# Transit

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Case studies on transit uses of census data involving several geographic study areas were presented. This summary will cover study objectives, how the data were used, and what data were used. The methodology, some of the tasks that were covered and some of the problems, and recommendations of the authors will be noted.

## New Orleans

The study objectives were to evaluate transportation alternatives for a corridor between the New Orleans central business district (CBD) and the airport. Ways of using an existing railroad right-of-way to increase capacity in that corridor were being considered. The possibilities were to widen an existing highway, extend an expressway, or build a light-rail line. A no-build or transportation system management alternative was also considered. The census data used included Summary Tape Files (STFs) 1 and 3 and the Census Transportation Planning Package (CTPP).

The first task in this study was a comparison of the population estimates from their model transportation analysis zones (TAZs) with CTPP data. The results for the overall population in the corridor were similar, but significant differences were found for individual analysis zones, and the researchers had trouble reconciling these differences.

The second task was to use the journey-to-work data to show whether levels of transit use in the corridor might support building a light-rail line. The mode split for each census tract in the corridor was reviewed, and here the results were questionable. Very little could be deduced about corridor-oriented travel. Some results were obtained that could not quite be rationalized, including higher levels of ridership in areas that were poorly served by transit and in areas that were farther from transit routes.

One of the problems noted in this study was the difficulty in comparing the model data from previous studies because, in New Orleans at least, the TAZs did not match up very well with census tracts. It appeared that the CTPP data lacked information on travel direction, such as to or from the CBD. An early release of the census data was used, and

the work end data at that point were only coded to the county, which, of course, did not do any good in smaller-area analysis. It appeared that travel in directions not served by transit might have overwhelmed transit use, that is, made it look smaller for the tract overall.

The researchers believed that there was a problem because of restriction in the questionnaire to reporting the main travel mode. The overall conclusion was that they would not use census data further for this study because of their lack of trust in the results.

## Los Angeles

The same researchers also studied transit riders in the Los Angeles area. The objective of this case study was to estimate the ethnic make-up of riders for the rail lines that were projected to operate in 2015. One of the constraints in this study was that the existing travel forecasting models did not contain ethnicity or race as a variable. So they turned to census data, STFs 1 and 2 and the Public Use Microdata Sample (PUMS).

The study used a simple method first to see if feasible results could be obtained. The first element was to estimate the walk access of rail riders by analysis zone. To do this, an assumption was made that the rail riders produced by a TAZ would have the same ethnic proportions as the TAZ population in general. (The TAZs in the Los Angeles area have a high equivalency to census tracts, unlike those in the New Orleans area.) STF 1-A was used to get TAZ ethnicity breakdowns, which were then applied to the walk access rail riders produced by a TAZ, available from prior modeling work.

To estimate automobile access to rail for each TAZ, cross-tabulations of ethnicity by car ownership data were developed from the PUMS data for Los Angeles County for areas within automobile access of the rail system. Proportions of households with vehicles available were assigned by ethnicity to each census tract in the Public Use Microdata Area (PUMA), and the proportion of automobile access rail riders by ethnicity was obtained for each TAZ.

The researchers believed that these results looked credible and proceeded to what was referred to as a more complex phase two analysis. In this procedure, they extended the analysis to include the effects of demographic variables that were included in some of their models, for example, vehicle ownership, household size, type of dwelling unit, and licensed drivers. The following steps were involved: (*a*) the PUMS data were used to produce vehicle ownership by household size and by ethnic group; (*b*) the trip rates for these factors from their models were applied to the PUMS data; (*c*) an average trip rate for work and nonwork trips within each PUMA was obtained; (*d*) those rates were then applied to ethnic proportions within a TAZ; which were known from the STF 1-A data; to obtain trip rates by ethnic group within a TAZ; (*e*) mode choice model data were combined with PUMS data to produce the relative propensity of a person to make transit trips versus automobile trips for each ethnic group in the PUMA; and (*f*) this percentage was applied to each TAZ in the PUMA. The research team believed that the results from this more complex approach were remarkably similar to those obtained with the first method. Generally, minority groups produced fewer total trips, although certain minority groups had a higher propensity to use transit.

Among the problems noted by the authors in this study was the need to apply the PUMS data averages to a large number of TAZs in the PUMA. They also noted that the study could not have been performed without the available census data.

Some overall recommendations from that study were (*a*) faster release by the Census Bureau of block-group-level data, which in the New Orleans case would have been a positive factor; (*b*) TAZ and PUMA boundaries contiguous with smaller census geography, which was not always the case; (*c*) PUMAs consisting of entire tracts; (*d*) better information from the journey-to-work survey on the direction of travel, such as the proportion CBD bound, bound in the opposite direction from the CBD, and bound in all other directions; and (*e*) information on driver's license status on the long form.

## New Jersey

The case study from the New Jersey area reported on at least six applications of census data. The first application was to estimate ridership for rail extensions into new areas. The CTPP journey-to-work data were used to identify the total potential work trips within the state of New Jersey. It was believed that these were the only journey-to-work data that exist for New Jersey locations. An alternative would have been older and less reliable data, which, it was believed, would have cost more than several hundred thousand dollars to collect.

In the second application, census travel time data were used to estimate automobile travel times to a sports complex for use in a forecasting model. These data were believed to be reliable because they are based on actual observed reported times.

The third application used journey-to-work data to assess the statewide potential for transit service on existing and abandoned rights-of-way. In this case, these were believed to be the only consistent statewide work-trip data available because New Jersey encompasses three metropolitan planning organizations (MPOs), and the individual MPO models do not account for trips outside of their individual boundaries.

The fourth application in the New Jersey area was to document the impact of rail travel on local economies. Median home values from 20 municipalities were obtained and a regression model was developed to predict change in housing value on the basis of travel time savings. It was believed that the census provided a consistent source of housing value information over the entire region.

In the fifth application the impact of transit service on reducing automobile travel and automobile ownership was estimated. Census journey-to-work data combined with census household and worker data were used.

The sixth application evaluated the need for transit support facilities, such as park-and-ride lots. Again, the journey-to-work data were used to establish the rail or bus trip rates per household. These were modified on the basis of some regional demographic forecasts and then combined with the rail and bus survey to estimate future ridership and parking demand.

Some overall problems noted in the New Jersey case study were lack of non-work-trip data, user confusion over definition of rail modes, definition problems with multimodal trips, and lack of data availability until 3 to 4 years after the census was conducted.

Overall recommendations were the following: use the census data in combination with other regional surveys and, to the extent possible, customize journey-to-work questions for specific areas, such as definition of modes, stratified sampling within modes, and some non-work questions.

## Cleveland

The case study from Cleveland involved the identification of additional work-related transit demand within the Cleveland service area. The CTPP data on workers and their key travel characteristics, such as mode, origin, and destination, were used.

To make the data more manageable, the first task was to aggregate TAZ data, which are continuous with tracts in the Cleveland area, to larger districts on the basis of their models. There were two approaches in the study. First, residential districts that exhibited high transit dependency on the basis of income, vehicle availability, population density and age, and mobility limitations were studied and 15 or so residential districts that had a high transit dependency were identified. Second, the primary work destinations for those areas were determined and then compared with the transit mode share and level of bus service provided in those areas to determine which of those corridors might benefit from improved transit service. The employment side of the data was also studied by looking at TAZs with high employment levels and comparing those with the transit mode share and level of service to further identify some areas of latent transit demand. Work-related transit latent demand from any corridor into the Cleveland CBD was determined to be limited; however, several reverse-commuting opportunities were identified.

Problems noted in this study included the lack of non-work-trip data. However, in some cases employment locations such as retail districts or medical centers were used as surrogates for non-work-trip destinations. In addition to aggregating the data up to make them more manageable, it was also found that to do route-level analysis the data had to be disaggregated back down to the TAZ level. Different numbering schemes for TAZs in different MPOs had to be dealt with, and it was suggested that there be a nationwide TAZ numbering scheme.

## Southern California

The Southern California case study, which covered seven counties, looked at the effects of immigration on mode choice for transit riders' journey to work in the area. The census data used were PUMS File A. The study examined the year immigrants arrived in the United States, their ethnicity, whether they were employed, and how they got to work. The cohort analysis technique was used to compare data for 1980 and 1990 for the same group over time.

It was found that recent immigrants (those who have arrived in the last few years) make up 45 percent of the total transit commuters and are much more likely to ride public transit than native-born workers. However, over time, as they adapt to California society and improve their economic status, their use of public transit declines by about 50 percent and in fact approaches that of native-born commuters.

Because of this longitudinal type of analysis, an overall recommendation for Census 2000 was to collect data comparable with data collected in 1980 and 1990.

## Chicago

The Chicago area case study covered at least 11 applications of census data—transit, regional, and so forth. Some examples were (*a*) establishing a regional-level data base for understanding changes in multimodal demand between 1980 and 1990; (*b*) performing feasibility studies for station relocation or route-level service expansion; (*c*) developing an atlas of route-specific market demographic data as profiles for areas served for each of 125 bus routes; (*d*) analyzing population, housing, and employment changes around defined market shares for rail stations; and (*e*) comparing the results of on-board surveys with census data along bus routes.

CTPP data were used to get origins and destinations of work trips and to examine their geographic distribution. STFs were used to get demographic data to analyze CBD and non-CBD work travel patterns. In 9 of the 11 applications it was believed that the census was the only source of data for the study area.

Overall in the Chicago area study it was concluded that the census represents a consistent method of data collection on a small-area basis and that it provides data for use in longitudinal studies. Without CTPP data, the work in these applications would have been much more difficult and would not have had the same level of detail. It was also believed that the data need to be available in a user-friendly form.

## Summary

In summary, some likes and dislikes and some recommendations from all of these studies are as follows:

### Likes

- Many studies could not have been performed without the available census data or it would have cost several hundred thousand dollars at least to get equivalent data.

- The CTPP journey-to-work data are the only consistent statewide work-trip data available that encompass three MPOs in one particular region. Again, this study could not have been done without census data since individual MPO models do not account for trips outside their boundaries.
- Some researchers liked census data for regional aspects and some for small-area aspects: the census provides a consistent source of housing value information over the entire region, and, conversely, it represents a consistent method of data collection on a small-area basis. It also allows for the use of census data in longitudinal studies.

## Dislikes

- Comparison with some model data was difficult because, in some areas, TAZs did not match up with census tracts.
- The restriction to reporting the main travel mode was a limitation.
- The need to apply the PUMS data average to a large number of TAZs in the PUMA was a concern.
- Lack of non-work-trip data was a limitation.
- Users were confused over the definition of rail modes.
- There were definition problems with multimodal trips.
- Data were not available until several years after the census.

## Overall Recommendations

- Faster release by the Census Bureau of block-group-level data might have made mapping to the TAZs easier in the New Orleans study.
- TAZ and PUMA boundaries should be contiguous with smaller census geography.
- The PUMA should consist of entire tracts.
- The Census 2000 should collect data comparable with that collected in 1990 and 1980 to allow measurement of trends over time.
- The data need to be available in a user-friendly form.