	1404.0	2.3	23.9	5.2	439.0	3816.0	12476.0	0.137	1.193	3.901
fw	nd	nd	ERR	nd	nd	nd	nd	nd	ERR	ERR	ERR
den	1540.000	433.0	3.6	18.8	3.8	178.0	1493.0	4323.0	0.116	0.969	2.807
det	3935.000	1243.0	3.2	20.1	3.2	284.0	2733.0	9658.0	0.072	0.695	2.454
elp	563.000	185.0	3.0	16.6	3.7	46.0	403.0	1672.0	0.082	0.716	2.970
eug	nd	nd	ERR	nd	nd	nd	nd	nd	ERR	ERR	ERR
fre	490.000	133.0	3.7	17.5	3.6	29.0	445.0	1338.0	0.059	0.908	2.731
hon	658.000	135.0	4.9	16.6	1.3	65.0	224.0	574.0	0.099	0.340	0.872
hou	2902.000	1549.0	1.9	24.1	5.0	336.0	2382.0	12025.0	0.116	0.821	4.144
ind	915.000	422.0	2.2	22.7	4.1	133.0	1110.0	2587.0	0.145	1.213	2.827
jac	749.000	536.0	1.4	24.2	4.8	100.0	682.0	2882.0	0.134	0.911	3.848
kan	1282.000	608.0	2.1	21.8	4.8	317.0	1364.0	4512.0	0.247	1.064	3.520
la	11760.000	2100.0	5.6	21.0	2.1	597.0	8232.0	16359.0	0.051	0.700	1.391
mem	865.000	400.0	2.2	18.7	3.5	72.0	620.0	2419.0	0.083	0.717	2.797
mia	1939.000	442.0	4.4	16.8	2.8	109.0	952.0	4550.0	0.056	0.491	2.347
mil	1219.000	550.0	2.2	24.1	3.9	106.0	1505.0	3230.0	0.087	1.235	2.650
min	2067.000	1017.0	2.0	21.2	4.4	301.0	2313.0	6673.0	0.146	1.119	3.228
nas	577.000	475.0	1.2	26.6	4.8	96.0	519.0	2207.0	0.166	0.899	3.825
nor	1040.000	270.0	3.9	14.7	4.1	61.0	669.0	2252.0	0.059	0.643	2.165
ny	15830.000	3186.0	5.0	14.1	2.2	1048.0	9493.0	24800.0	0.066	0.600	1.567
nrf	950.000	809.0	1.2	21.6	3.7	96.0	900.0	2533.0	0.101	0.947	2.666
okl	784.000	449.0	1.7	24.8	4.7	134.0	1125.0	2437.0	0.171	1.435	3.108
oma	538.000	213.0	2.5	16.8	4.3	47.0	557.0	1711.0	0.087	1.035	3.180
phi	5113.000	1240.0	4.1	13.0	2.1	321.0	3117.0	7401.0	0.063	0.610	1.447
pho	1973.000	1054.0	1.9	20.9	4.5	111.0	2258.0	6603.0	0.056	1.144	3.347
pit	1679.000	1033.0	1.6	19.7	4.5	205.0	2399.0	4962.0	0.122	1.429	2.955
POR	1220.000	416.0	2.9	18.9	4.1	128.0	1292.0	3703.0	0.105	1.059	3.035
sac	1165.000	344.0	3.4	20.5	3.1	100.0	832.0	2691.0	0.086	0.714	2.310
sal	nd	nd	ERR	nd	nd	nd	nd	nd	ERR	ERR	ERR
san	1129.000	442.0	2.6	21.0	4.4	162.0	1092.0	3727.0	0.143	0.967	3.301
sad	2444.000	691.0	3.5	20.7	2.3	223.0	1610.0	4003.0	0.091	0.659	1.638
sf	3725.000	875.0	4.3	20.5	2.4	338.0	2567.0	6261.0	0.091	0.689	1.681
sj	1502.000	339.0	4.4	21.8	2.4	169.0	985.0	2531.0	0.113	0.656	1.685
oak	nd	nd	ERR	nd	nd	nd	nd	nd	ERR	ERR	ERR
sea	1802.000	645.0	2.8	23.9	3.7	174.0	1743.0	4790.0	0.097	0.967	2.658
stl	1950.000	694.0	2.8	23.2	3.6	260.0	2016.0	4911.0	0.133	1.034	2.518
tac	530.000	251.0	2.1	22.9	4.2	53.0	702.0	1503.0	0.100	1.325	2.836
spo	291.000	150.0	1.9	18.2	5.6	29.0	481.0	1126.0	0.100	1.653	3.869
tol	480.000	184.0	2.6	21.0	4.0	64.0	505.0	1371.0	0.133	1.052	2.856
tuc	422.000	157.0	2.7	21.3	4.6	23.0	498.0	1458.0	0.055	1.180	3.455
tul	475.000	269.0	1.8	29.5	6.0	95.0	683.0	2084.0	0.200	1.438	4.387
dc	3282.000	926.0	3.5	19.8	2.6	289.0	2207.0	6137.0	0.088	0.672	1.870
wic	338.000	171.0	2.0	19.5	4.5	70.0	393.0	1087.0	0.207	1.163	3.216