TABLE OF CONTENTS

Policy Study No. 165
August 1993

THE FACTS ABOUT "GRIDLOCK" IN SOUTHERN CALIFORNIA

by
Peter Gordon and Harry W. Richardson

EXECUTIVE SUMMARY

Traffic congestion is considered one of Southern California's most serious problems, yet much of what people believe about traffic, especially rush-hour commuting, is wrong. Up-to-date data from the 1990 Census and Nationwide Personal Transportation Survey provide a sound basis for rethinking our approach to transportation planning in the greater Los Angeles region.

Despite concern over congestion, the fraction of commuters choosing to drive to work alone actually increased during the 1980s—from 70.5 percent to 72.3 percent of all worktrips. Carpooling and transit each attracted a smaller share in 1990 than in 1980. By 1990 more people walked to work or rode bicycles or motorcycles than used public transit services. As of 1990, transit accounted for only 4.5 percent of all worktrips.

Although greater Los Angeles is generally considered the nation's most congested metro area, it compares surprisingly well to the other top-10 metro areas in both trip speeds and commuting times. Los Angeles is fifth highest among the top 10 in commuting speed, and it ranks even better for shopping and personal-trip speeds. Moreover, average commuting *times* have remained surprisingly constant over the past 20 years, at around 24 to 25 minutes. Continuing suburbanization has brought many jobs to the suburbs, and people have also moved closer to work. These locational adjustments have kept speeds and trip times from deteriorating.

Despite congestion, Southern Californians are making a lot more trips than 10 or 20 years ago, in part because of a strong increase in women's travels, both worktrips and (especially) family related and personal trips. The large majority of all trips are nonworktrips. Surprisingly, nonworktrips make up a considerable share even of rush-hour travel. After factoring out "chained" trips (worktrips that include a stop along the way for shopping, daycare, and the like), truly *non*worktrips constitute 43 percent of the morning rush hour in greater Los Angeles and 56 percent of the afternoon rush hour.

These facts suggest that transportation planners need to rethink many of their assumptions. Disproportionate emphasis is being placed on worktrip reduction (e.g., mandatory employer-based ridesharing under Regulation XV) and on fixed-rail transit. More promising efforts include high-occupancy vehicle lanes, expanded opportunities for taxis and van services, and increased telecommuting.

I. INTRODUCTIONI. INTRODUCTION

In 1990, *domestic* transportation accounted for 14.5 percent of U.S. GDP. Of the $796 billion that Americans spent on domestic transportation, $16 billion was spent on local transit, $112 billion was spent on local (as opposed to intercity) trucking and $371 billion was spent on personal passenger auto transportation, most of which was also local. Local transportation planning in Los Angeles and elsewhere commands considerable resources, directly as well as indirectly. Sound policymaking requires an accurate assessment of what the problem is. Getting it wrong can be disastrous.

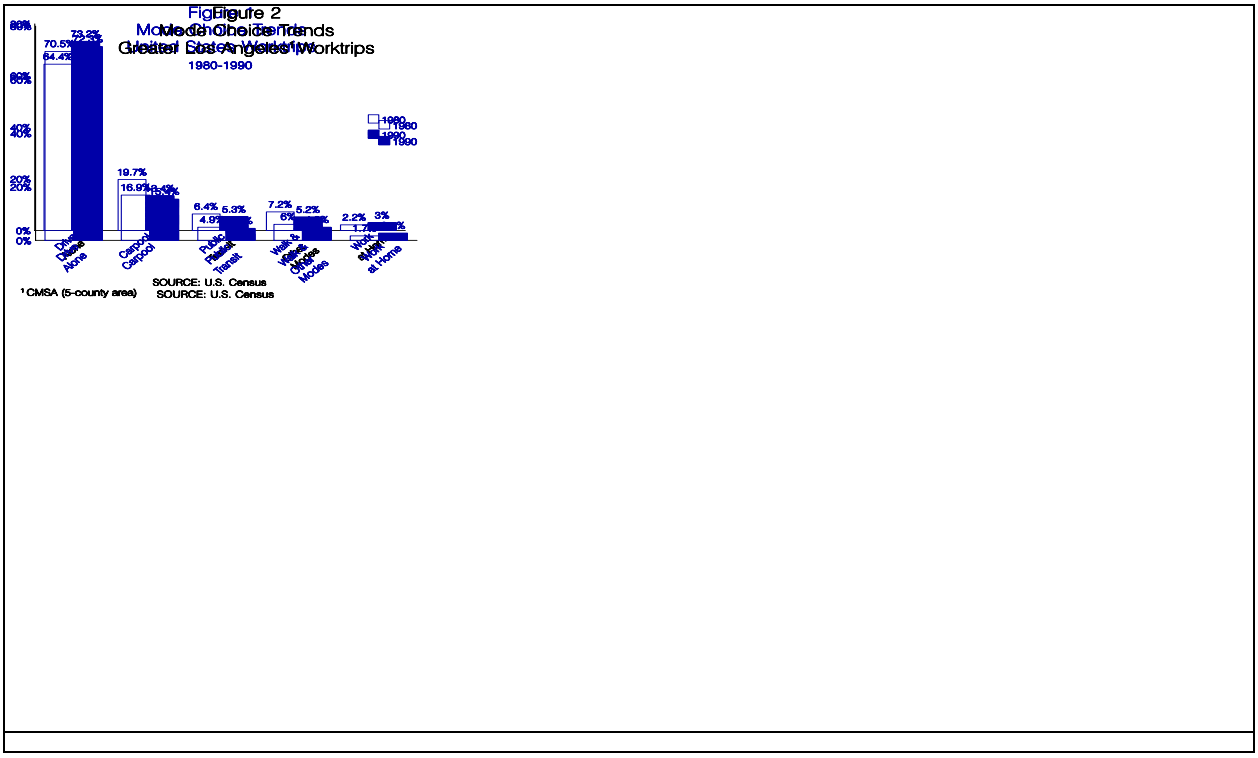
This paper describes the dominant facts that bear on transportation planning in the greater Los Angeles area. Unless otherwise noted, by "greater Los Angeles" we refer to the five-county area of Los Angeles, Orange, Riverside, San Bernardino and Ventura, formally designated the Los Angeles Consolidated Metropolitan Statistical Area (CMSA). Where possible, we make comparisons with other large U.S. metropolitan areas, drawing on the latest available cross-sectional data. A companion paper will focus on policy recommendations in light of these facts.

II. WHAT CURRENT TRANSPORTATION DATA TELL USII. WHAT CURRENT TRANSPORTATION DATA TELL US

A. Mode Choice TrendsA. Mode Choice Trends

Nationwide, the 1990 Census revealed dramatic changes in Americans' commuting habits during the 1980s. As has been widely reported, the already large majority that drives to work alone increased even further during the 1980s, while the proportion riding with someone else dropped by one-third. Public transit use continued its ongoing post-World War II decline, declining from 6.4 percent of commute trips in 1980 to just 5.3 percent in 1990. Walking and other modes (e.g., bicycling) also declined. The only other mode choice that increased its share was working at home, which grew to encompass 3.0 percent of commute trips. These changes are depicted in Figure 1.

Greater Los Angeles commuting patterns changed in a similar, if less extreme, fashion during the 1980s, as depicted in Figure 2. Driving alone increased slightly to 72.3 percent of all commutes, while the carpool share decreased slightly to a 15.4 percent share of all such trips—this despite extensive efforts to promote ridesharing, both via exhortation and via law (the South Coast Air Quality Management District's Regulation XV, which mandates ridesharing efforts by employers of 100 or more). Public transit use also declined, to 4.5 percent of commute trips, while working at home increased to 2.7 percent, slightly less than the national average share.



It appears that despite increased public concern over traffic congestion during the past decade, an even larger majority of people continue to choose the single-occupant vehicle (SOV) for getting to and from work in Southern California. Reasons for this choice will become apparent as we explore the data in more detail, drawing not only on Census data but also on the U.S. Department of Transportation's detailed Nationwide Personal Transportation Survey (NPTS).

B. Commuting SpeedsB.Commuting Speeds

The Texas Transportation Institute reports that Los Angeles scores highest on their Road Congestion Index.[1] Closer to home, the Los Angeles County Transportation Commission's 30-year plan (1992) suggests that under its “no-build” alternative, average rush-hour freeway speeds and average rush-hour commuter speeds will fall from the current 29 MPH to 17 MPH. To many, neither the ranking nor the gloomy prognosis are news, since autos, traffic and Southern California have been joined in the popular imagination for so long that the links are unquestioned. Like all cliches, however, this one is wrong. What is news about Los Angeles and traffic is how well the area handles it. In the

1980s, the CMSA grew by more than 3 million people, far more than any other metro area (Dallas was second with less than 1 million population growth). Yet average Los Angeles traffic speeds in 1990 were among the highest in the country, according to DOT's NPTS survey data[2] (see Figure 3).

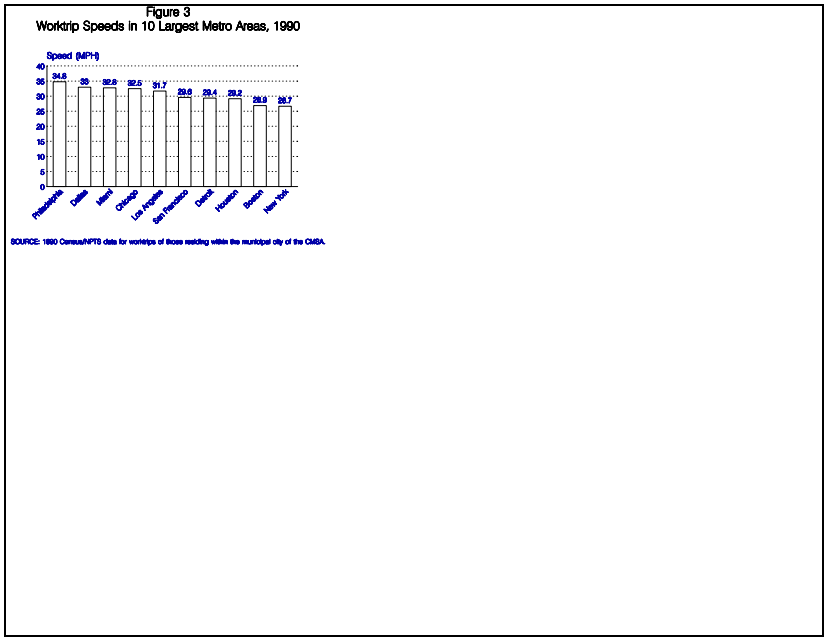


Figure 3 is derived from Table A-2 (in the Appendix), which reproduces worktrip speeds (calculated from respondents' reported trip distances and durations) for 20 U.S. CMSAs (ranging in 1990 population from New York's 18,087,000 to Hartford's 1,086,000). Whereas trip times and distances can also be compared, Los Angeles' acknowledged longer distances account for its longer-than-average trip times. Even this perception of long commutes is exaggerated: the urbanized portions of greater Los Angeles spread over 3,536 square miles according to the Southern California Association of Governments, yet 86 percent of all worktrips were within the person's county of residence in 1990 [Table A-3], about the same proportion as in 1980. The important point is that while Los Angeles has had extraordinarily large population growth in the past decade, its worktrip speeds (and average speeds) compare very favorably with those of other cities.

C. Types of TripsC. Types of Trips

Worktrips are the focus of most public-policy efforts (e.g. transit and ridesharing efforts, Reg. XV), but a surprisingly large fraction of all trips, even during rush hours, are nonworktrips. Figure 4 illustrates the composition of trip types in the morning peak (6-9 A.M.), the afternoon peak (4-7 P.M.), and off peak (all other hours and weekends). As can be seen, 43 percent of the A.M. peak consists of nonworktrips, as does 56 percent of the P.M. peak. Note that in each case, worktrip chains are depicted separately; these are trips in which a nonwork stop is included on a home-to-worktrip or a nonhome stop is included on a work-to-home trip (e.g., for shopping, day-care, etc.). These patterns for greater Los Angeles are very similar to what is observed in the rest of the top-ten metro areas (see Table 1). In both Los Angeles and the other large metro areas, peak nonworktrips outweighed worktrips in the afternoon peak and accounted for a sizeable proportion of morning peak trips. This story is even more important than the overall nonworktrip/worktrip distribution because

the peak nonworktrips are highly vulnerable to policy intervention—yet so far have received virtually no attention from policymakers.

Figure 4
Trip Types by Time Period
Greater Los Angeles Area,[1] 1990

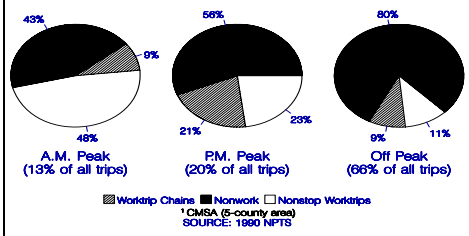


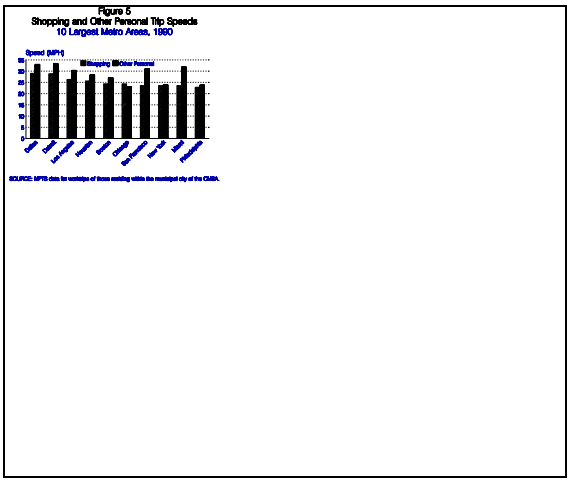
Table 1

	Los Angeles Metro Area**	Nine Other Metro Areas**
Nonstop Worktrips		
A.M. Peak	32.8	31.4
P.M. Peak	29.7	30.2
Off Peak	34.8	31.7
All Other Trips		
A.M. Peak	28.7	28.0
P.M. Peak	29.0	28.3
Off Peak	29.8	28.5

* Single-occupant vehicle trips ** CMSAs
SOURCE: 1990 NPTS

In terms of *nonwork*trip speeds, Los Angeles does even better, when compared with other major metro areas, than it does for worktrip speeds. Figure 5 summarizes data from Tables A-5 and A-6, for the ten largest metro areas. Apparently the large Los Angeles area freeway system works reasonably well during the off-peak times when the majority of shopping and other personal trips take place. In addition, the portions of our CMSA defined as the "central cities" include many suburban areas of relatively low density, in contrast with other, more-centralized large cities. The suburbs tend to have fewer traffic problems.

D. Female TripmakingD. Female Tripmaking



One of the major changes in American society over the last 20 years has been the rise in female employment and its consequences. Because more female workers imply, *ceteris paribus*, more commuting per household, this trend might be expected to have had some impact on travel behavior. Pisarski's review of 1990 NPTS results (relative to 1983) chose to devote a full chapter to women's travel behavior.[3] He concluded:

i) Women's tripmaking increased almost twice as fast as men's (9 percent vs. 5 percent);

ii) nevertheless, male VMT per capita was higher, because fewer male trips per capita were outweighed by longer average trips; and

iii) family and personal trips accounted for almost all of the increase in women's trips. More light is shed on these trends in Figure 6 (derived from Tables A-8 through A-11). Although these are nationwide figures, the similarity of U.S. and Los Angeles transportation experience (and the fact that only small samples of females-only data are available for Los Angeles) suggests that they are relevant to this discussion.

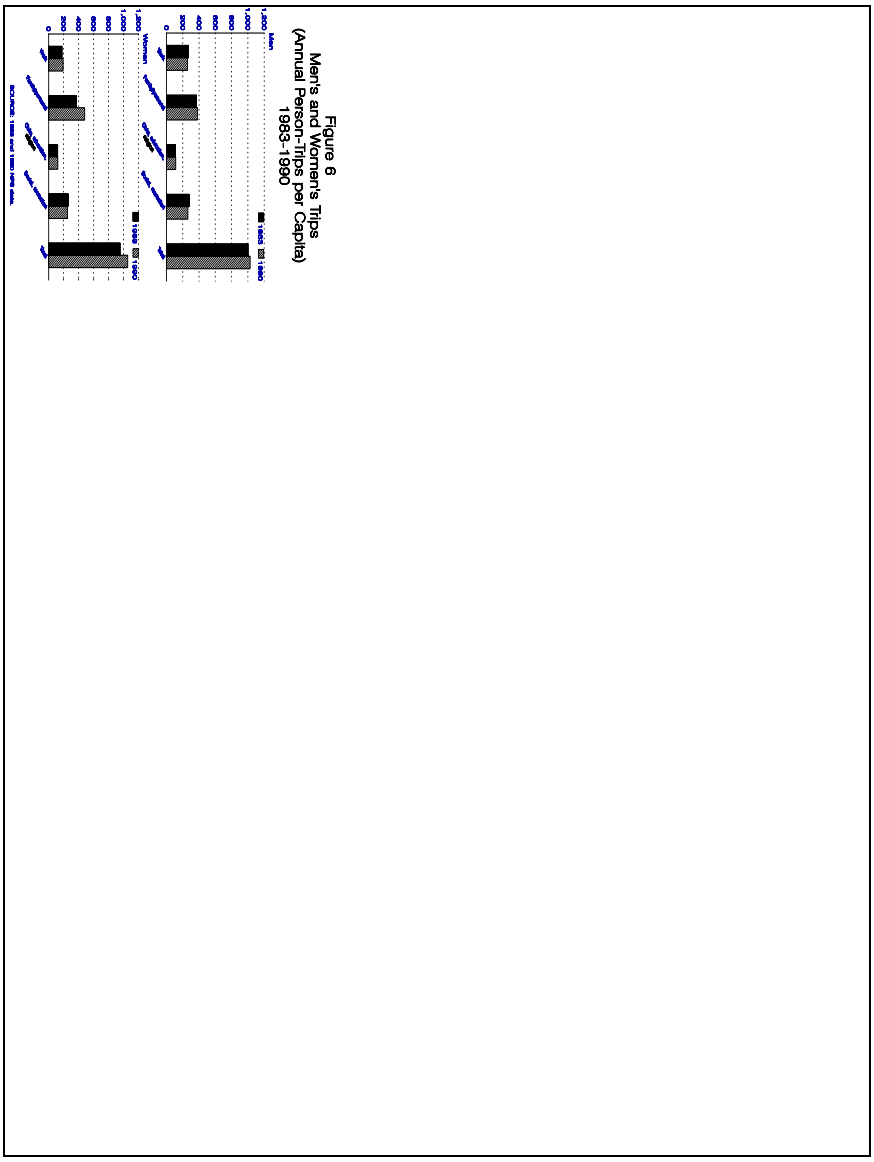


Figure 6
Men's and Women's Trips
(Annual Person-Trips per Capita)
1983-1990

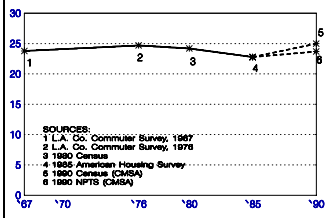
Females made about the same total number of trips as males in 1983, but women made 14 billion more trips than men by 1990. Although there were some differences between males and females in the distribution of trip types, namely more worktrips by males and more family and personal trips by females, the main shift between 1983 and 1990 was common to both sexes, namely a sharp increase in family and personal trips. The other striking change was the increase in the share of travel by private modes (as we have previously seen), common to both sexes. Figure 6 shows that whereas female trips per capita were about 5 percent lower than those of males in 1983, they had forged ahead by 1990 (female trips per capita grew by 10.6 percent while male trips grew by 2.6 percent). The major explanations were a faster growth in family and personal trips (28.9 percent as against 19.2 percent) and a sharp increase in female worktrips. Notably, private mode trips gained at the expense of both public transit and the minor modes for both sexes (see Tables A-10 and A-11).

E. Are Things Getting Worse?E. Are Things Getting Worse?

In some cases, the data permit us to make comparisons over time. For Los Angeles, commuting time averages have been remarkably stable. A large-scale Los Angeles County commuter survey showed that average commuting times were 24 minutes in 1967 (all modes) and 24.4 minutes in 1976. The 1980 census reported 24.3 minutes; the 1985 American Housing Survey (using the same questionnaire as the census) reported 22.8 minutes; the 1990 census reports a 26-minute average. The 1990 NPTS average for the entire CMSA was 23.8 minutes while the 1990 census reports 25.1 minutes. These figures are shown graphically in Figure 7.

These broad intertemporal comparisons must be carefully interpreted since many of them neglect to control for reduced transit use and carpooling, and increased trip-chaining. This is why many of our cross-sectional commuting comparisons focussed on drive-alone private vehicle *nonstop* trips. This type of disaggregation cannot be carried out with the census data. Liao's finding that trip-chaining had grown from 14.7 percent of all worktrips in 1983 to 19.2 percent in 1990 suggests that even the moderate increase in commuting time reported in the 1990 census is mis-leading.[4]

Figure 7
Los Angeles Area
Average Commuting Times, 1967-1990



III. SUBURBANIZATION AS THE SOLUTION, NOT THE PROBLEMIII. SUBURBANIZATION AS THE SOLUTION, NOT THE PROBLEM

We have reported elsewhere that stable travel times are the result of dynamic locational adjustments.[5] The well-known suburbanization of cities is really a process whereby residents seek peripheral locations for a variety of reasons (including house prices, amenities, and schools) and where industry eventually follows, providing many with nearby jobs. This process can, therefore, also be credited with removing traffic from core areas. Our emphasis on *metropolitan-wide*

comparisons stems from this interpretation.

The many traffic "doomsday" forecasts deemphasize locational adjustments and rest on the naive idea that more and more people will compete for limited central areas and roads. "Peak-spreading" (more worktrips taken outside of the traditional rush hours) has been negligible and cannot be credited for contained average trip times,[6] while highway capacity expansions in the Los Angeles area have been modest.[7]

The successful adjustments reflect a coping mechanism that we would expect from a market-dominated system. Indeed, whereas suburbanization has long been associated with Los Angeles' "sprawl," similar trends can be seen in all of the large U.S. metropolitan areas. Since these decentralization trends diminish markets for conventional public transit, it comes as no surprise that the U.S. transit industry has been in decline for most of the 20th century. This decline, as well as the industry's inability to adapt to changing conditions, has been the topic of a vast literature and will be discussed in a companion paper.[8]

A shorthand but reliable way to predict demand for conventional transit is to measure downtown employment. Los Angeles' is particularly small. The Central Business District's share of the region's jobs in 1980 was merely 3 percent. CBD job growth in the period 1980–86 (no 1990 CBD job counts were conducted by the census) was merely 0.3 percent per year, indicating a steeply falling share of the region's employment (see Tables A-13 and A-14). The effects of nearly $2.5 billion (1991 dollars) in urban-renewal funds directed to Los Angeles' downtown since 1959 have been negligible. Transit advocates like to project relocations that generate development and travel demand near, predominantly centrally located, stations. The evidence on employment decentralization (Table 2) suggests that this would be an implausible reversal of widespread long-term urban development trends. All of the major metropolitan areas now have the largest share of their jobs in the outer suburbs (Ring II in Tables A-13 and A-14).

Table 2

Percentage of Jobs in:	1976	1980	1986
Downtown Los Angeles	5.8%	5.4%	4.9%
Rest of Los Angeles City	34.9%	32.6%	28.7%
Anaheim-Santa Ana area	16.7%	19.5%	22.7%
Balance of area	42.6%	42.5%	43.7%
Total	100.0%	100.0%	100.0%

* Los Angeles and Orange Counties only

SOURCE: Computed from Wharton Urban Decentralization Project database

IV. TRANSPORTATION ALTERNATIVESIV. TRANSPORTATION ALTERNATIVES

A. Public TransitA. Public Transit

Despite the extensive decentral-ization of Los Angeles, the centerpiece of local transportation planning is a rail transit system focused on the downtown CBD. The 30-year "Integrated Plan" of the Los Angeles County Trans-portation Commission (now the Metropolitan Transportation Authority) projects countywide expenditures of $183.5 billion, of which $78.2 billion is for rail.[9] Although there are no corresponding 30-year plans for the four surrounding counties, it is possible to look at their planned transportation expenditures for the seven-year period 1993–2000. Of the $21.5 billion that the four counties plan to spend, nearly $5 billion is earmarked for fixed-rail transit.

Los Angeles County planners claim that 500,000 daily auto trips will be removed when their system is completed. The downward trend in transit ridership, both national and local, calls this estimate seriously into question. Moreover, new rail-transit systems nationwide have been plagued by overly optimistic ridership forecasts, in what the *Los Angeles Times* has called an "elaborate shell game."[10] These forecasts are widely publicized when spending decisions are made, but are sharply reduced when the systems begin operations. Furthermore, even if the forecasts were reliable, the impact on congestion would be uncertain. Brookings Institution researcher Anthony Downs has formulated the "iron law of freeway congestion," which states that in the absence of pricing, any freeway capacity made available by trip-reduction programs will soon be utilized by new trips ("latent demand"), as people formerly discouraged from driving are attracted back to the freeways.[11]

The first two rail projects in Los Angeles County do not augur well for the future of the 400-mile plan. The 22-mile Los Angeles-Long Beach Blue Line has been operating since July 15, 1990. James Moore reports that its $877-million capital costs, $38.6 million operating costs for fiscal 1991, and average daily boardings near 30,000 imply costs per passenger round-trip between $25 and $30.[12] This is almost double the average for four recently completed light-rail lines studied by the U.S. Department of Transportation's Volpe Transportation Systems Center.[13] Moore shows that even if local planners' ridership forecasts were reached, costs per passenger round-trip would still exceed

$20. Moreover, only 3-4,000 riders are former auto drivers; the large majority are former bus riders. Hence, the taxpayers' cost of each drive-alone auto trip diverted to the Blue Line is $103.

The first segment of the underground, heavy-rail Red Line is admitted to have cost $284 million per mile, compared with an estimated $188 million per mile at the time funding was approved by Congress. But since the operational segment of this 4.4 mile "minimum operable segment" is actually only 3.2 miles (the balance consists of storage tracks), the actual cost of the 3.2 mile segment is closer to $391 million per mile. Operating costs are not yet known, but revenues are miniscule thus far because the initial 25-cent "teaser fare" has been continued indefinitely since ridership has averaged only 15,000 boardings per day. When operating costs become known, the full costs per passenger are likely to be double or triple those that have been documented for the Blue Line. And recent closings of landmark enterprises along the Red Line route (including the Ambassador Hotel, Bullocks, and the Sheraton Town House) indicate that real estate markets are not optimistic about the performance of the subway.

Almost unmentioned in the media coverage of the rail projects has been the fate of local bus riders. Diverting large sums to build expensive rail projects has come at the expense of local bus service. In Los Angeles County, bus ridership fell by 20 percent from 1985 to 1990, from a peak of 497 million boardings to 401 million (with just 379 million forecast by the MTA for 1993). The steep decline in bus use began when the Southern California Rapid Transit District raised bus fares from $0.50 in order to amass funds for rail construction. One example of the cost shift from bus to rail concerns security costs. The Blue Line's contract with the Sheriff's Office costs $12 million per year, while security for the entire 2,000-bus fleet costs only $9 million. Those numbers equate to nearly $1 per boarding on the Blue Line versus just over 2 cents per boarding on the bus system.

It is unlikely that the Los Angeles rail network will ever lure back as many passengers as have been lost. If this turns out to be the case, the result will be many fewer transit users being served at many times higher cost.

B. CarpoolingB. Carpooling

As noted previously in Figures 1 and 2, commuting mode choice data from the census reveal that the share of commuters carpooling declined in the 1980s. The same dispersion of workplaces and residences that results in a decline in demand for conventional transit also makes carpooling more difficult. Local planners' expectations of vastly expanded ridesharing (from the current 1.1 average vehicle occupancy for commuters to a target 1.5) must also be viewed with skepticism.

The South Coast Air Quality Management District's Regulation XV is an attempt to reverse the historical decline in ridesharing. First imposed in 1988, it requires firms with more than 100 employees to submit a ridesharing plan that would achieve the target AVRs (average vehicle ridership). Currently, firms are fined only for not submitting an acceptable plan; penalties for

noncompliance with targets have not yet been introduced. In the first year of the regulation, a small increase in the mean AVR (2.72 percent) was achieved;[14] on the assumption that the least inconvenienced potential ridesharers will adapt first, this does not augur well for the attainment of the regional average 1.5 target. Even if AQMD tightens the screws as sometimes discussed (applying Regulation XV to 50-plus firms, increasing the target AVR to 1.8 or even to 2.1 [as mentioned in the 1991 Air Quality Management Plan], and penalizing noncompliance), the targets are unattainable. For one thing, AQMD has no available policy instruments for compelling ridesharing on nonworktrips; these account for more than 75 percent of all trips (although, on the other hand, average vehicle occupancy levels are somewhat higher than in the case of worktrips).

C. High-Occupancy Vehicle (HOV) LanesC. High-Occupancy Vehicle (HOV) Lanes

By offering certain vehicles a tangible improvement in speed during rush hours, HOV lanes may be able to give both carpools and nonrail transit (bus, van, taxi) vehicles a comparative advantage over single-occupant vehicles.

The majority of highway capacity expansion plans for greater Los Angeles involve HOV lanes added to the freeway system. Los Angeles County, which has three existing HOV facilities (on portions of SR 91, I-10, and I-405) proposes an additional 300 miles of HOV lanes in the 30-Year Integrated Transportation Plan. Caltrans estimates the cost at $6.2 billion, as of mid-1993. Orange County, with approximately 55 miles of HOV lanes already in operation, is planning for a total of 110 miles of HOV facilities. In addition, a private firm is planning to add four combined HOV/toll lanes to the median of the Riverside Freeway (SR 91), and a second private group has a franchise to build an extension of SR 57 down the Santa Ana River channel to link up with I-405 and SR 73. Finally, the Transportation Corridors Agencies in Orange County are developing three other toll roads, at a capital cost of $1.743 billion; two of these will include HOV facilities.

D. Working at HomeD. Working at Home

The future of telecommuting has been hotly debated. Obviously, its rate of change could have a nonnegligible impact on travel demand. The estimates vary widely; one of the most quoted is the Bureau of Labor Statistics 1987 figure of 9 million workers working at home more than eight hours per week. Most of this was in the form of unpaid overtime, but 1.9 million workers (two-thirds of them women) worked exclusively at home. There are many problems with home-based work; lost social contacts, supervisory control issues, data and documentation security risks. However, in an era of downsizing, an expansion in out-sourcing services by large firms and the desire to cut down on office space requirements and costs are likely to result in a secular upward trend in working at home.

Although the proportion of local area workers that worked at home increased from 1.68 percent in 1980 to 2.73 percent in 1990, this trend is less visible nationally. In fact, the American Housing Surveys for 1985 and 1989 show a national decline in workers (in all urban areas) that worked at

home, from 2.09 percent to 1.97 percent. On the other hand, Census information showed an increase between 1980 and 1990 from 2.3 percent to 3.0 percent.[15] What is interesting is the fact that, in 1990, only about 120,000 more local area workers used public transit than worked at home. In addition, transit commuter use has been falling while working at home has been becoming more popular.

E. Commercial Transportation in Los AngelesE. Commercial Transportation in Los Angeles

To compete with the private auto, alternate modes must offer door-to-door convenience. This is one reason why the poorest households who are less likely to own autos use taxis to a surprisingly large extent. In 1990, households with incomes below $15,000 were 21.3 percent of all households but accounted for 29.2 percent of all taxi trips, 19.9 percent of all private vehicle trips and 27 percent of all transit trips.[16] It is perhaps surprising, therefore, that local transportation planners have not even considered the door-to-door transportation service expansion that would cost taxpayers almost nothing: taxi deregulation. Taxicabs in the city of Los Angeles are regulated by the Los Angeles Department of Transportation.[17] Firm licenses are restricted to operation within the Los Angeles city limits. The strict application of the law maintains that cabs which cross city boundaries must be regulated by the California Public Utilities Commission. In Los Angeles, fares are regulated and the rules restrict each firm to a service area based on one or more City Council districts. Firms may not pick up passengers outside their own franchise area except by telephone order, and they are fined for soliciting business outside their service areas. Firms, however, may not refuse requests for destinations anywhere in the city.

The numbers of taxicabs licensed in Los Angeles has remained stable over the last three years. There are nine licensed taxicab companies in the city, authorized to operate a maximum of 1,432 vehicles. As of February 1993, the nine companies operated 1,294 vehicles. Yearly averages for taxicabs in service are given in Table 3.

Table 3

	1987	1988	1989	1990	1991	1992	1993
Taxis				1280	1280	1313	1294
Shuttle	17	20	27	33	37	37	

SOURCE: USC Planning Institute research.

Firms that wish to offer intercity shared-ride service may do so under PUC regulations. Under present law, these vehicles may not rove for customers or use meters; orders must be made in advance for a fixed fare (set by the PUC). These services, unlike taxicabs, may cross city boundaries and service any area within 40 miles of their home office.

These are the rules that apply to airport shuttle vans.

There has been relatively open entry into the airport shuttle van industry since 1989. The shuttle van industry in California now carries 8 million passengers a year and earns revenues of over $100 million statewide, according to the Public Utilities Commission. Since 1989, the share of revenues held by the largest firms has dropped, and the numbers of vans and firms have gone up. At LAX, the number of firms increased from 17 in 1987 to 37 in 1992. The market share held by the four largest firms dropped from 85 percent in 1988 to 73 percent in 1990. The share held by the largest firm, Super Shuttle, dropped from 72 percent to 58 percent over the same period. All available statistics show a surge in activity immediately after the opening of competition. Yearly averages for the number of shuttle van companies in service are given in Table 3.

Given the restrictions on taxis, the limited geographic focus of the successful shuttle van industry suggests a puzzle as well as an opportunity. The reasons that the shuttle van operators cannot expand their service beyond the airport are the current PUC restrictions against roving and meters.

V. CONCLUSIONS AND FURTHER STUDYV. CONCLUSIONS AND FURTHER STUDY

This paper has shown that travel behavior in Los Angeles is very similar to that in the nation as a whole. Los Angeles' somewhat longer worktrip distances are somewhat compensated by above-average travel speeds. Nonworktrips have as high a share of total trips as in the other large cities, but more of these take place in peak travel hours than in other cities. Faster central city travel speeds in Los Angeles are a little misleading because they partly reflect the peculiar character of the officially defined central city, namely the inclusion of characteristically suburban areas (with fewer traffic problems) in the City of Los Angeles. The evidence suggests that commuting times in Los Angeles have remained more or less constant for a quarter of a century, but a precise conclusion is difficult because different data sources include or exclude transit use, carpooling and trip-chaining.

We argue that this relative constancy is the result of a coping mechanism in locational adjustments whereby households and firms progressively relocate to decentralized locations in order to maintain access to each other. Somewhat surprisingly to those who think of Los Angeles as an outlier rather than the norm, the decentralization trends observed in Los Angeles are replicated to a similar degree everywhere else. Average vehicle occupancy has declined both in Los Angeles and across the nation, in part because of declining household size, but also because of the low attractiveness of commuting carpools (especially the three- and four-person carpools). An unresolved question is whether the current HOV expansion projects can reverse the carpooling trends. Further deregulation of the shuttle van industry could have more than negligible impacts on average vehicle occupancies. Although the picture remains unclear, working at home is increasing in Los Angeles but may be declining slightly in the nation as a whole. A noteworthy fact is that working at home in Los Angeles

is rapidly catching up with the use of transit, an interesting observation given the magnitude of public investment in transit and the negligible public resources allocated to promoting working at home.

A companion study will continue these discussions in an effort to offer alternative policy guidelines. That paper will examine current plans and compare these to policies that stress market-based alternatives to the plans now being implemented in the Los Angeles area.

ABOUT THE AUTHORSABOUT THE AUTHORS

Peter Gordon is Dean of the School of Urban and Regional Planning at the University of Southern California, and a professor in both the School of Planning and the Department of Economics. He has consulted for a number of international agencies, government departments, and private groups. He earned his Ph.D. from the University of Pennsylvania.

Harry W. Richardson is professor of economics and planning at the University of Southern California. He served as president of the Western Regional Science Association in 1988–89 and is currently associate editor of *African Urban Quarterly* and an editorial board member of *Regional Studies*. His current work involved economic impact models such as the Southern California Planning Model.

APPENDICESAPPENDICES

Table A-1

MODE CHOICES, LOS ANGELES METROPOLITAN AREA, FROM THE 1980 AND 1990 CENSUS

	1980		1990	
	Number	Fraction	Number	Fraction
Los Angeles County				
Workers (16 years & older)	3,222,572		4,115,248	
Private car, truck, van	2,755,693	(.86133)	3,524,185	(.85637)
Drive Alone	2,223,055	(.68984)	2,884,615	(.70096)
Carpool	552,638	(.17149)	639,570	(.15541)
Public transportation	208,962	(.06484)	265,029	(.06440)
Bus or streetcar	206,960	(.06422)	264,052	(.06416)
Subway, elevated train, railroad	887	(.00028)	977	(.00024)
Worked at home	49,295	(.01530)	112,797	(.02741)
Walked	113,642	(.03526)	133,927	(.03254)
Other	74,980	(.02327)	77,129	(.01874)
Orange County				
Workers (16 years and older)	811,407		1,278,661	
Private car, truck, van	736,611	(.90782)	1,156,060	(.90412)
Drive alone	607,681	(.74892)	981,436	(.76755)
Carpool	128,930	(.15890)	174,624	(.13657)
Public transportation	15,154	(.01868)	31,798	(.02487)
Bus or streetcar	14,811	(.01825)	31,158	(.02437)
Subway, elevated train, railroad	154	(.00019)	640	(.00050)
Worked at home	13,654	(.01683)	34,382	(.02689)
Walked	20,818	(.02566)	28,560	(.02234)
Other	25,170	(.03102)	27,456	(.02147)
Riverside County				
Workers (16 years and older)	201,461		482,618	
Private car, truck, van	179,653	(.89175)	441,282	(.91435)
Drive alone	144,384	(.71668)	356,024	(.73769)
Carpool	35,269	(.17507)	85,258	(.17666)
Public transportation	1,828	(.00907)	4,359	(.00903)
Bus or streetcar	1,760	(.00087)	4,303	(.00892)
Subway, elevated train, railroad	--	(.00000)	56	(.00012)
Worked at home	5,735	(.02847)	14,482	(.03001)
Walked	8,154	(.04047)	11,909	(.02468)

MODE CHOICES, LOS ANGELES METROPOLITAN AREA, FROM THE 1980 AND 1990 CENSUS

	1980		1990	
	Number	Fraction	Number	Fraction
Other	6,091	(.03023)	10,400	(.02155)

San Bernardino County				
Workers (16 years and older)	275,705		597,330	
Private car, truck, van	247,714	(.89847)	549,865	(.92054)
Drive alone	204,379	(.74130)	449,204	(.75202)
Carpool	43,335	(.15718)	100,661	(.16852)
Public transportation	2,263	(.00821)	4,161	(.00697)
Bus or streetcar	1,971	(.00715)	4,061	(.00680)
Subway, elevated train, railroad	76	(.00028)	100	(.00017)
Worked at home	5,772	(.02094)	14,303	(.02394)
Walked	11,035	(.04002)	17,118	(.02866)
Other	8,921	(.03236)	11,669	(.01954)
Ventura County				
Workers (16 years and older)	165,726		335,186	
Private car, truck, van	146,964	(.88679)	306,891	(.91558)
Drive alone	116,921	(.70551)	254,755	(.76004)
Carpool	30,043	(.18128)	52,136	(.15554)
Public transportation	2,618	(.01580)	2,096	(.00625)
Bus or streetcar	2,583	(.01559)	2,057	(.00614)
Subway, elevated train, railroad	--	(.00000)	39	(.00012)
Worked at home	3,939	(.02377)	10,138	(.03025)
Walked	6,024	(.03635)	8,430	(.02515)
Other	6,181	(.03730)	7,497	(.02237)
Five-county area (L.A. CMSA)				
Workers (16 years and older)	4,676,871		6,809,043	
Private car, truck, van	4,086,635	(.87380)	5,978,283	(.87799)
Drive alone	3,296,420	(.70483)	4,926,034	(.72345)
Carpool	790,215	(.16896)	1,052,249	(.15454)
Public transportation	230,825	(.04935)	307,443	(.04515)
Bus or streetcar	228,085	(.04877)	305,631	(.04489)
Subway, elevated train, railroad	1,117	(.00024)	1,812	(.00027)
Worked at home	78,395	(.01676)	186,102	(.02733)
Walked	159,673	(.03414)	199,944	(.02936)
Other	121,343	(.02595)	134,151	(.01970)

SOURCE: 1980 Census of Population, Volume 2, Subjects Reports, *Place of Work*, PC80-2-6E, Table 1. 1990 Census of Population and Housing, Summary File 3.

Table A-2

WORKTRIP DURATIONS AND SPEEDS (PRIVATE VEHICLES) COMPARED WITH CMSA GROWTH

CMSA	1990 Pop. (000)	Pop. Change (000) 1980-1990	% Pop. Change 1980-1990	Central City P.M. Peak Worktrip Duration, 1990 (min.)	Worktrip Duration, 1990 (mins.)		Worktrip Speed, 1990 (MPH)	
					Residing Inside Central City	Residing Outside Central City	Residing Inside Central City	Residing Outside Central City
Los Angeles	14,532	3034	26.4	25.5	23.7	26.0	31.7	33.6
Dallas	3,885	954	32.6	25.5	21.0	18.8	33.0	36.1
San Francisco	6,253	885	16.5	16.6	19.7	21.9	29.6	33.9
Houston	3,711	611	19.7	24.7	20.2	24.5	29.2	33.9
Miami	3,193	549	20.8	19.8	19.7	23.5	32.8	28.6
New York	18,087	547	3.1	26.1	23.0	23.4	26.7	31.5
Seattle	2,559	466	22.3	19.8	20.1	30.1	32.3	29.5
Denver	1,848	230	14.2	24.7	21.2	20.5	31.6	32.2
Philadelphia	5,899	218	3.8	22.3	22.6	22.1	34.8	30.8
Boston	4,172	200	5.0	24.3	21.3	20.8	26.9	33.2
Portland	1,478	180	13.9	18.3	16.8	21.6	26.7	35.0
Chicago	8,066	129	1.6	30.4	27.8	23.3	32.5	28.1
Cincinnati	1,744	84	5.1	19.2	17.4	22.0	31.5	34.8
Hartford	1,086	72	7.1	19.2	17.1	22.2	29.6	32.6
Providence	1,142	59	5.5	16.7	12.5	19.1	39.0	35.1
Milwaukee	1,607	37	2.4	21.5	19.8	19.1	29.9	35.1
Buffalo	1,189	-54	-4.4	16.7	17.7	24.1	35.5	34.3
Cleveland	2,760	-74	-2.6	19.1	19.8	20.3	27.1	30.4
Detroit	4,665	-88	-1.9	24.2	20.9	22.8	29.4	36.8
Pittsburgh	2,243	-180	-7.4	28.8	22.2	17.7	25.6	29.5

SOURCES: 1990 and 1980 Census Population and NPTS data.

Table A-3

JOBS AND WORKERS IN SOUTHERN CALIFORNIA, 1990

Los Angeles-Anaheim-Riverside CA CMSA		Los Angeles County	Orange County	Riverside County	San Bernardino County	Ventura County	Five-County Total	Worked Elsewhere
TOTAL JOBS	6,893,334	4,344,614	1,280,811	407,118	501,420	279,794	6,813,757	79,577
COUNTY OF RESIDENCE								
Los Angeles County	4,115,248	3,872,310	140,999	7,257	34,747	23,635	4,078,948	36,300
Orange County	1,278,861	202,944	1,043,418	9,034	8,514	492	1,264,402	14,459
Riverside County	482,618	38,455	49,645	340,095	43,582	207	471,984	10,634
San Bernardino County	597,330	115,261	27,197	41,390	406,361	319	590,528	6,802
Ventura County	335,188	72,353	763	99	243	250,348	323,806	11,382
Five-County Total	6,809,245	4,301,323	1,262,022	397,875	493,447	275,001	6,729,668	79,577
Living Elsewhere	84,089	43,291	18,789	9,243	7,973	4,793	84,089	

SOURCE: U.S. Bureau of the Census, CTPP, 1990

Table A-4

PERCENTAGE OF PERSON-TRIPS BY TRIPS PURPOSE AND TIME OF DAY L.A. CMSA vs OTHER NINE LARGEST CMSAs, 1990 (all modes)

	Non-stop Worktrips			Worktrip Chains			All Other Trips		
	A.M. Peak	P.M. Peak	Off Peak	A.M. Peak	P.M. Peak	Off Peak	A.M. Peak	P.M. Peak	Off Peak
L.A. CMSA	6.46	4.60	7.54	1.17	4.25	5.66	5.73	11.54	53.05
NINE CMSAs	6.83	4.60	7.05	1.19	3.72	4.89	4.47	10.99	56.26
U.S. Metro	6.41	4.26	6.88						

SOURCE: 1990 NPTS data

Notes:

1. 1 mile <= distance <= 150 miles.
2. 1 min. <= duration <= 150 minutes.
3. 3 MPH <= speed <= 80 MPH.
4. Trips less than 1 mile and 1 minute excluded.
5. Nonstop worktrips are direct worktrips.
6. All legs of the chained trips are treated as separate trips.
7. A.M. Peak is 6-9 A.M., P.M. Peak is 4-7 P.M., weekdays; Off Peak includes all other hours and weekends.

Table A-5

DISTANCES, DURATIONS, SPEEDS: SHOPPING TRIPS
(ranked by speeds in right most column)

Consolidated Metropolitan Statistical Area	Distance (miles)		Duration (mins.)		Speed (MPH)	
	Inside Central City	Outside Central City	Inside Central City	Outside Central City	Inside Central City	Outside Central City
Cleveland-Akron-Lorain, OH	8.20	5.46	14.01	11.48	31.80	25.15
Seattle-Tacoma, WA	5.78	4.60	10.84	10.52	26.23	25.35
Miami-Fort Lauderdale, FL	4.94	5.49	12.48	12.84	22.92	25.88
Chicago-Gary-Lake County, IL-IN-WI	4.74	4.94	11.74	11.62	24.31	26.36
Houston-Galveston-Brazoria, TX	5.09	5.48	11.98	11.50	25.61	26.58
Providence-Pawtucket-Fall River, RI-MA	5.30	5.30	12.05	11.48	26.70	26.68
San Francisco-Oakland-San Jose, CA	4.53	6.30	12.43	13.02	23.60	27.17
Los Angeles, Anaheim-Riverside, CA	4.85	4.60	11.01	9.91	26.33	27.36
Buffalo-Niagara Falls, NY	7.40	6.91	14.84	13.42	26.80	27.37
New York-North, NJ-Long Island, NY-NJ-CT	4.83	5.40	12.25	11.76	23.58	27.59
Detroit-Ann Arbor, MI	6.16	6.64	12.04	12.21	28.85	28.07
Phila.-Wilmington-Trenton, PA-DE-NJ-MD	3.80	6.02	10.60	11.88	22.86	28.37
Pittsburgh-Beaver Valley, PA	6.25	5.84	14.05	11.66	30.97	28.71
Boston-Lawrence-Salem, MA-NH	3.50	6.24	8.56	12.52	24.34	29.19
Denver-Boulder, CO	3.79	4.97	10.81	10.40	21.85	29.96
Cincinnati-Hamilton, OH-KY-IN	5.16	7.40	11.00	12.89	28.63	30.50
Dallas-Fort Worth, TX	4.36	5.70	8.90	10.81	29.02	30.70
Hartford-New Britain-Middletown, CT	4.46	6.69	10.20	12.16	25.42	30.81
Portland-Vancouver, OR-WA	5.10	5.90	11.07	9.84	23.36	36.06
Milwaukee-Racine, WI	6.19	8.63	11.63	12.42	30.62	37.64

SOURCE: 1990 NPTS data

Notes:
1. Travel days: weekdays and weekends.
2. Private vehicles only.
3. Person trips excluding those with distance < 0.5 mile.
4. 0 < Distance <= 150 miles.
5. 0 < Duration <= 150 minutes.
6. 3 <= speed <= 80 MPH.

Table A-6

DISTANCES, DURATIONS, SPEEDS: OTHER FAMILY/PERSONAL BUSINESS TRIPS (ranked by speeds in right most column)

Consolidated Metropolitan Statistical Area	Distance (miles)		Duration (mins.)		Speed (MPH)	
	Inside Central City	Outside Central City	Inside Central City	Outside Central City	Inside Central City	Outside Central City
Chicago-Gary-Lake County, IL-IN-WI	5.88	7.57	13.41	14.35	23.10	26.66
Cleveland-Akron-Lorain, OH	5.65	6.63	11.87	13.04	28.99	26.91
Houston-Galveston-Brazoria, TX	6.36	7.59	13.98	14.81	28.38	27.72
Phila.-Wilmington-Trenton, PA-DE-NJ-MD	5.50	6.79	11.97	13.91	23.87	27.85
New York-North, NJ-Long Island, NY-NJ-CT	6.04	7.18	13.67	13.72	23.93	28.48
Miami-Fort Lauderdale, FL	12.05	5.95	18.33	13.31	31.93	28.71
Pittsburgh-Beaver Valley, PA	7.49	7.68	13.76	14.97	26.49	28.87
Hartford-New Britain-Middletown, CT	6.44	7.54	13.46	14.03	27.03	29.56
Los Angeles-Anaheim-Riverside, CA	8.88	8.06	15.41	14.31	30.40	29.64
San Francisco-Oakland-San Jose, CA	9.88	8.77	16.15	15.60	31.16	29.87
Denver-Boulder, CO	6.58	6.94	12.93	14.38	26.32	29.93
Seattle-Tacoma, WA	8.87	10.70	19.04	17.48	27.89	30.98
Boston-Lawrence-Salem, MA-NH	8.67	9.07	16.59	15.08	27.05	31.75
Buffalo-Niagera Falls, NY	4.69	7.11	9.38	12.69	27.08	32.64
Providence-Pawtucket-Fall River, RI-MA	8.56	6.33	15.94	11.02	35.33	32.69
Portland-Vancouver, OR-WA	10.19	8.85	18.44	14.51	30.23	32.90
Milwaukee-Racine, WI	7.39	6.88	14.09	12.39	28.81	33.14
Cincinnati-Hamilton, OH-KY-IN	6.86	11.20	13.50	18.05	32.78	33.76
Dallas-Fort Worth, TX	9.08	7.34	14.35	11.82	33.05	34.62
Detroit-Ann Arbor, MI	8.59	9.16	14.51	14.51	33.43	34.72

SOURCE: 1990 NPTS data

Notes:
1. Travel days: weekdays and weekends.
2. Private vehicles only.
3. Person trips excluding those with distance < 0.5 mile.
4. 0 < Distance <= 150 miles.
5. 0 < Duration <= 150 minutes.
6. 3 <= speed <= 80 MPH.

Table A-7

COMPARISON OF MEAN TRIP SPEEDS: L.A. CMSA vs. OTHER NINE LARGEST CMSAs, 1990
(person-trips; driving alone in private vehicles only; in miles per hour)

L.A./ Others		Nonstop Worktrips			All Other Trips		
		A.M. Peak	P.M. Peak	Off Peak	A.M. Peak	P.M. Peak	Off Peak
Residing Inside Central Cities	Male	31.2/ 32.2	26.7/ 30.7	37.4/ 30.7**	23.5/ 27.5	30.6/ 26.8	31.2/ 27.1**
	Female	34.7/ 27.7**	25.5/ 26.7	30.3/ 27.4	27.3/ 24.8	30.3/ 25.0*	31.5/ 27.1**
Residing Outside Central Cities	Male	33.1/ 33.1	30.9/ 31.4	35.2/ 33.8	27.2/ 29.7	28.7/ 29.0	30.6/ 29.4
	Female	32.7/ 30.4	33.0/ 29.7	35.1/ 31.6	33.1/ 28.3*	27.6/ 30.1	27.0/ 28.9*
TOTAL		32.8/ 31.4	29.7/ 30.2	34.8/ 31.7**	28.7/ 28.0	29.0/ 28.3	29.8/ 28.5**

* Significantly different at 95% level of confidence (two-tailed test).
** Significantly different at 99% level of confidence (two-tailed test).

SOURCE: 1990 NPTS data

Notes:
1. 1 mile <= distance <= 150 miles
2. 1 min. <= duration <= 150 minutes.
3. 3 MPH <= speed <= 80 MPH
4. Trips less than 1 mile and 1 minute excluded.
5. Nonstop worktrips are direct worktrips.
6. All other trips include all nonwork trips plus all in-chain worktrips.
7. A.M. Peak is 6-9 A.M, P.M. Peak is 4-7 P.M., weekdays; Off Peak includes all other hours and weekends.

Table A-8

PERSON-TRIPS BY MEN BY MODE AND PURPOSE, 1983 AND 1990 NPTS

Purpose	Private		Public		Other[a]		Total	
	1983	1990	1983	1990	1983	1990	1983	1990
Earning a Living	26,360 (87.01%)	27,216 (91.51%)	1,052 (3.47%)	1,089 (3.66%)	2,884 (9.52%)	1,435 (4.83%)	30,296 (100.00%) 27.08%[b]	29,740 (100.00%) 25.26%
Family & personal business	30,020 (84.07%)	40,461 (92.66%)	400 (1.12%)	350 (0.80%)	5,287 (14.81%)	2,855 (6.54%)	35,707 (100.00%) 31.92%	43,666 (100.00%) 37.08%
Civic, educational & religious	6,628 (53.94%)	7,564 (57.79%)	524 (4.26%)	448 (3.42%)	5,137 (41.80%)	5,076 (38.79%)	12,289 (100.00%) 10.98%	13,088 (100.00%) 11.11%
Social & recreational	23,987 (77.06%)	26,148 (86.06%)	563 (1.81%)	358 (1.18%)	6,578 (21.13%)	3,876 (12.76%)	31,128 (100.00%) 27.82%	30,382 (100.00%) 25.80%
All purposes[c]	89,038 (79.59%)	102,081 (86.69%)	2,532 (2.26%)	2,272 (1.93%)	20,301 (18.15%)	13,401 (11.38%)	111,871 (100.00%)	117,754 (100.00%)

Table A-9

PERSON-TRIPS BY WOMEN BY MODE AND PURPOSE, 1983 AND 1990 NPTS

Purpose	Private		Public		Other[a]		Total	
	1983	1990	1983	1990	1983	1990	1983	1990
Earning a Living	18,200 (87.2%)	21,900 (90.8%)	1,250 (6.0%)	1,011 (4.2%)	1,414 (6.8%)	1,204 (5.0%)	20,864 (100.00%) 18.54%[b]	24,115 (100.00%) 18.30%
Family & personal business	40,000 (91.0%)	55,600 (92.6%)	476 (1.1%)	656 (1.1%)	3,475 (7.9%)	3,771 (6.3%)	43,951 (100.00%) 39.06%	60,027 (100.00%) 45.54%
Civic, educational & religious	8,172 (57.6%)	10,000 (65.4%)	720 (5.1%)	627 (4.1%)	5,296 (37.3%)	4,660 (30.5%)	14,188 (100.00%) 12.61%	15,287 (100.00%) 11.60%
Social & recreational	26,300 (85.4%)	27,200 (86.5%)	428 (1.4%)	384 (1.2%)	4,074 (13.2%)	3,851 (12.3%)	30,802 (100.00%) 27.38%	31,435 (100.00%) 23.85%
All purposes[c]	94,948 (84.4%)	115,491 (87.6%)	2,922 (2.6%)	2,686 (2.0%)	14,644 (13.0%)	13,631 (10.3%)	112,514 (100.00%)	131,808 (100.00%)

SOURCE: Travel Day data, Patricia S. Hu and Jennifer Young, 1992, Summary of Travel Trends: 1990 Nationwide Personal Transportation Survey. Conversations with the authors indicate that 1983 data are estimates currently being revised.

Notes: [a] Includes trips by bicycle, walking, school bus, taxi, airplane, Amtrak, moped and other modes.
[b] Trip purpose share.
[c] Category "Other trips" not shown.

Table A-10

PER CAPITA ANNUAL PERSON-TRIPS BY MEN BY MODE AND PURPOSE, 1983 AND 1990 NPTS

Purpose	Private		Public		Other[a]		Total		Percent Change
	1983	1990	1983	1990	1983	1990	1983	1990	
Earning a Living	236.38	237.82	9.43	9.52	25.86	12.54	271.68	259.87	-4.35
Family & personal business	269.20	353.55	3.59	3.06	47.41	24.95	320.20	381.56	19.16
Civic, educational & religious	59.44	66.10	4.70	3.91	46.07	44.35	110.20	114.36	3.77
Social & recreational	215.10	228.48	5.05	3.13	58.99	33.87	279.14	265.48	-4.89
All purposes[b]	798.45	892.00	22.71	19.85	182.05	117.10	1003.20	1028.95	2.57

Table A-11

PER CAPITA ANNUAL PERSON-TRIPS BY WOMEN BY MODE AND PURPOSE 1983 AND 1990 NPTS

Purpose	Private		Public		Other[a]		Total		Percent Change
	1983	1990	1983	1990	1983	1990	1983	1990	
Earning a Living	154.32	175.24	10.60	8.09	11.99	9.63	176.91	192.96	9.07
Family & personal business	339.16	444.89	4.04	5.25	29.46	30.17	372.66	480.31	28.89
Civic, educational & religious	69.29	80.02	6.10	5.02	44.90	37.29	120.30	122.32	1.68
Social & recreational	223.00	217.64	3.63	3.07	34.54	30.81	261.17	251.53	-3.69
All purposes[b]	805.06	924.11	24.78	21.49	124.17	109.07	954.00	1054.67	10.55

SOURCE: Travel Day data, Patricia S. Hu and Jennifer Young, 1992, Summary of Travel Trends: 1990 Nationwide Personal Transportation Survey. Conversations with the authors indicate that 1983 data are estimates currently being revised.

Notes: [a] Includes trips by bicycle, walking, school bus, taxi, airplane, Amtrak, moped and other modes.
[b] Category "Other trips" not shown.

Table A-12

DOWNTOWN JOB GROWTH BY MAJOR SECTOR, 1976–80, 1980–86 LOS ANGELES CBD* (average annual growth rates)

	1976–1980	1980–1986
TOTAL	0.0386	0.0032
Manufacturing	0.0177	-0.0447
Retail	0.1291	-0.1149
FIRE & Services	0.0281	0.0112

* CBD refers to Central Business District; RCC refers to the Rest of the Central City; Ring I refers to the balance of the core MSA; Ring II refers to the balance of the CMSA, in this case the Anaheim-Santa Ana MSA.

SOURCE: Computed from The Wharton Urban Decentralization Project Database.

Table A-13

SHARES OF SECTORAL EMPLOYMENT, 1976, 1980, 1986, BY LOCATION, L.A. and Orange Counties

	CBD*			RCC			RING I			RING II		
	'76	'80	'86	'76	'80	'86	'76	'80	'86	'76	'80	'86
TOTAL	.058	.054	.049	.349	.326	.287	.426	.425	.437	.167	.195	.227
Mfg.	.042	.039	.029	.317	.277	.253	.470	.479	.492	.171	.205	.226
Retail	.034	.050	.022	.295	.285	.271	.468	.428	.450	.203	.237	.256
Fire & Svcs.	.083	.068	.060	.406	.392	.331	.357	.370	.390	.153	.170	.219

SOURCE: Computed from The Wharton Urban Decentralization Project Database.

Table A-14

SECTORAL EMPLOYMENT TRENDS IN TWELVE MAJOR CMSAS*, 1982–87

Sector	Central City			Ring I			Ring II			CMSA
	1982 Share	1987 Share	AGR** 1982–87	1982 Share	1987 Share	AGR** 1982–87	1982 Share	1987 Share	AGR** 1982–87	AGR** 1982–87
Manufacturing	.302	.258	-.0388	.349	.377	.0075	.349	.365	.0012	-.0078
Retail	.281	.258	.0215	.368	.379	.0454	.351	.364	.0468	.0394
Wholesale	.377	.319	-.0029	.336	.360	.0445	.287	.321	.0535	.0304
Services	.416	.361	.0397	.300	.327	.0885	.284	.313	.0904	.0698

* Includes New York, Los Angeles, Chicago, Philadelphia, San Francisco, Detroit, Houston, Miami, Cleveland, Milwaukee, Cincinnati, Seattle

** Annual Growth Rate

SOURCE: P. Gordon and H.W. Richardson (1992), "L.A. Lost and Found," Tables 4 and 5.

ENDNOTES AND REFERENCESENDNOTES AND REFERENCES

1. TTI used Los Angeles county (the PMSA) for analysis. Unless otherwise stated, this report focuses on the five-county area, denoted by the United States Census as the Los Angeles-Anaheim-Riverside CMSA. In 1990, the PMSA accounted for 61 percent of the CMSA's 14,532,000 population and 60 percent of the CMSA's 6,814,000 jobs (according to the Census Bureau's CTPP file, based on the long form; the Bureau's STF-3 complete enumeration reports 6,913,000 CMSA jobs). The TTI index uses vehicle-miles of travel per lane-mile data. These are contrasted with parameters that supposedly indicate "congested conditions."

2. The "1990 Nationwide Personal Transportation Survey" (NPTS) is the fourth of a series of large-scale national personal travel surveys. The most recent one reports data from a telephone survey of 22,300 households (including 48,400 persons) throughout the United States Research Triangle Institute conducted the interviews for the Federal Highway Administration of the United States Department of Transportation.

3. *Travel Behavior Issues in the `90s*, Alan E. Pisarski, Office of Highway Information Management, HPM-40, Federal Highway Administration, July 1992.

4. Yu-chun Liao, "Trip Chaining in Urban Travel," presented at University of Southern California Urban Economics Group seminar, February 1993.

5. Peter Gordon and Harry W. Richardson, "Notes from the Underground: The Failure of Urban Mass Transit," *The Public Interest*, vol. 94, (1989).

6. NPTS data show that for 1977, 39.1 percent of all trips began in the six peak hours (6-9 A.M., 4-7 P.M.), 37.2 percent of all trips started in these six hours in 1983, while 38.3 percent of all trips started in the same six hours in 1990.

7. The United States Department of Transportation's Federal Highway Administration has been reporting average daily traffic per freeway lane *for urbanized areas* since 1989 (United States Department of Transportation, "Highway Statistics 1989, 1990, 1991"; HM-72). The ratios for the Los Angeles-Long Beach-Pomona-Ontario Urbanized Area were 22,823 in 1989, 23,368 in 1990, and 23,216 in 1991, indicating that freeway capacity expansion has been lagging growing demand.

8. John R. Meyer, John F. Kain and Martin Wohl, *The Urban Transportation Problem* (Cambridge: Harvard University Press, 1965).
George W. Hilton, "Rail transit and the Pattern of Cities: The California Case," *Traffic Quarterly*, vol. 3, (1967).

George W. Hilton, "Federal Transit Subsidies," American Enterprise Institute, Washington, D.C., (1974).
Jose A. Gomez-Ibanez, "A Dark Side to Light Rail?" *Journal of the American Planning Association*, vol. 57, (1985).
Alan E. Pisarski, "Commuting in America: A National Report on Commuting Patterns and Trends," Eno Foundation for Transportation, Westport, (1987).
John Kain, "Choosing the Wrong Technology: Or How to Spend Billions and Reduce Transit Use," *Journal of Advanced Transportation*, vol. 21, (1988).
Peter Gordon and Harry W. Richardson, "Notes from the Underground: The Failure of Urban Mass Transit," *The Public Interest*, vol. 94, (1989).
Martin Wachs, "United States Transit Subsidy Policy: In Need of Reform," *Science*, vol. 244, (1989).
John Kain, "Deception in Dallas: Strategic Misrepresentation in Rail Transit Promotion and Evaluation," *Journal of the American Planning Association*, vol. 56, (1990).

9. These amounts are from the LACTC "Fundable Plan," described in the *LACTC Proposed 30-Year Integrated Transportation Plan*, March 1992. The document also mentions an "Expanded Plan" which assumes that "reasonable revenue increases" will be forthcoming, including a new federal gasoline tax. Beyond that, there are allusions to an "unconstrained Plan" which "includes all potential transportation improvements identified for the County." In this scenario, "No resource constraints are assumed, and no analysis of costs and revenues has been conducted," p. 67.

10. Nora Zamichow, "Ridership Forecasts Have Track Record of Peaks, Valleys," *Los Angeles Times*, January 30, 1993.

11. Anthony Downs, *Stuck in Traffic*, Cambridge, Mass.: The Lincoln Institute of Land Policy, 1992.

12. James E. Moore II, "Ridership and Cost on the Long Beach-Los Angeles Blue Line Train," *Transportation Research A*, Vol. 27, 1993.

13. Don Pickrell, "Urban Rail Transit Projects: Forecast Versus Actual Ridership and Costs," Transportation Systems Center, U.S. Department of Transportation, October 1989.

14. Genevieve Giuliano, Keith Hwang and Martin Wachs, "Employee Trip Reduction in Southern California: First Year Results," *Transportation Research A*, forthcoming.

15. "Supplement to the American Housing Survey," "Current Housing Reports H151/85," Table 1–5, p. 14–15, February 1991 and "Supplement to the American Housing Survey," "Current

Housing Reports H151/89," Tables 1–5, p. 12–13, October 1992.
United States Department of Transportation Federal Highway Administration, *New Perspectives in Commuting*, July 1992, p. 5.

16. John Pucher and Fred Williams, "Socioeconomic Characteristics of Urban Travelers: Evidence from the 1990–91 NPTS," *Transportation Quarterly*, vol. 46, (1992).

17. Cab regulations may be divided into those related to operation procedures, drivers, and vehicles. Each of the regulations carries the possibility of a fine and suspension of service for violation. Independent associations (cooperatives of owner-operators) are also regulated in the same manner and subject to the same rules as taxi companies, with additional restrictions on admitting lone owner-operators into the associations. For firms and associations, drivers must be licensed by LADOT in addition to their California driver's license. They must meet standards of appearance and conduct set forth in the City's Taxicab Rules. Firms must keep records on each driver that are reported to LADOT monthly. Any changes in drivers must be reported immediately. Vehicles must also be permitted by LADOT, which regulates the make and model and specifies minimum equipment. The Taxicab Rules specify everything from radios and meters to hubcaps and bumper stickers. The vehicle is to be not more than four years old when first placed in service. Vehicles must be retired after reaching seven years of age; however, two extensions of a year each are possible if inspections are passed. Not surprisingly, 94 percent of all cabs are four years old or older, with an average age of 5.7 years. Vehicles must be inspected twice a year, and they must carry LADOT-approved insurance. In the past, such operations took place under LADOT "auto-for-hire" regulations, but only within city boundaries. In 1988, when the PUC removed restrictions on the minimum number of seats a vehicle must have to qualify as a shared-ride service, all but one of the former LADOT "autos-for-hire" converted to PUC authority. Prior to the creation of a shuttle van industry, airport transportation in California was limited to taxicabs and fixed-schedule buses, called passenger stage carriers (PSCs). PSCs operated at each airport under monopoly contracts in the past; they continue to operate under more open regulations today. The first on-call airport shuttle van services were approved by the PUC in 1976. Competition was allowed in 1980, under strictly regulated service areas based on the number of carriers and size of firms. In 1989 open entry was allowed. A moratorium on new firms was imposed for 6 months between November 1991 and May 1992 at the request of existing firms. There are entry and exit restrictions in the market. Applications for permits cost $500 and take from 3 to 9 months for approval by the PUC. Upon PUC approval, individual airport authorities then begin a second approval process, which adds further delay. In addition, LAX requires that all firms must purchase new vehicles (though anecdotal evidence suggests this is not strictly enforced). LAX has also imposed irregular moratoriums. The PUC has found that 20 percent of firms that receive state approval never begin operations, possibly due to delays

and denials of local permits.