

Changes over Time in Transportation Mode for Journey to Work: Effects of Aging and Immigration

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The changing commuting behavior of immigrants in Southern California is studied. Using 1980 and 1990 census data, trends in transportation mode are analyzed for cohorts of immigrants defined by age and recency of arrival in the United States. Cohorts are further identified by sex and race-ethnicity. The study finds that recent immigrants are far more reliant on public transit, but after they gain an additional 10 years of residence in the United States, their transit use falls markedly. The change is especially sharp in the case of women, who increase their rate of solo car driving noticeably. The implication is that sustained high immigration bolsters the ridership base of public transit and reduces traffic congestion.

Transportation behavior varies markedly by demographic characteristics, as is well known. The present paper adds two elements to current knowledge. The main contribution is a focus on the role of immigration in shaping commuting behavior. Immigrants are characterized by sex, age, and race-ethnicity, as are native-born citizens, but their commuting behavior systematically differs from that of their native-born counterparts. Immigration researchers, who are largely sociologists or labor economists, have addressed many social and economic differences of immigrants, but to date none has addressed travel behavior.

Immigration is the subject of a comprehensive study under way at the University of Southern California. The

first report issued from the study, *The Changing Immigrants of Southern California* (1), addressed the characteristics of immigrants upon arrival in the United States, naturalization to U.S. citizenship, growth in English language proficiency, occupations, and poverty and income trajectories over time. The present paper is drawn from the second project report, *Transportation, Housing, and Urban Planning Implications of Immigration to Southern California*, principally Section 3 (2). Immigrants' differences and changes in travel behavior turn out to be among the most interesting of all the topics addressed in the overall study.

A second contribution of the present paper is its application of a new methodology for addressing change over time, one that is rooted in maximizing the information value of census data. Census data are essential because the study covered immigrants over time in Southern California, not in the nation, and thus national surveys of transportation, economic, or social behavior could not be used.

The present analysis illustrates the potential insights into longitudinal change that can be gained from cohort analysis with census data. Cohort analysis is a specialized use of census data that provides deeper insights into longitudinal change. An age group in one decade can be linked to the age group that is 10 years older in the next decade. Differences in behavior measured between these two observations reflect the aging of the cohort. This often gives insights that are very different from those

gained in a single survey year. Immigrants have an extra dimension of behavior, namely, the length of time they have resided in the United States and their degree of assimilation during that time. Research on immigrants is forced to consider their travel behavior within the temporal framework of an evolving career that is advancing over both a life cycle and an adjustment period following their arrival in the United States.

The new methodology, termed "double cohort" analysis, was presented by Myers and Lee (3). In this paper only the graphic expression of cohort trajectories is used, a tool invaluable for visualizing complex changes as well as a very useful method for communicating with policy makers and the public. The cohort trajectories also can be represented in a multivariate statistical framework that relies on multidimensional interaction terms. Logit models employed by Myers and Lee (3) permit the introduction of controls for income, education, or other traits likely to determine transportation behavior. Although only mode choice in the journey to work is addressed in this discussion, the outcome variables could be extended to a number of other transportation-related topics, including travel time, number of vehicles available, housing choices, and location.

Census data are indispensable for this analysis. As explained more fully elsewhere (4), census data are collected at regular intervals in a systematic coverage in which comparable questions are asked of a large sample, even the entire population. With these data, reliable investigations of change over decade intervals can be conducted for any local area in the United States. Such questions of change over time are central to most policy issues or other social inquiries. The transportation topic illustrates the value to be gained by exploiting the available census data. It is hoped that Census 2000 will collect data that are comparable in scope and quality to those in 1990 and 1980. Without those data, trends of the 1990s or a comparison of the 1990s trends with those of prior decades cannot be measured reliably.

To preview the findings of the paper, immigrants are far more likely than are those who are native born to use public transit and far less likely to drive alone to work [single-occupant vehicles (SOVs)]. In fact, recent immigrants account for over 40 percent of all transit users in Southern California. Immigrants show far more modest consumption of transportation services and far less per capita impact than do native-born residents. One would expect that the rapid increase in immigration would swell the number of public transit riders and thereby relatively decrease road congestion. Surprisingly, transit use has grown much more slowly than the number of workers in the region, and SOVs have surged ahead. The cohort analysis shows that transit usage, although higher for recent immigrants, plunges over time as they assimilate into Southern California life-style and econ-

omy. (Carpooling also decreases markedly.) Conversely, solo driving rises markedly, especially among women and in certain age ranges.

Transportation planners face a dilemma. They have been striving to attract new riders to transit systems, knowing that if ridership can be increased, service can be expanded and fares lowered. In this positive scenario, more people would find the bus a desirable alternative, which would take drivers off the road, lessen congestion, and improve air quality. As will be shown, immigrants play a major part in the effort to build a constituency for mass transit. Planners have also been trying to boost the number of carpoolers in hopes that higher occupancy levels will also reduce road congestion and air pollution.

However, as immigrants advance economically and adapt to the California life-style, they appear to abandon the buses and join the mainstream, who drive to work. More of them even drive solo, reducing their carpooling over time. The dilemma is that planners may wish to help immigrants assimilate into the middle class, but to do so, the data indicate, would undermine efforts to preserve transit ridership and reduce road congestion. Immigrant success in pursuing the American Dream has inevitable transportation consequences.

Only by closely analyzing census data across two decades can the dynamics of transportation behavior within the context of immigrants' evolving life cycles and careers be fully understood. In turn, the comparison of these immigrants with their native-born counterparts holds a mirror to the rest of society, promoting a better understanding of the transportation behavior of all segments of the diverse U.S. population.

BACKGROUND

A very large body of literature exists about people's travel behavior. Unfortunately, none of this vast literature addresses the specific issue of immigrants. Instead, people are classified by their employment status, type of housing in which they live, sex, family status, age, and income. The literature is also generally cross-sectional; that is, people's travel behavior is studied at a moment in time, or comparisons of behavior at two different moments are sought. Apparently little effort has been made to connect people's behavior over time in a representation of travel careers. Thus, the application of an immigrant cohort model may shed new light on trends in travel behavior.

Pisarski (5) provides a comprehensive and systematic overview of travel behavior in the United States. Population trends, trips by men and women per capita, and average trip length combine to produce total person-miles of travel. In turn, that total travel demand is translated into vehicle-miles of travel (measuring road space

consumed) by factoring in decisions about alternative modes of travel such as mass transit, carpooling, or solo car driving.

In 1990, 20.1 percent of all personal travel in the United States was made up of trips to and from work (6). Travel to work is the centerpiece of travel behavior because many other trips are often chained together as part of the journey to and from work (such as stops at the dry cleaners or the grocery store). Also, travel to work often occurs at peak hours, contributing to congestion and drawing special attention from transportation planners.

During the course of the 1980s, transportation planners were frustrated by several nationwide trends. First, the number of vehicles on the road increased faster (+17.4 percent) than the population grew (+9.7 percent). At the same time, the number of persons driving to work alone (SOVs or solo drivers) grew by 35 percent. Meanwhile, the number of persons using public transit declined by 1.7 percent, and the number of carpoolers fell by some 19.3 percent. As a result of these divergent growth trends, public transit in 1990 accounted for only 5.3 percent of all work trips, whereas SOVs rose to nearly three-fourths of all trips (6, Table 2). Similar trends were found in the Los Angeles region between 1980 and 1990, with by far the largest increase in persons who drive alone, but Pisarski (6, p. 27) notes that the region resisted the decline in carpooling better than most other areas.

Behind the rise in solo driving to work and the decline in transit usage lies a story of increasing gender equality. Women's rising labor force participation has been the major factor in workforce growth, and these women have rapidly increased their rate of solo driving in a convergence with that of men. At the same time, women have reduced their dependence on public transit, which was historically greater than that of men. Here is another dilemma for the transportation planner: to encourage gender equality or to preserve the base of transit ridership?

As will be seen, immigration status—whether U.S. native born or length of residence in the United States—constitutes another important dimension for analysis of transportation behavior. To date, very little has been written on this topic. As part of the broader study of immigrants' progress in Southern California, immigrants' commuting patterns and their changes over time will be studied in depth.

DATA FOR ANALYSIS

Persons who report being employed during the week before the census are asked the following questions: "How did this person usually get to work LAST WEEK? If this

person usually used more than one method of transportation during the trip, fill the circle of the one used for most of the distance." Also, those who traveled by car, truck, or van were asked, "How many people, including this person, usually rode to work in the car, truck or van LAST WEEK?" These questions were included on the long-form version of the census questionnaire, with responses collected from about one in eight persons who were employed the week before the census (4, Chap. 4).

Immigration effects are analyzed by classifying commuters according to their place of birth and year of arrival in the United States. Persons born abroad of U.S. parents or born in outlying territories of the United States (such as Puerto Rico) are treated as native born. The foreign-born commuters are further classified by their answers to the following question in the census: "When did this person come to the United States to stay?" Although a number of detailed categories are provided for answers, the responses have been grouped into decades of arrival: 1980-1990, 1970-1979, 1960-1969, and before 1960. Immigrants arriving in the decade before the census are termed "recent arrivals." Particular attention will be given the recent arrivals before 1980, identifying the 1970-1979 immigration cohort also in the 1990 census to learn how much their commuting behavior has changed after an added 10 years in the United States.

The data source used for the present analysis is the Public Use Microdata Sample (PUMS), File A, which amounts to a 5 percent sample of all persons. This file consists of approximately one-third of all the long-form questionnaires collected by the census. Comparable data were assembled for both 1980 and 1990 for the study region—the broad Southern California region consisting of the seven southern counties ranging from Ventura to San Diego.

Figure 1 presents the basic pattern of responses in both 1980 and 1990 by recent immigrants in Southern California; the responses of men are distinguished from those of women and the three main race-ethnicities are compared. In general, the patterns are broadly similar between the two census years. Concentrating on 1990, Latinos of both sexes are much less likely than whites or Asians to commute solo by car. Although their greater dependence on carpooling and walking or cycling to work is readily apparent, the greatest difference appears to be in their transit usage. Fully 13 percent of men and 26 percent of women rely on public transit, principally the bus (7). This transit usage rate is two to four times that of Asians or whites of the same sex.

Figure 2 presents comparable data for native-born men and women of the same race-ethnicities. Solo car driving is much more common among the native born, and transit use is far lower. This difference is true of both

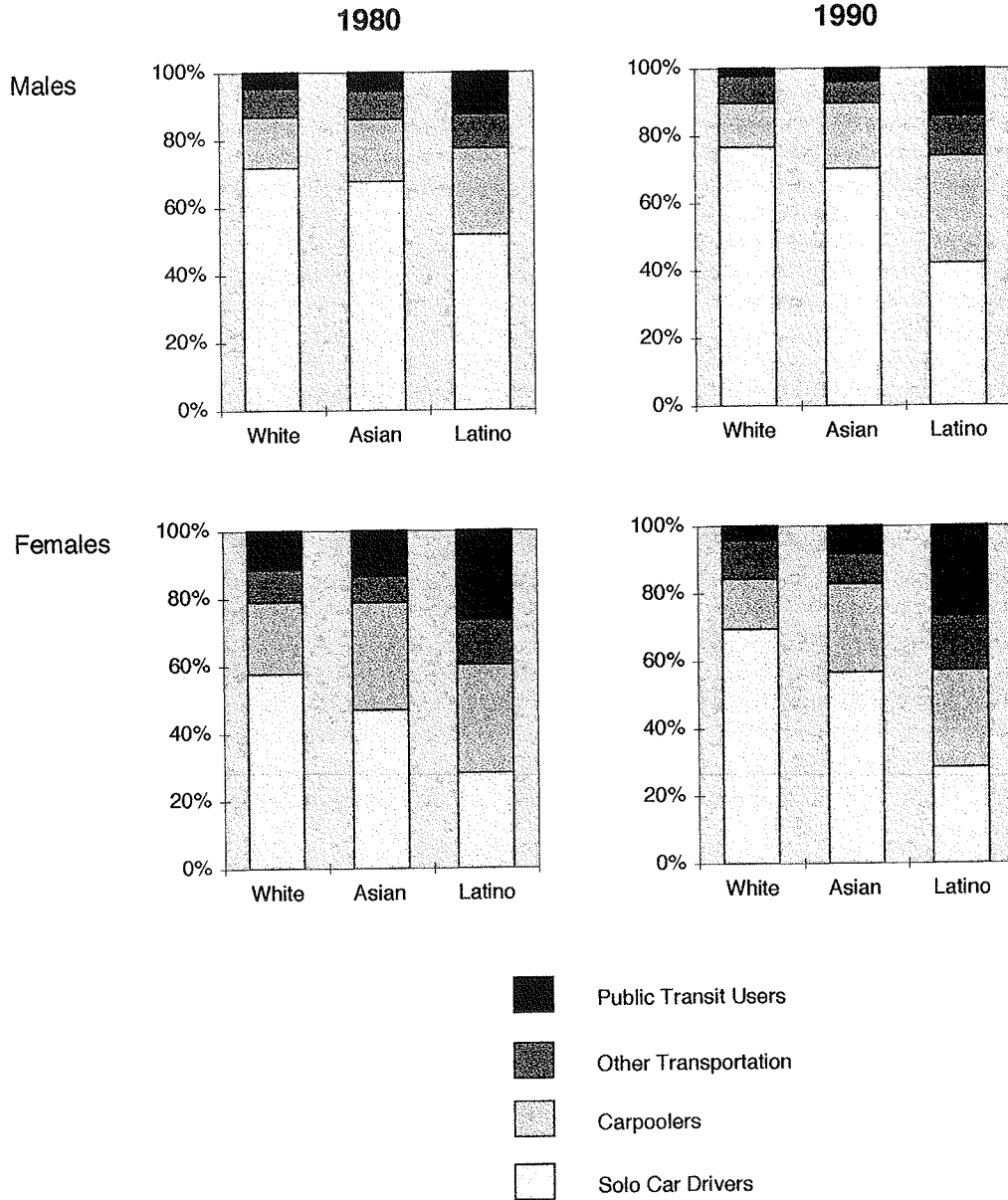


FIGURE 1 Transportation to work used by recent immigrants.

sexes and all race-ethnicities, but it appears greatest among male and female Latinos, especially the women. Given the much higher transit usage of immigrants than that of native-born residents, the implication is that the growing number of immigrants in Southern California should lead to a growing demand for public transit.

Three categories of transportation deserve more detailed analysis. Solo car driving, or SOVs, represents the most intensive use of the region's roadway system and deserves attention also for its popularity. Carpooling is a transportation alternative that increases vehicle occupancy and thus imposes a lower per passenger burden on the roadway system. Public transit is most efficient of all and has special importance to transportation planners,

especially in Southern California where there is heavy investment under way in construction of a new rail system.

PATTERNS OF CHANGE FROM 1980 TO 1990

Between 1980 and 1990 the Southern California region experienced considerable growth: population increased by 26.6 percent, and the number of workers increased by 33.7 percent. During this time the foreign-born share of all workers grew from 18.2 percent to 29.5 percent, and nearly half of those foreign-born workers were immigrants who arrived in just those last 10 years. Thus, the growing presence of immigrants among commuters

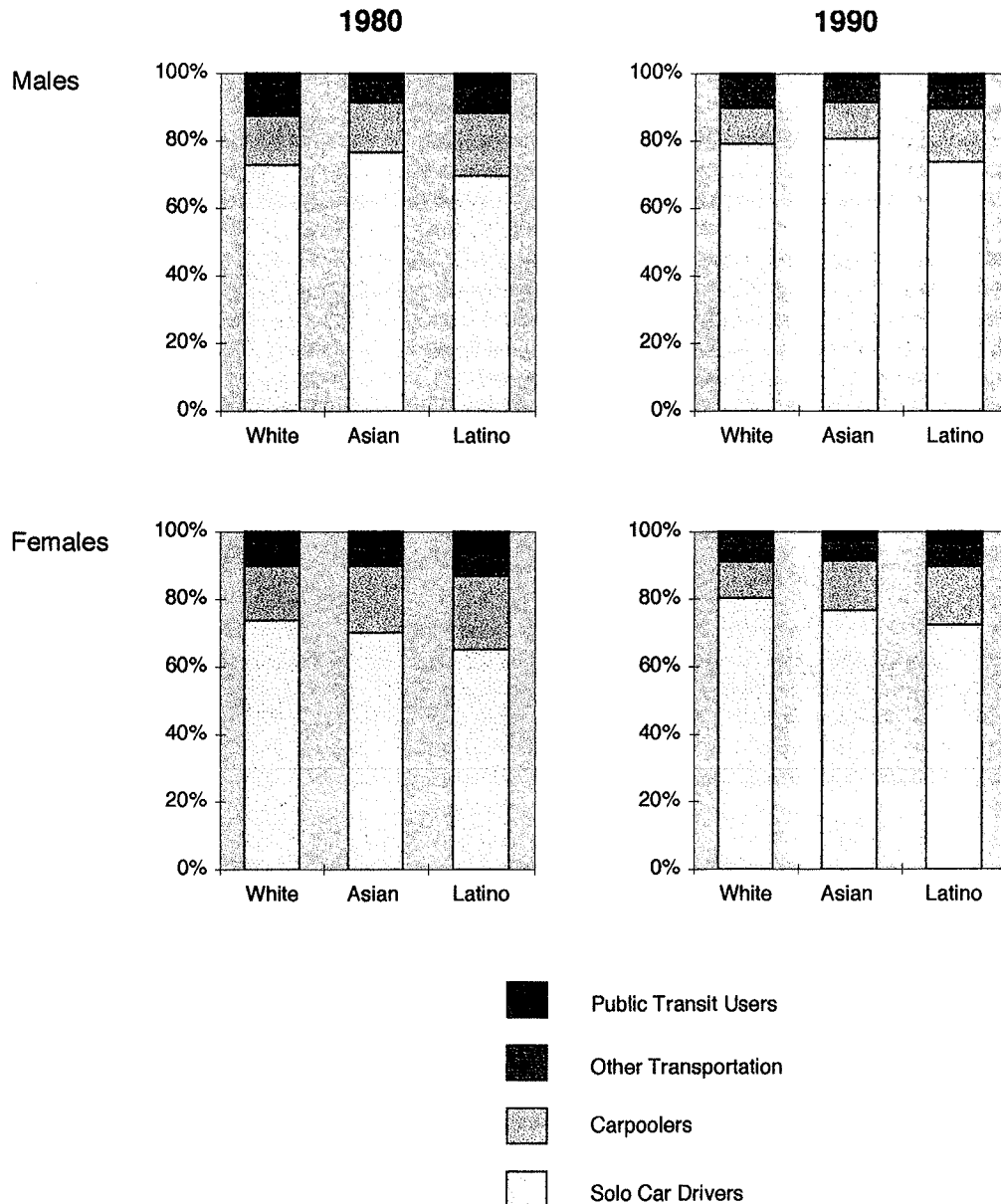


FIGURE 2 Transportation to work used by native-born residents.

should have led to disproportionate growth in transportation modes that are more relied upon by immigrants.

The evidence of transportation growth is puzzling. As shown in Table 1, the number of solo car commuters increased at a somewhat faster rate (38.5 percent) than the number of workers (32.8 percent). At the same time, the number of carpoolers grew more slowly (17.9 percent) than number of workers, and the number of transit commuters grew the slowest (16.7 percent). This pattern of growth seems at odds with the travel behavior of immigrants and their increasing presence in the population.

A better understanding of these dynamics of change can be gained by focusing in depth on changes in one particular mode of commuting. The use of public transit

is selected here because the difference between immigrants and native-born residents is so great (and yet, paradoxically, transit use has fallen relatively despite growing immigration).

Public transit usage rates in both 1980 and 1990 were disaggregated by ethnicity, sex, and age, as well as by immigration status. The aim was to discover the changes in subgroup-specific rates, weighting these rates by the changing number of workers in each subgroup and arriving ultimately at an understanding of how the changing population was contributing to the overall change in public transit usage. The required analysis is highly detailed and too voluminous to review in all its particulars. Instead, the main patterns are summarized, the age analysis is dis-

TABLE 1 Transit Use by All Workers, 1980–1990, Southern California

	1980	1990	Change	% Change
Solo Car Drivers	4,153,080	5,752,536	1,599,456	38.5
Carpoolers	1,017,480	1,199,475	181,995	17.9
Public Transit Users	282,800	330,065	47,265	16.7
Other Transit	524,420	659,388	134,968	25.7
Total Workers	5,977,780	7,941,464	1,963,684	32.8
Total Population	13,321,060	16,860,708	3,539,648	26.6

cussed, and the results of the overall calculation regarding immigrants' contribution to transit ridership are reported.

In Figure 3 the 1990 rates of transit use are displayed for each segment of the population defined by race-ethnicity and year of arrival in the United States (or native born). The top graph displays data for male workers and the bottom for female workers. As seen previously, women have higher transit ridership rates than do men, and Latinos' rates are higher than those of Asians or whites. Data are not shown for blacks because there are so few black immigrants in Southern California who arrived before the 1980s. However, the transit ridership of native-born blacks deserves note because it is higher than that of other native-born residents, 6.9 percent for men and 7.9 percent for women.

The main point to observe from Figure 3 is the apparent decline in transit use among immigrants who have lived in the United States for a longer time. The most recent arrivals have transit rates that are twice those who arrived in the 1970s, and earlier arrivals' rates are still lower, converging on the low rates of the native-born residents. It should be emphasized that this picture is only drawn from a single point in time, 1990, and thus may not reflect the true longitudinal behavior of immigrants. There is no age detail in this portrait either. As time passes, immigrants both increase the duration of their residence in the United States and advance through their life cycle. Thus it is possible that life-cycle effects may account for much of the apparent differences between immigrant generations. That question is addressed in the next section.

Turning now to the findings from the full matrix of transit behavior observed in 1980 and 1990 by sex, race-ethnicity, age, and immigration status within this full context, Figure 4 summarizes the importance of immigration status. Recent immigrants (who arrived within 10 years of each census) account for a very large and growing number of all transit commuters. The number

of transit commuters who immigrated more than 10 years before also increases, whereas the number of native-born riders shrinks substantially.

The top portion of Figure 4 shows that the recent immigrants' share of total transit commuters in all of Southern California grew from 27 percent to 42 percent between 1980 and 1990. The bottom portion of Figure 4 gives the absolute numbers, showing that the total number of transit commuters grew from 283,000 to 330,000, an increase of 47,000. Recent immigrants alone accounted for a growth of 62,000 riders and earlier immigrants added another 32,000 increase in ridership.

The clear conclusion is that without the growth in immigrants, absolute transit ridership would have plunged. Another way of assessing immigrants' effect on transit is to ask what would have happened if they commuted to work in the same fashion as their native-born counterparts of the same sex, age, and race-ethnicity. Although this "instant assimilation" is fanciful, it is still instructive. The last bar on the right in Figure 4 graphs this outcome: recent immigrants' share of all transit commuters would then collapse from 42 percent to only 15 percent, and their absolute number of riders would fall from 140,000 to only 28,000. The latter result reflects the fact that recent immigrants' per capita transit use rates are four times greater than those of their native-born counterparts. Thus recent immigrants provide a strong base of transit ridership, making possible a level of service that would otherwise not be available to other residents in the region. Without a growing number of new immigrants, transit services in Southern California likely would be sharply curtailed.

PROGRESS IN TRANSPORTATION CAREERS

Figure 1 provided only a snapshot of transportation to work among the most recent arrivals before the 1990

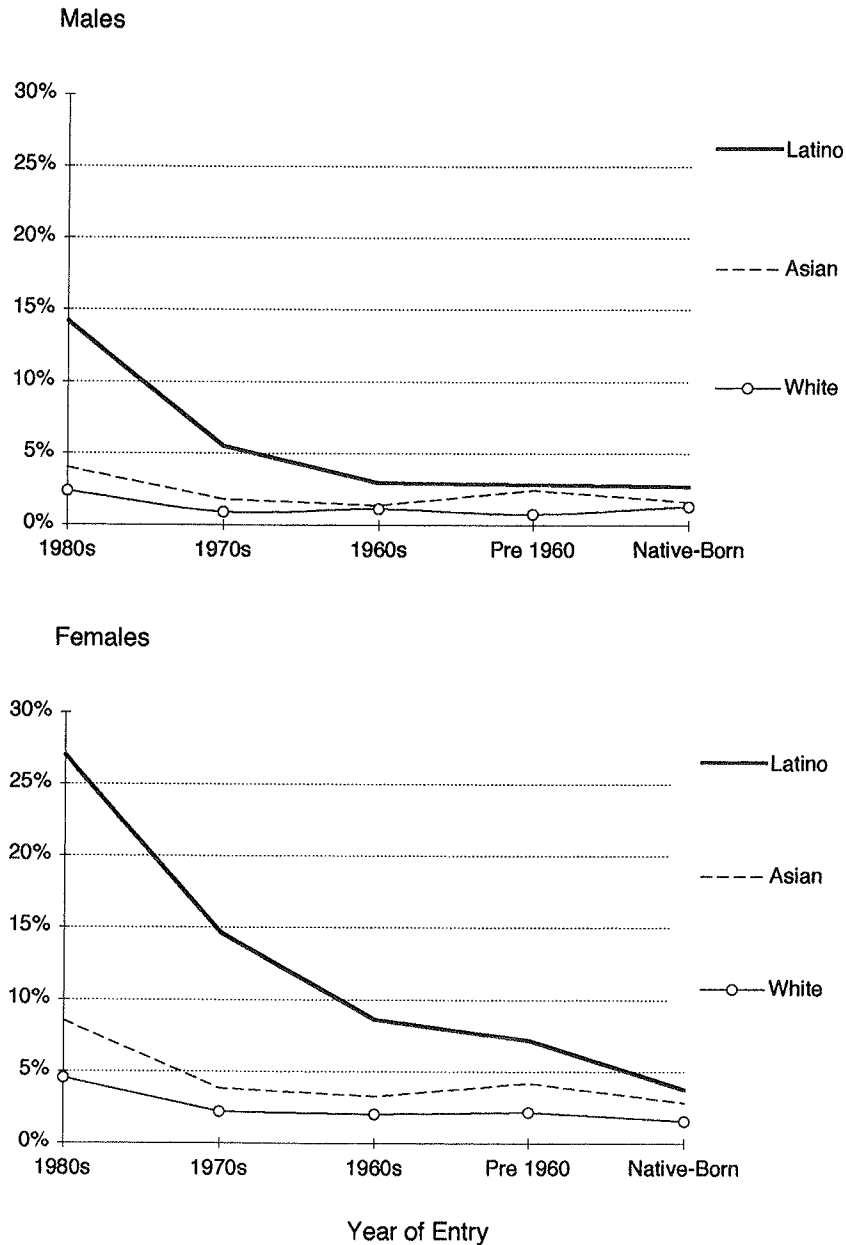


FIGURE 3 Percent using public transit in 1990 by race and immigration status.

census. Arriving over the entire decade of the 1980s, these immigrants have already resided in Southern California for an average of 5 years. How much they will change their commuting behavior after residing in the United States another 10 years remains in question.

Insights from Linking Cohorts in Two Census Years

The question of change over time is central to most social inquiries or policy studies. Census data are invaluable for this purpose. As explained more fully elsewhere (4), cen-

sus data are collected at regular intervals in a systematic coverage that asks comparable questions of a very large sample representing the entire population. With these data reliable investigations can be conducted of change over decade intervals for any local area in the United States.

Cohort analysis is a specialized use of census data that provides the deepest insights into longitudinal change. An age group in one decade can be linked to the age group that is 10 years older in the next decade. Differences in behavior measured between these two observations reflect the aging of the cohort. This often gives insights that are very different from those gained in a single survey year. Myers and Lee (3) recently extended this methodology in

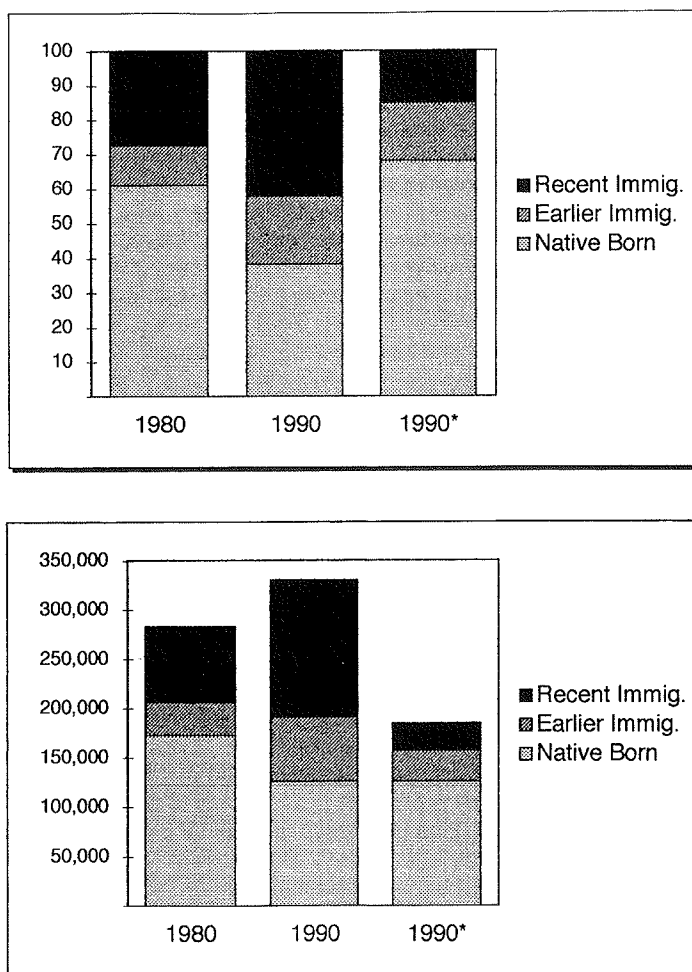


FIGURE 4 *Top*: Share of total transit commuters; *bottom*: total number of transit commuters.

a “double cohort” framework that not only traces changes along the age dimension but also follows immigrants as they remain in the United States an additional 10 years. Thus, age cohorts can be traced within immigration cohorts as they pass through a life cycle and as they assimilate into U.S. society. That methodology is applied in the following discussion in a graphic representation of cohorts’ trajectories of change. [See also the fuller explanation provided in the first report from the Southern California immigration study (1).]

The best answer to the question of how much recent immigrants will change their transportation behavior over time can be gained by studying the progress of previous new arrivals. A cohort of new arrivals was identified at the time of the 1980 census as those who arrived in the 1970s. When the 1990 census was taken, individuals from that same arrival group were again identified as those who had arrived in the 1970s. By comparing the answers given in 1990 with those given by persons from the same cohort in 1980, the rate of change in commuting behavior over a 10-year segment of their transporta-

tion careers can be judged. Similarly, within this immigration cohort specific age cohorts can be traced by linking, for example, women aged 25 to 34 in 1980 with women aged 35 to 44 in 1990.

With this methodology some significant questions can be addressed. For example, Latino women are especially prominent in their transit usage, but how loyal is their patronage over time? Among other groups, is there any evidence of increased transit usage? Conversely, female immigrants have lower rates of solo driving than do their male counterparts. Over time, do they close the gap by increasing their reliance on personal vehicles for commuting? Or do men increase their solo driving at least as fast as do women? The increase in solo driving is examined next, followed by trends in carpooling and transit usage.

Solo Driving to Work

From initially low levels, immigrants rapidly increased their reliance on personal vehicles for commuting to work. Figure 5 compares the upward trajectories of male

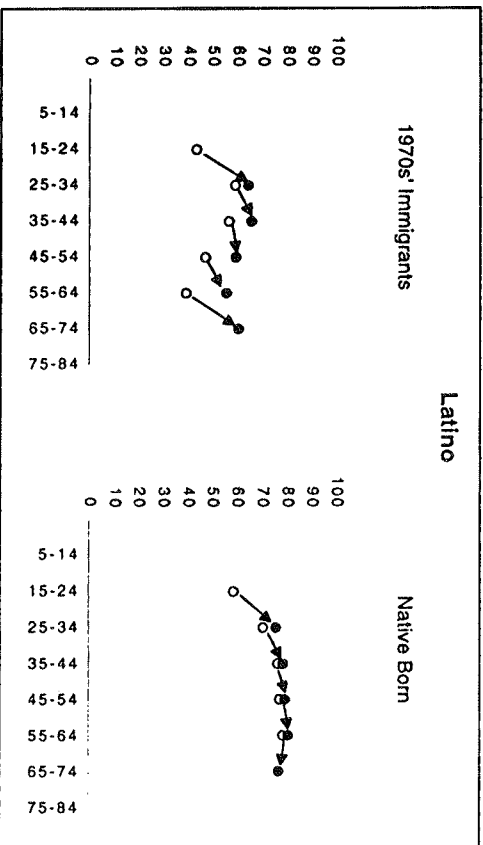
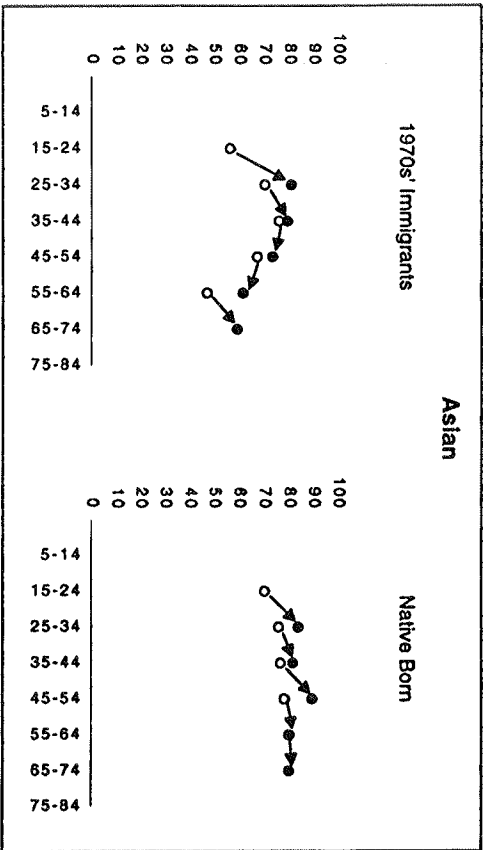
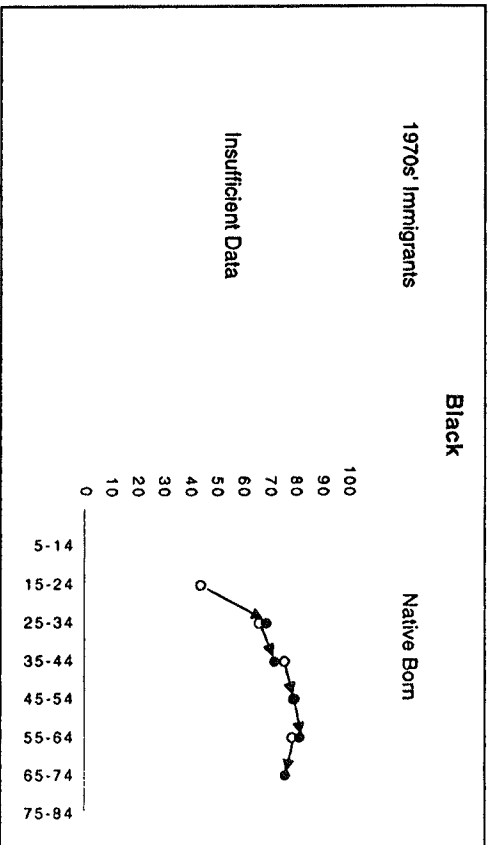
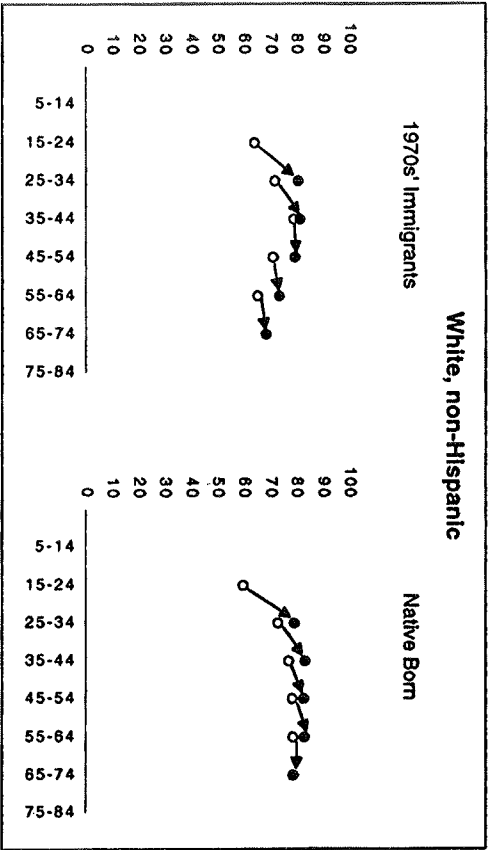


FIGURE 5 Percentage of men driving alone to work, 1980 to 1990.

workers between 1980 and 1990 among native-born residents and recent immigrants for each of the major race-ethnicities. In general, as cohorts grew older they increased their rate of solo driving, with the greatest increases occurring in the younger half of the life cycle. Immigrant men have somewhat lower reliance on solo driving than do their native-born counterparts of the same race-ethnicity. Aside from some sharp upward turns among the very oldest immigrant workers (a small and unusually self-selected group), there are no large differences in the pattern between immigrants and native-born residents.

In contrast, the pattern of change for female workers is more dramatic. Figure 6 shows that immigrant women in 1980 had much lower rates of solo commuting than did their native-born counterparts. However, by 1990 the cohort trajectories have thrust sharply upward with increases from 10 to 30 percentage points in their solo commuting rate. Immigrant women are moving rapidly toward parity with immigrant men, and both sexes are converging on the commuting pattern of native-born workers.

In general, these upward trajectories of solo car commuting are consistent with nationwide trends. However, the increases among immigrants are stronger than those observed for native-born workers, reflecting the gains of assimilation made by these immigrants.

As a methodological note, observe that if the data used were restricted to only 1980 or to only 1990, the cross-sectional pattern by age might lead to the conclusion that people would be less likely to drive solo as they became older. This is a reflection of the well-recognized age-cohort fallacy: comparisons between age groups at one point in time often do not reflect the effects of aging; only analysis of cohorts over time can yield valid conclusions about increasing age (8).

Carpooling to Work

Workers who drive alone to work are not sharing their vehicles with other passengers. With so many solo drivers, it is unlikely that many others can be carpooling. However, it is possible that carpooling is a significant and growing option for certain selected groups.

Figure 7 compares the trajectories of carpooling participation among male workers who are native born or recent immigrants among each of the major race-ethnicities. In 1980, among the native born, younger workers tended to carpool more than older ones, and as cohorts grew older over the decade they decreased their rate of carpooling. The rate of change is about the same at all points in the life cycle. Among the recent immigrants, however, the pattern is different: older whites and Asians tend to carpool more than younger workers,

and only among the two youngest white cohorts is there any evidence of decline with passing time.

Among female workers (Figure 8), the pattern of change is once again more dramatic. Native-born female workers reveal greater decreases in carpooling than men as they grow older. Among immigrants the decreases are even sharper. This likely reflects the rapid growth in solo car driving by immigrant women, many of whom probably once carpooled.

Commuting by Public Transit to Work

Turning to the question of how much immigrants sustain or increase their reliance on public transit over time, given the harsh inconveniences of public transit in Southern California, one would expect immigrants to switch to other modes of transportation as they are able (7).

Figure 9 presents the findings for male workers. Use of public transit among native-born whites, Asians, and Latinos in Southern California is nearly zero. Transit commuting is substantially greater for blacks, especially among the younger workers. This may be because the black population is more centrally concentrated and their homes are better served by bus lines. Among the immigrants, the transit commuting rates of most cohorts drop substantially. Among whites and Asians under age 55, transit use falls to a level comparable with that of native-born workers. However, among Latinos, transit use remains at 5 percent or higher even after the decade's declines.

Among female workers (Figure 10), the sharp declines in transit commuting by immigrants are dramatic. For example, among female workers aged 25 to 34 in 1980 and 10 years older in 1990, transit use fell from 10.0 to 2.5 percent for whites, from 9.3 to 1.7 percent for Asians, and from 25.1 to 15.2 percent for Latinas. Native-born Latinas had much lower rates of transit use than immigrants, but their ridership also dropped somewhat over the decade. Blacks again evidenced the highest ridership of the native-born female workers, but their ridership also fell over the decade.

Overall, this pattern of declining transit patronage is consistent with the rising rate of solo car driving, and it also reflects nationwide trends toward declining transit use. From the perspective of the transit agencies, what might be especially alarming is the fact that the young age groups containing the majority of immigrant workers experienced the sharpest reductions in transit use. One misleading interpretation would be to focus only on the 1990 rates of transit use by age—much higher for older than younger Asians and Latinas—and conclude mistakenly that the older people grow, the more likely they are to ride public transit. The cohort trajectories tell a much different story.

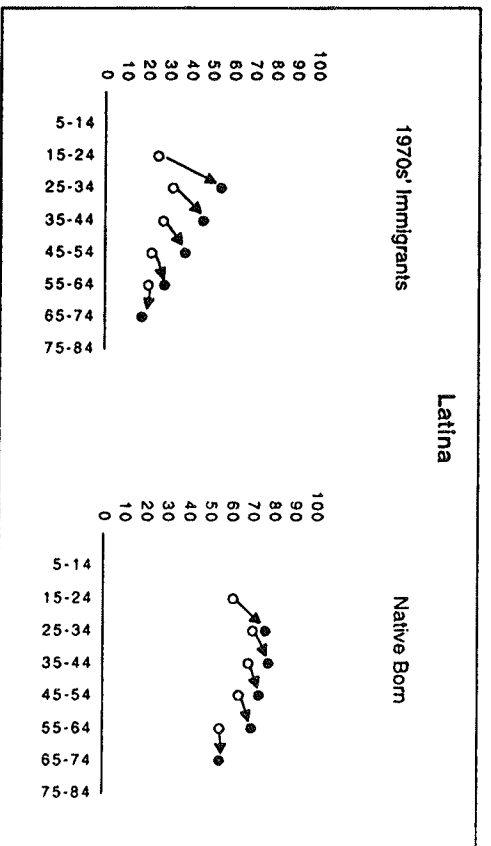
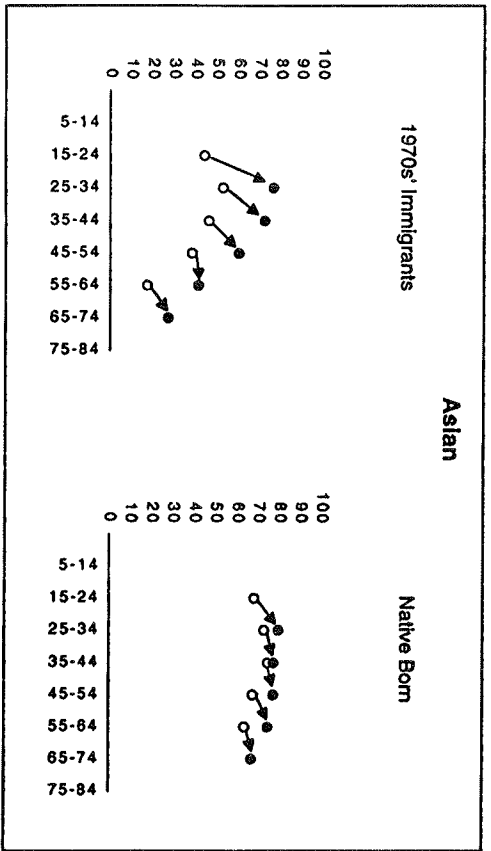
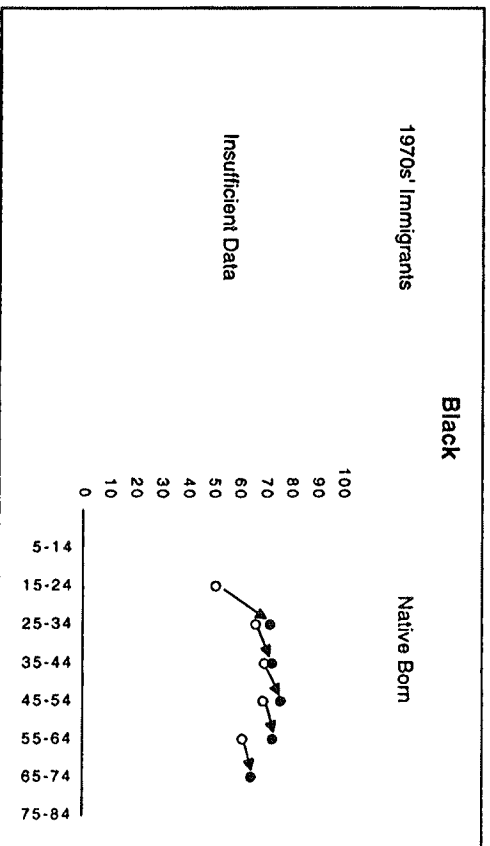
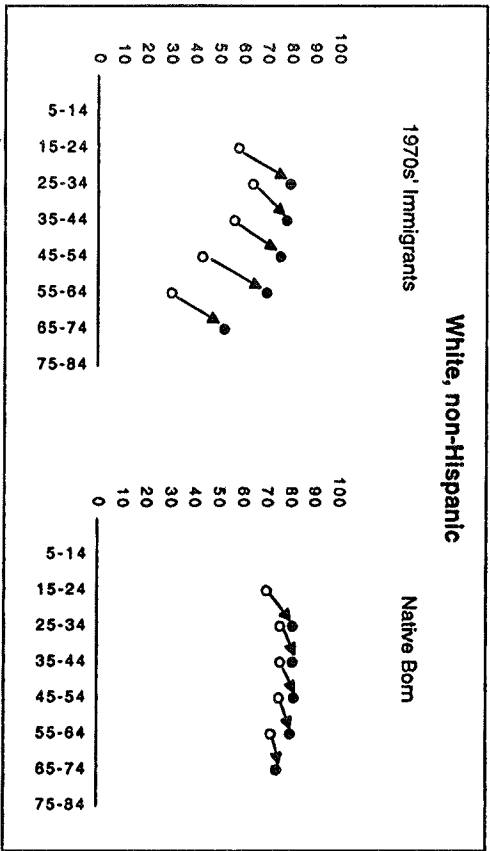


FIGURE 6 Percentage of women driving alone to work, 1980 to 1990.

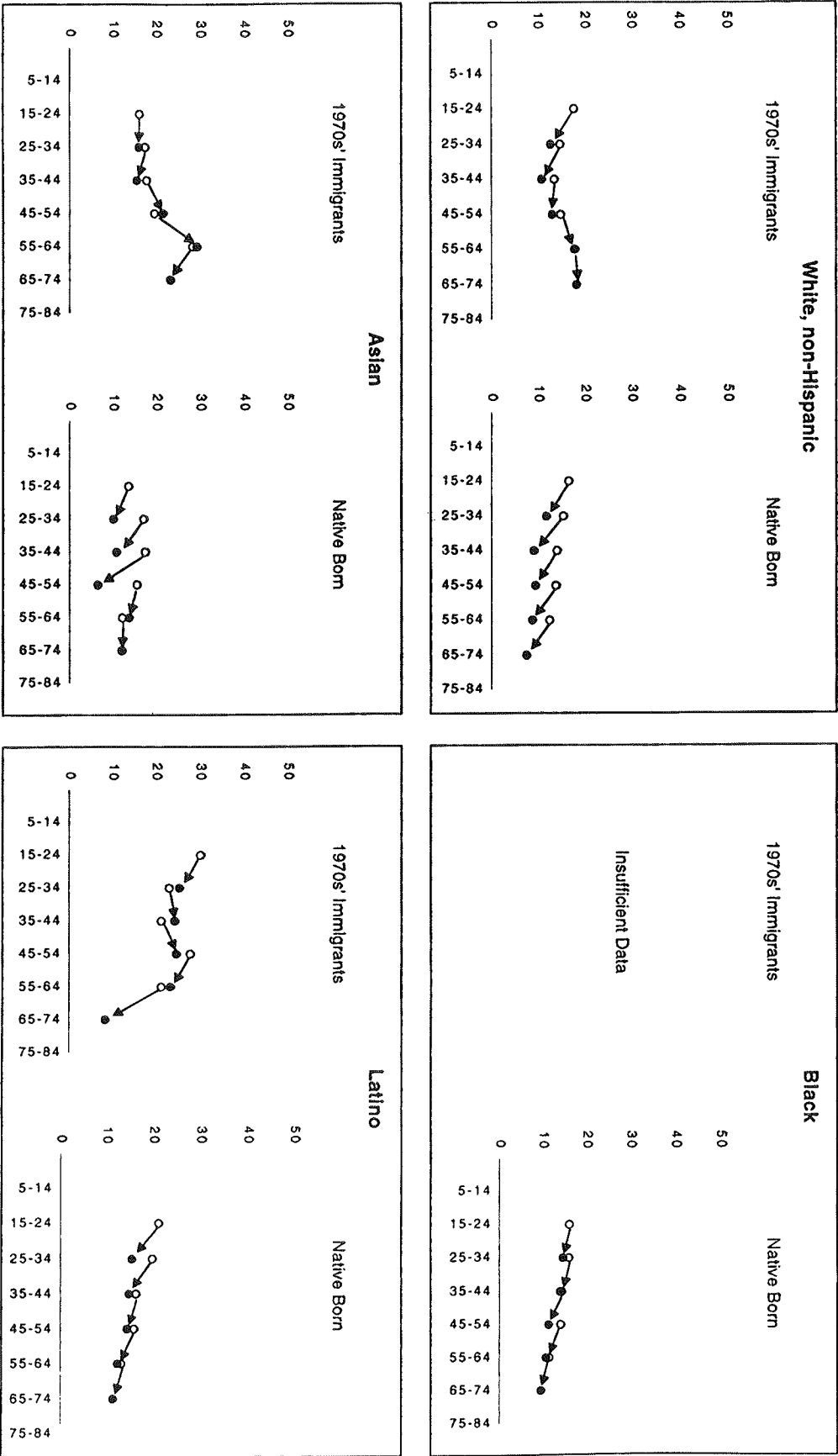


FIGURE 7 Percentage of men carpooling to work, 1980 to 1990.

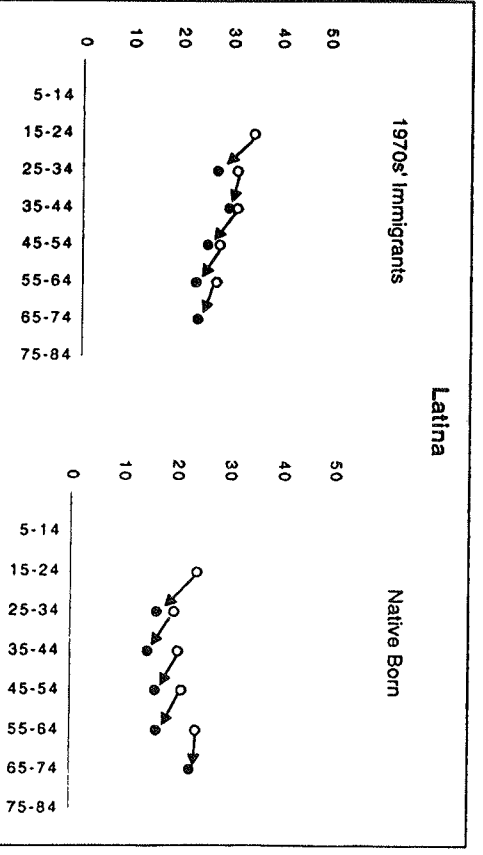
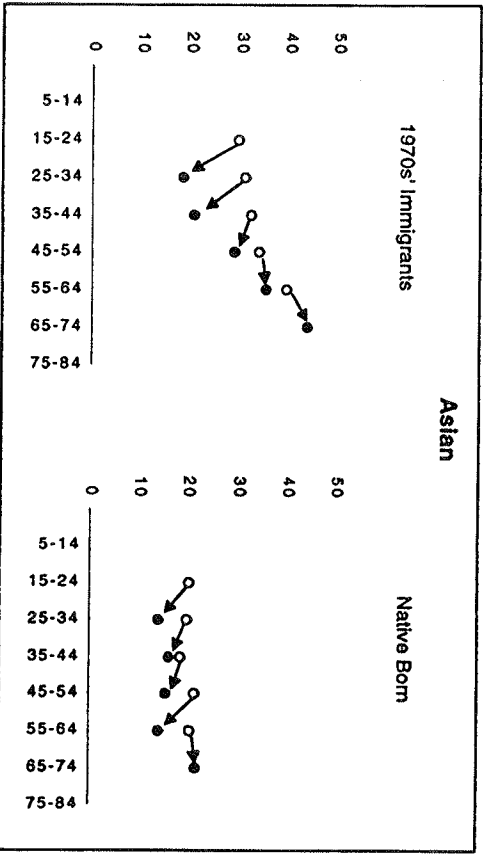
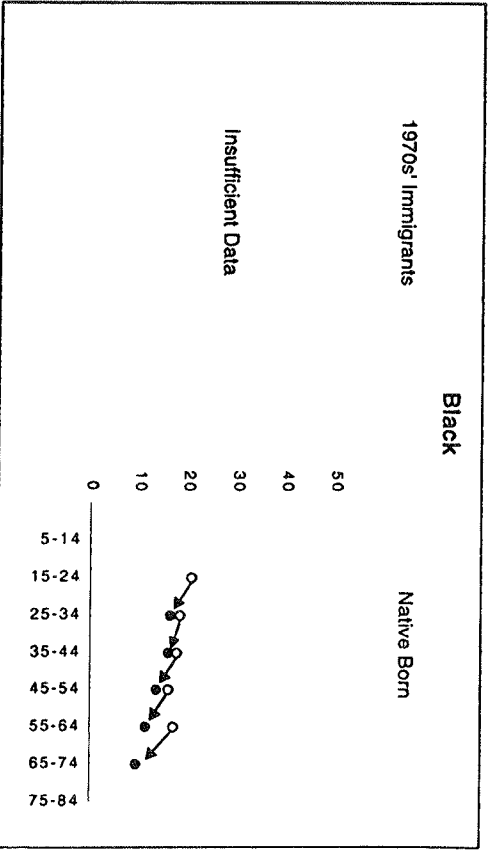
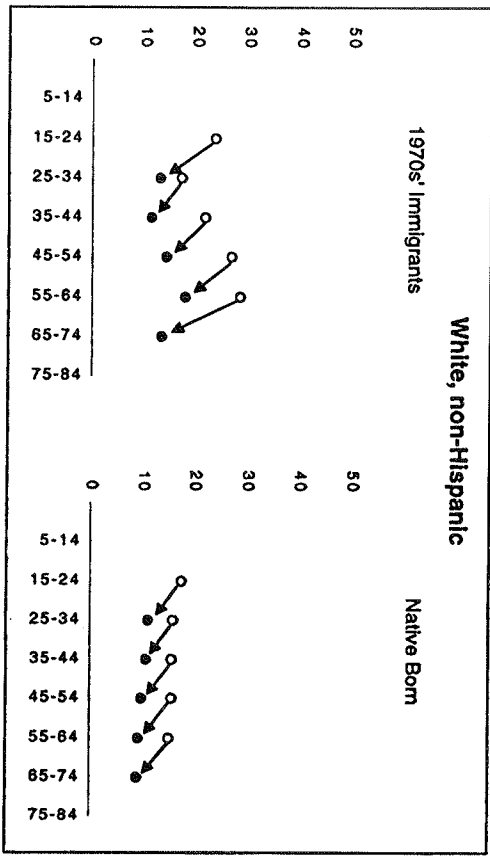


FIGURE 8 Percentage of women carpooling to work, 1980 to 1990.

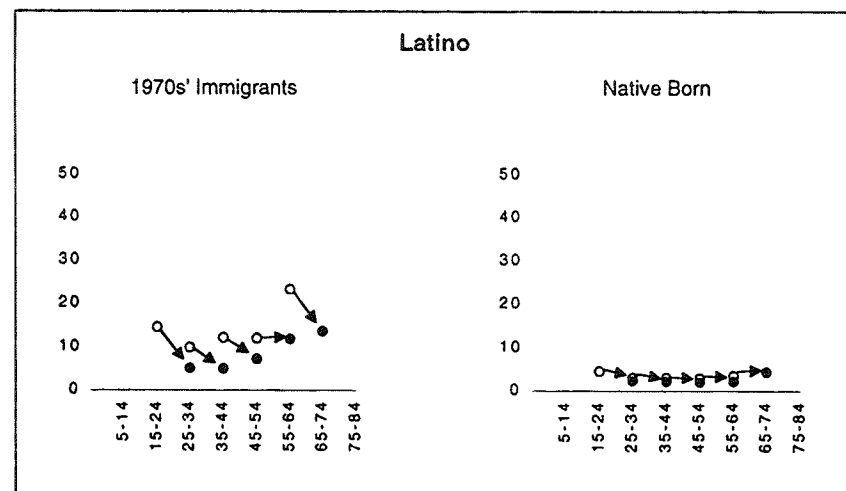
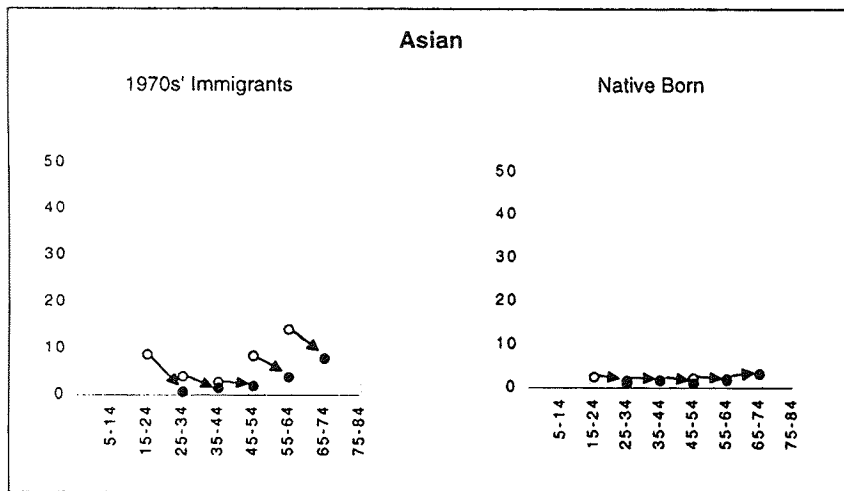
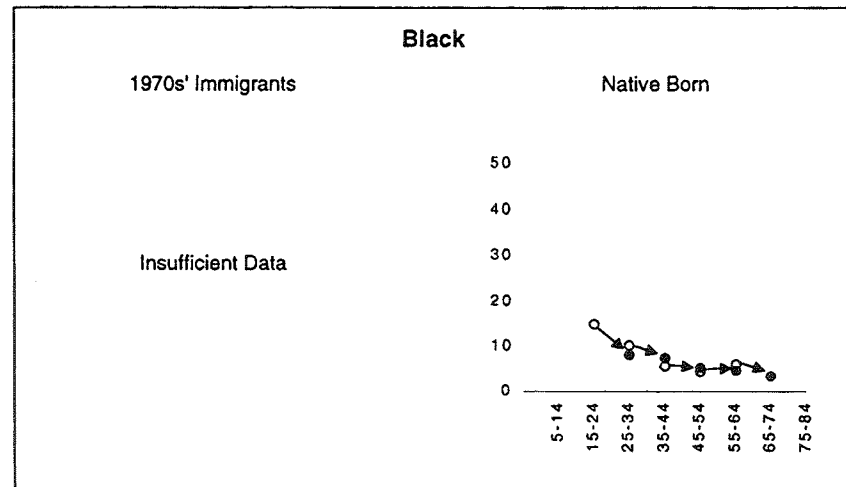
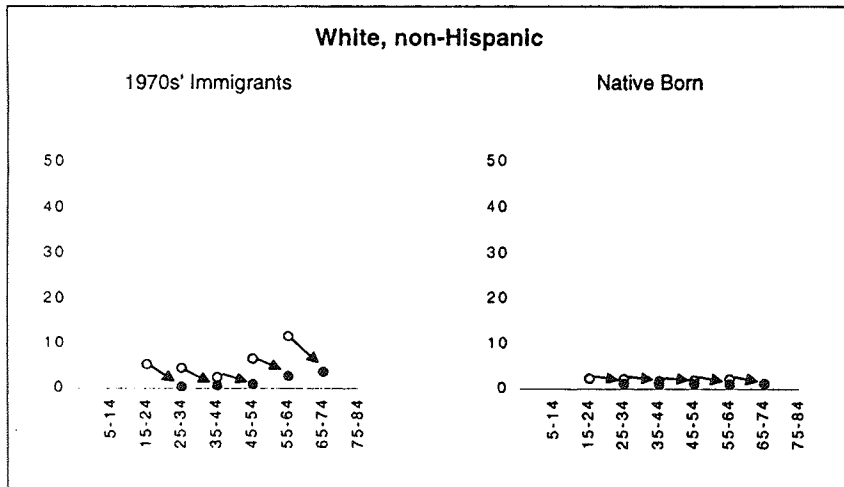


FIGURE 9 Percentage of men taking public transit to work, 1980 to 1990.

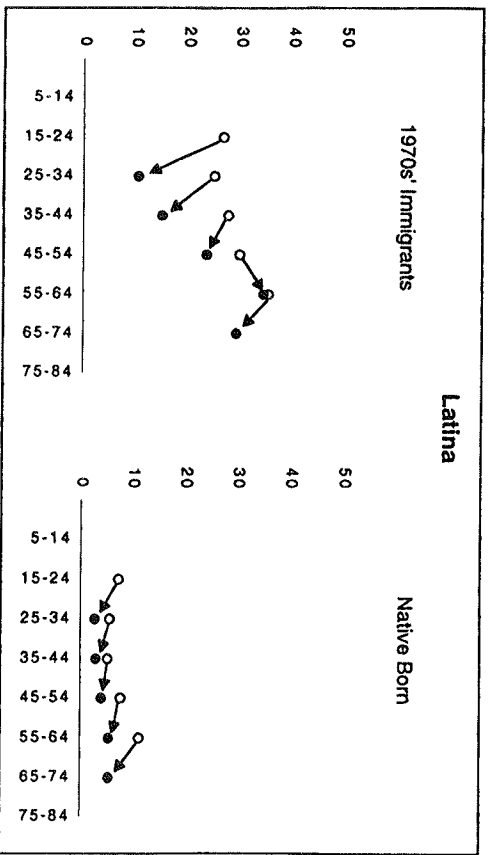
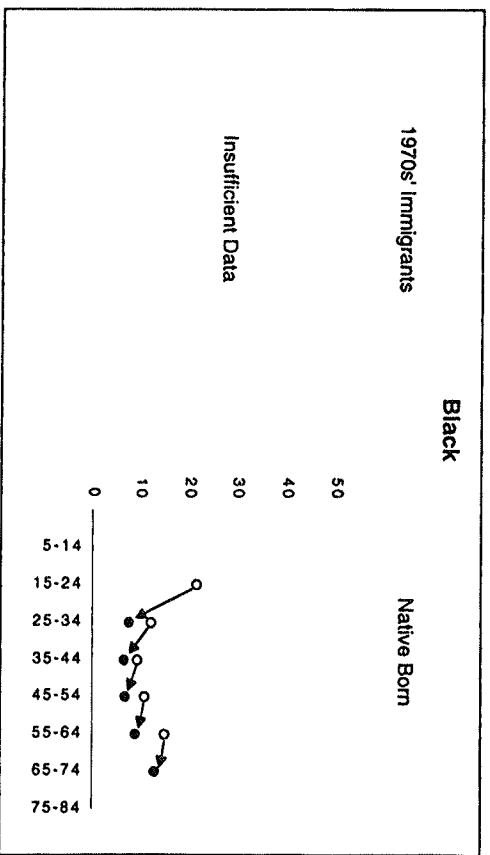
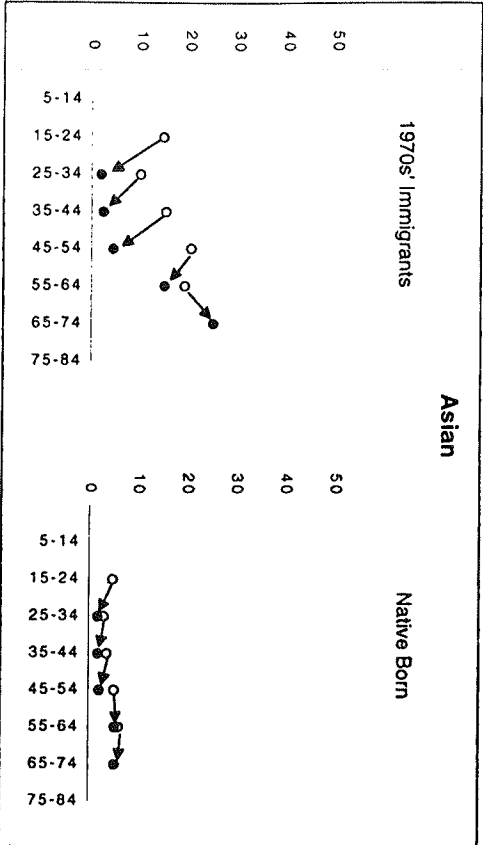
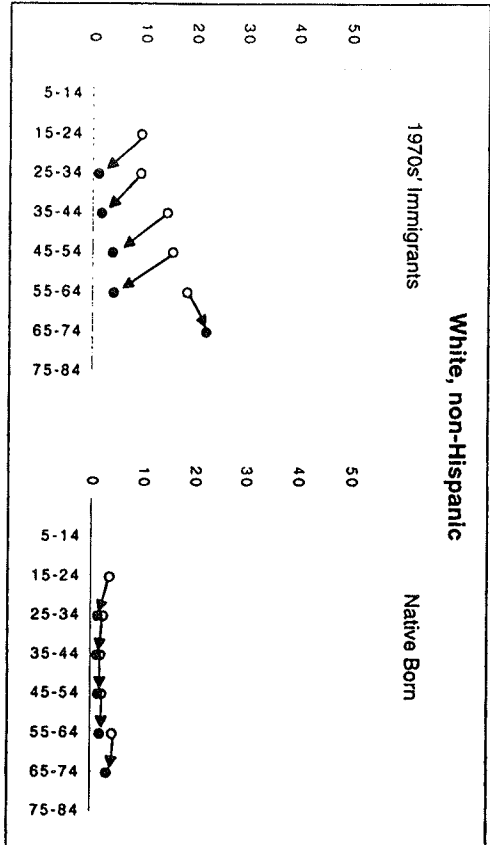


FIGURE 10 Percentage of women taking public transit to work, 1980 to 1990.

SUMMARY

Immigrants are found to have very different commuting behavior than that of native-born workers. Recent immigrants are much more likely to ride public transit than other workers, and they make up 45 percent of the total transit commuters. At the same time, they are also much less likely to drive alone to work; thus, they have much less impact on the roads than do native-born commuters.

Unfortunately, or not, this modest transportation behavior is not a permanent characteristic of individual immigrants. Over time, recent arrivals adapt themselves to California society and improve their economic status. Their convergence on the commuting behavior of native-born residents is one demonstration of the immigrants' assimilation into the mainstream of California life. This is a desirable outcome from the perspective of immigrants' personal well-being, but it poses a challenge to transportation planners and a threat to transit agencies.

Transit planners have been the unintended beneficiaries of a liberalized immigration policy and the post-1965 surge in immigration. These new arrivals have provided a solid base upon which to base transit ridership, extend service, and preserve low fares. In one planning scenario, the new immigrants would learn to appreciate public transit and develop a sustained attachment to its use. At the same time, more of the native-born residents would be attracted to public transit by its efficient service and low fares, thus building an ever-broadening base of ridership.

However, there is a countercenario to consider, one more consistent with the evidence in this paper. The speed of immigrants' adaptation is remarkable, with their propensity to commute by public transit plunging by as much as half in just 10 years. Meanwhile, native-born residents continue to move away from public transit. The pattern portrayed here suggests that the only way to sustain present levels of transit ridership would be to continue importing fresh waves of new immigrants who can replace their upwardly mobile neighbors. Should immigration policy seal the border, or at least slow the rate of new arrivals, this would lead quickly to an accelerated decline in transit ridership. Thus, transit ridership in Southern California is built on a precarious base.

More generally, the present analysis has illustrated the potential insights into longitudinal change that can be gained from cohort analysis with census data. This paper has only sketched the broad contours of possibilities. Cohort trajectories can be represented not only graphically as has been shown here but also in a multivariate statistical framework. As shown by Myers and Lee (3),

this permits the introduction of controls for income, education, or other traits likely to determine transportation behavior. The outcome variables can also be extended beyond mode choice to a number of other topics, including travel time, housing choices, and location.

It is hoped that the Census 2000 will collect data that are comparable in scope and quality to those in 1990 and 1980. Without those data, the trends of the 1980s cannot be measured reliably or compared with those of prior decades.

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