



Caltrans Division of Research,  
Innovation and System Information

# Research



# Results



Planning, Policy,  
and Programming

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**Project Title:**  
The Effect of Population Shifts on  
Passenger Travel

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## The Effect of Population Shifts on Passenger Travel

Understanding changes in travel patterns induced in part by population shifts, and the impact of this uncertainty on transportation planning and investments.

### WHAT IS THE NEED?

We know how the distinctive and changing travel preferences/ behaviors of teens and young adults, the elderly, and immigrants have been influencing urban transportation landscapes. But how mobility patterns impacts travel by altering population composition both across and within U.S. metros is yet to be investigated. Theoretically, declining (or any change over some baseline condition/level) population mobility should alter demographic makeups and trajectories of urban areas (and sub-regions), and hence affect travel demand trends. This phenomenon should also influence multi-modal transportation system consumptions (e.g. transit ridership) and traffic flow patterns.

Transport planners and system managers should consider the mobility trends during travel demand analysis and forecasting. Lower migration and the resulting stability may help planners assess/forecast demand more precisely and make more effective decisions due to reduction in uncertainty/risk. As the declining productivity of U.S. public transport systems necessitates more prudent investment decisions under resource constraints, and as growing congestion and unreliability increases the demand for large investments in integrated multi-modal corridor and regional management, consideration of mobility trends may actually be advantageous.

### WHAT WAS OUR GOAL?

This study will primarily help to understand population migration/ mobility trends, and analyze urban transportation implications. The nature of the mobility-travel demand relationship will be empirically demonstrated. We will evaluate whether consideration of mobility trends can help make more reliable travel/traffic forecasts, and hence better investment decisions.



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integrated and efficient transportation  
system to enhance California's  
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## WHAT DID WE DO?

This research project consists of three parts. The first part of our research focuses on understanding whether the changing demographic composition of the U.S. is related to the decline in mobility. While there has been an increase in the immigration populations over the past four decades, this population is now much more mature and has been in the U.S. longer than it was in the 1980s. This could mean that there has been a decline in the mobility within the immigrant population simply due to this maturity. Further, we do not know how the mobility of the second generation compares to the first generation. We will analyze the most recent changes, and document the determinants, magnitudes, and characteristics of the decline in inter- and intra-urban mobility. As we are currently working on data analysis, some preliminary results show that changes in the composition of the immigrant population can explain 20-25% of the reduction in mobility in this population.

In the second part of our research, we will analyze whether consideration of past/current population migration trends allows us to better model and hence more reliably forecast urban passenger travel demand. We have developed the research methodology, reviewed the relevant literature, and considered data availability and accuracy. We have decided to begin with conducting a longitudinal analysis of the determinants of transit ridership across U.S. urbanized areas. The estimated effect, along with prediction of future migration and other demographic trends, is expected to help forecast the demand for transit use across select cities that are most affected by the decline in mobility. Depending on our research findings, we will consider whether we need to extend the national study to an intra-urban (Los Angeles region) analysis of travel behavior and traffic trends.

We plan to start by exploring two specific research questions:

1. How does population migration affect the demand for transit?
  - We will conduct longitudinal (2008-2013) analysis to estimate how demographic change, specifically due to in- and out-migration, is associated with change in aggregate transit ridership across U.S. urban areas. We will use data from the National Transit database (NTD), American Community Survey (ACS)/Census (including iPUMS), etc
2. Does previous experience affect present travel behavior?
  - This will be a disaggregate analysis to estimate the effect of environmental characteristics of previous residential location (county) on current commute mode choice of movers (across counties), holding other established determinants of present mode choice constant. We will use ACS/Census (including iPUMS) data, and attempt to add to the literature on the effects of built environments, past experiences, and habits on travel behavior.

Finally, we will explore and discuss various supply (e.g. investing in more and better transit service) and demand (e.g. congestion and parking pricing) side strategies aimed at managing auto travel demand and encouraging transit use. We will also discuss whether declining mobility aids demand prediction and forecasting by minimizing at least some uncertainty associated with travel.

## WHAT IS THE BENEFIT?

This study aims at enhancing our fundamental understanding of the various determinants of travel demand, e.g. transit ridership, vehicle miles traveled, mode use, etc. It therefore contributes

to accurate demand forecasting and better (more reliable; carrying fewer risks) investment decisions. The study will therefore be useful for Caltrans, regional planning authorities, and transit agencies as they develop plans and programs for the future.

**IMAGES**

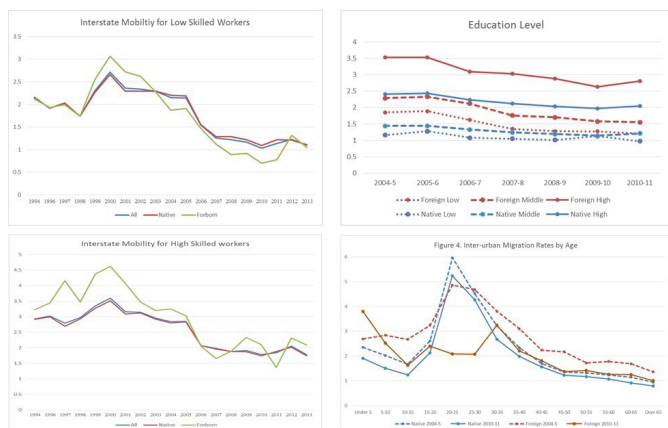


FIGURE 1: Migration Rates across Population Sub-groups

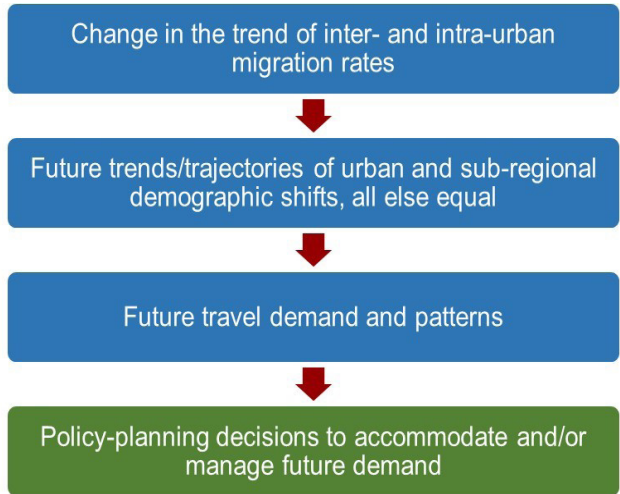
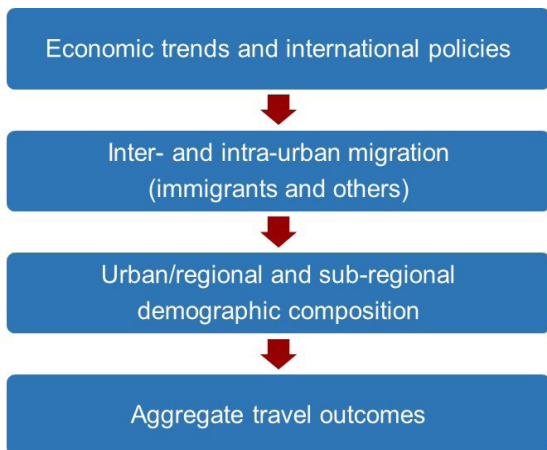


FIGURE 2 and 3: Mobility-Travel Connection, and Significance for Transport Policy

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