Transferability of Activity-Based Model Parameters

DETAILS

0 pages | 8.5 x 11 | PAPERBACK
ISBN 978-0-309-43354-9 | DOI 10.17226/22384

AUTHORS

Gliebe, John; Bradley, Mark; Ferdous, Nazneen; Outwater, Maren; Lin, Haiyun; and Chen, Jason

The Second
STRATEGIC HIGHWAY RESEARCH PROGRAM

SHRP 2 REPORT S2-C10A-RW-2

Transferability of Activity-Based Model Parameters

John Gliebe, Mark Bradley, Nazneen Ferdous, Maren Outwater,
Haiyun Lin, and Jason Chen
RSG
White River Junction, Vermont

TRANSPORTATION RESEARCH BOARD
WASHINGTON, D.C.
2014
www.TRB.org

Subject Areas

Environment
Highways
Planning and Forecasting

The Second Strategic Highway Research Program

America's highway system is critical to meeting the mobility and economic needs of local communities, regions, and the nation. Developments in research and technology—such as advanced materials, communications technology, new data collection technologies, and human factors science—offer a new opportunity to improve the safety and reliability of this important national resource. Breakthrough resolution of significant transportation problems, however, requires concentrated resources over a short time frame. Reflecting this need, the second Strategic Highway Research Program (SHRP 2) has an intense, large-scale focus, integrates multiple fields of research and technology, and is fundamentally different from the broad, mission-oriented, discipline-based research programs that have been the mainstay of the highway research industry for half a century.

The need for SHRP 2 was identified in *TRB Special Report 260: Strategic Highway Research: Saving Lives, Reducing Congestion, Improving Quality of Life,* published in 2001 and based on a study sponsored by Congress through the Transportation Equity Act for the 21st Century (TEA-21). SHRP 2, modeled after the first Strategic Highway Research Program, is a focused, time-constrained, management-driven program designed to complement existing highway research programs. SHRP 2 focuses on applied research in four areas: Safety, to prevent or reduce the severity of highway crashes by understanding driver behavior; Renewal, to address the aging infrastructure through rapid design and construction methods that cause minimal disruptions and produce lasting facilities; Reliability, to reduce congestion through incident reduction, management, response, and mitigation; and Capacity, to integrate mobility, economic, environmental, and community needs in the planning and designing of new transportation capacity.

SHRP 2 was authorized in August 2005 as part of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The program is managed by the Transportation Research Board (TRB) on behalf of the National Research Council (NRC). SHRP 2 is conducted under a memorandum of understanding among the American Association of State Highway and Transportation Officials (AASHTO), the Federal Highway Administration (FHWA), and the National Academy of Sciences, parent organization of TRB and NRC. The program provides for competitive, merit-based selection of research contractors; independent research project oversight; and dissemination of research results.

SHRP 2 Report S2-C10A-RW-2

ISBN: 978-0-309-27381-7

Copyright Information

Note: SHRP 2 report numbers convey the program, focus area, project number, and publication format. Report numbers ending in "w" are published as web documents only.

Notice

The project that is the subject of this report was a part of the second Strategic Highway Research Program, conducted by the Transportation Research Board with the approval of the Governing Board of the National Research Council.

The members of the technical committee selected to monitor this project and review this report were chosen for their special competencies and with regard for appropriate balance. The report was reviewed by the technical committee and accepted for publication according to procedures established and overseen by the Transportation Research Board and approved by the Governing Board of the National Research Council.

The opinions and conclusions expressed or implied in this report are those of the researchers who performed the research and are not necessarily those of the Transportation Research Board, the National Research Council, or the program sponsors.

The Transportation Research Board of the National Academies, the National Research Council, and the sponsors of the second Strategic Highway Research Program do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of the report.

SHRP 2 Reports

Available by subscription and through the TRB online bookstore:

www.TRB.org/bookstore

Contact the TRB Business Office:
202-334-3213

More information about SHRP 2:

www.TRB.org/SHRP2

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

The **National Academy of Sciences** is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. On the authority of the charter granted to it by Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Ralph J. Cicerone is president of the National Academy of Sciences.

The **National Academy of Engineering** was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. C. D. (Dan) Mote, Jr., is president of the National Academy of Engineering.

The **Institute of Medicine** was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, on its own initiative, to identify issues of medical care, research, and education. Dr. Victor J. Dzau is president of the Institute of Medicine.

The **National Research Council** was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Ralph J. Cicerone and Dr. C. D. (Dan) Mote, Jr., are chair and vice chair, respectively, of the National Research Council.

The **Transportation Research Board** is one of six major divisions of the National Research Council. The mission of the Transportation Research Board is to provide leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal. The Board's varied activities annually engage about 7,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation. **www.TRB.org**

www.national-academies.org

ACKNOWLEDGMENTS

This work was sponsored by the Federal Highway Administration in cooperation with the American Association of State Highway and Transportation Officials. It was conducted in the second Strategic Highway Research Program (SHRP 2), which is administered by the Transportation Research Board of the National Academies. The project was managed by Stephen J. Andrle, Deputy Director for SHRP 2.

Jason Chen and Haiyun Lin were the RSG staff members who performed most of the technical work described in this document. They received scripting and GIS support from Bhargava Sana and Erich Rentz, respectively. Joe Wildey provided copy editing and formatting support for this report. The work done to create synthetic populations was led by the Fulton School of Engineering at Arizona State University. John Bowman was responsible for much of the work referenced in Appendix C on the transferability of estimated parameters.

This work would not have been possible without the cooperation and hard work of the staff members of the North Florida Transportation Planning Organization in Jacksonville and the District 7 Systems Planning group of the Florida Department of Transportation, Tampa. These agencies were supported by teams of local consultants: Atkins; Gannett Fleming, Inc.; Grimail Crawford Inc.; and Reynolds, Smith & Hill.

FOREWORD

Stephen J. Andrle, *SHRP 2 Deputy Director*

This report will be of particular interest to planning organizations considering development of an activity-based travel demand model and, in general, to professionals who use travel demand models as part of the transportation planning process. The SHRP 2 program developed proof-of-concept Dynamic Integrated Models in partnership with planning organizations in Sacramento, California, and Jacksonville, Florida. "Dynamic Integrated Model" refers to an activity-based travel demand model linked with a feedback loop to a Dynamic Traffic Assignment (simulation) model. The goal of that research was to improve urban-scale modeling and network procedures to address operations or spot improvements that affect travel-time choice, route choice, mode choice, reliability, or emissions.

Building a new activity-based model set for transportation planning is an expensive and time-consuming commitment. The objective of this research was to determine if activity-based model parameters can be successfully transferred from one community to another. If transfer of parameters could be shown to produce reasonable results, it could save development time and money.

DaySim, an activity-based travel demand model originally developed in Sacramento, California, was applied to Jacksonville, Florida, with Sacramento parameters and then calibrated to the Jacksonville environment. DaySim was also applied to Tampa, Florida, with Sacramento parameters and then calibrated with local data. A statistical analysis was performed to identify significant differences between transferred parameters and parameters developed from local data. Variations in model performance on validation tests were also evaluated. The analyses identified specific model components that would be better transferred than reestimated and others for which it would be better to reestimate. A model with borrowed parameters must still be calibrated against local conditions.

A significant finding of the research was that there must be a good match between the complexity of the source model to be transferred and the depth and coverage of data available for calibrating at the destination site. A second finding was that urban areas must be similar in key demographics such as household size, age, income, auto ownership, and trip purposes. Tampa has a much higher proportion of retirees and non-work-trip purposes than either Sacramento or Jacksonville, a situation that affected the transferability of parameters.

Travel demand models have been used for more than half a century to determine the need and estimate the usage of proposed new highway and transit systems. The majority of such models use Traffic Analysis Zones to aggregate demographic data and estimate interzonal travel demand for large time blocks (such as morning peak period). The interzonal demand is assigned to a link and node network to estimate likely roadway volumes.

Activity-based travel demand models are based on the disaggregate travel activity of individual travelers, not the aggregate behavior of all the travelers in a zone. They have the potential to better simulate behaviors such as time-of-day choice, route choice, mode choice, and trip chaining. Because they are disaggregate and based on individual behavior, there may be potential to borrow model structures and parameters to reduce model development costs in new locations.

In this project the DaySim activity-based demand model developed in Sacramento, California, was transferred to both the Jacksonville and Tampa, Florida, regions. The structure and parameters (coefficients) of the original Sacramento DaySim model were applied in Jacksonville and Tampa using local demographic and land-use data. Then, local data were used to reestimate parameters and coefficients, effectively creating new activity-based model sets for the Jacksonville and Tampa regions. Statistical and model performance tests were conducted between the model pairs, revealing significant differences that varied by model component and the regions being compared.

The analysis was hampered by small sample sizes or absence of data for certain variables required in the Sacramento DaySim specifications, leading to the observation that the complexity of a borrowed model specification should be supported by the data available at the destination site. In addition, spatial distribution of activity centers is region specific, which can lead to differences in mean trip lengths.

CONTENTS

Executive Summary

This study is an extension to the SHRP 2 C10A project, Partnership to Develop an Integrated, Advanced Travel Demand Model and a Fine-Grained Time-Sensitive Network: Jacksonville-Area Application. The extension was used to develop regional activity-based modeling systems for the Tampa Bay and Jacksonville regions in Florida and to test the concept of transferability. Transferability was an important finding from the original C10A project. If transferability of parameters could be demonstrated to produce reasonable results, it could save metropolitan planning organizations (MPOs) millions of dollars in data collection and model estimation costs and make activity-based models practical for a wider market. This study used a travel demand model specification borrowed from the Sacramento Area Council of Governments and the DaySim activity-based modeling platform. To test the transferability of the modeling system and specifications, the Sacramento parameters were applied directly in each study region, then the models were calibrated using Tampa- and Jacksonville-specific (hereafter "local") target values and distributions, which were derived from the National Household Travel Survey (NHTS) add-on samples for each region. In addition, the same data sources were used to estimate new local parameters for each region's model system to look for significant differences in regional travel behavior, again following the variables specified in the original Sacramento implementation.

The model estimation tests were hampered by small sample sizes for many of the model components. Nevertheless, the study team was able to identify statistically significant differences in enough model components to begin to characterize travel patterns in the Tampa region as being dominated by different lifestyle considerations. Looking at pairings of regional models in which the same parameter was significant in both regions, there were proportionally far more differences in the Tampa-Sacramento pair than either Jacksonville-Sacramento or Tampa-Jacksonville. These differences pointed to the influence of the Tampa region's large population of retirees as evidenced by significant effects of retiree-household and single-driver-household variables, single-auto households, and a reduced consideration of the presence of children on escort tour destination choices. In addition, the models estimated for the Tampa region had significantly higher propensities toward leisure tours and lower propensities toward work tours and shared rides involving more than two persons.

The study team found that the NHTS sample size was insufficient to reestimate many of the model components found in the original Sacramento specification. The study team concluded that for purposes of delivering production-ready versions of model systems to both regions, it would be better to start with the Sacramento specification (which was at least a holistic description of variation in regional travel behavior across a representative population) rather than to piece together versions of models that were a partial blend of estimated parameters from multiple regions. Specifically, the study team found that the NHTS samples lacked adequate representation of certain submarkets, such as young children, and underreported evening and non-work travel and non-auto modes.

In practice, model transfer typically does not involve reestimation of a complete model system. Sometimes, though, parts are reestimated, such as mode and destination choice, subject as they are to differences in characteristics of highway and transit networks as well as urban spatial structure. This study found sufficient evidence to recommend that when transferring a model, consideration should be given to reestimation of singly constrained destination choice models, data permitting. In addition, models that are reasonably consistent between regions, such as time-of-day choice models, may be good candidates for transfer and calibration rather than reestimation if the data available for estimation lack sufficient variation in observed multidimensional choices.

Using the Sacramento specification as a base, the Jacksonville and Tampa model systems were calibrated to benchmark values for the distribution of model outcomes using the NHTS data, which were more robust at the aggregate level. Those data were supplemented by other sources such as the Census American Community Survey (ACS), the Census Transportation Planning Package (CTPP), regional traffic counts, and transit boarding counts. The order in which individual model components were calibrated followed the order in which they are applied hierarchically in the DaySim model stream. Household auto ownership models and models related to predicting daily activity patterns and tour frequencies required more calibration effort than downstream models. This extra effort resulted in calibrating fewer parameters at the end of the model stream—namely, trip-level mode and destination and time-of-day choice models—which were conditioned by and benefited from the upstream tour-level calibrations. Recognizing the importance of the retiree market segment, the study team added retiree-bias constants in the daily-pattern choice model during calibration of the Tampa regional model, parameters that were not transferred over from the Sacramento specification because they did not exist in it. Similarly, other household and person segmentation variables were added to some of the Jacksonville models during calibration.

An important outcome of this study was the decision to use the richer, more complete variable and parameter specification from Sacramento rather than a local specification of variables and parameters; the latter is less robust in terms of explaining variation in the population due to the limitations of the estimation sample data. An important lesson learned in this study is that when reestimating an activity-based model specification to evaluate transferability of parameters, it is necessary to start with a model specification that is sufficiently parsimonious to allow estimation using both the regions' household interview survey data and other supporting data. In other words, the complexity of the model system should be supported by the available data in the transfer-recipient's region.

CHAPTER 1

Background

Motivation for the Study

The motivation for this extension to the C10A report, *Dynamic, Integrated Model System: Jacksonville-Area Application,* was to demonstrate the transferability of activity-based model specifications between regions. The model that was developed originally for Jacksonville, Florida, was intended to demonstrate the integration of an activity-based travel demand model, DaySim, with a time-dependent network supply model, TRANSIMS. The DaySim model components were specified using parameters from a version of the DaySim model originally developed for the Sacramento Council of Governments (SACOG), calibrated to local survey data from the National Household Travel Survey (NHTS) Florida Add-On Survey for the Jacksonville region. It was beyond the scope of the original contract, however, to formally test whether the transferred model parameters produced meaningful differences from what could have been obtained using a parameter set developed from local data.

Using the Sacramento model parameters with Jacksonville socioeconomic and network data inputs, the transferred model produced plausible results when compared with calibration target values. This was an important finding in the original study. The study team theorized that this was because of the activity-based model's more detailed representation of travel behavior, linking trips into tours and daily patterns while providing greater spatial and temporal resolution. Recognizing that there could be significant cost savings for agencies that would like to develop advanced models and were willing to transfer parameters from another region, this study focused on the question of study model transferability.

Overview of the Study

The work in this study involved creating two new versions of the DaySim model, one for Jacksonville and a parallel version for the Tampa Bay region. New sets of parameters were developed using the NHTS Florida Add-On Survey, which was used for both model estimation and calibration, as described later in this report. For model estimation, the original plan for the study was to pool the NHTS data for estimation. However, concurrent work on the Federal Highway Administration's Surface Transportation Environment Planning and Cooperative Research Program (FHWA STEP) project suggested that Jacksonville was actually more similar to Sacramento than it was to Tampa in terms of travel patterns and sociodemographics, which was revealed through preliminary model estimation exercises. With that knowledge, it did not make sense to pool the data for estimation. That would have produced results that were a blend of two dissimilar regions. This realization led the project team to estimate and test Jacksonville and Tampa specifications independently against the Sacramento model and against each other.

The sample sizes for the North Florida Transportation Planning Organization (NFTPO) and for District 7 of the Florida Department of Transportation (FDOT-D7) were individually too small to estimate parameters for all of the models and variables in the Sacramento DaySim specification. However, the study team felt they were adequate, individually, for calibrating to regional target values for all of the original Sacramento model components. This led the study team to undertake a research exercise in which estimation of new parameters from the NHTS sample data would allow the team to draw inferences from the outcomes about similarities between regions. The production version of each regional model system started from the original Sacramento model system, which has been used by SACOG for several years and is known to be a behaviorally robust model. The NHTS sample data were then used only to develop Jacksonville and Tampa regional calibration target values for various DaySim model components. Calibration of activity-based model components typically means adjusting constants in choice models or, in the case of destination choice models, coefficients on impedance terms to match trip lengths.

To encourage the regions to participate, the models were created as updates conforming to each region's current base model year, networks, and zone systems. Thus, NFTPO in Jacksonville and FDOT-D7 in Tampa Bay received new regional activity-based modeling systems, using the DaySim design ready for operational use. Both agencies expressed interest in using the models in upcoming long-range transportation plan (LRTP) updates.

The initial SHRP 2 C10 study funded the development of a Jacksonville-area model using existing 2005 inputs and, for a limited geographic scope, covering four counties. The 2010 regional modeling area actually encompasses six counties. For NFTPO, this meant expanding the previous Jacksonville model from four counties to six and developing 2010 land-use and socioeconomic data and network models. Similarly, for FDOT-D7, this meant updating its model to a 2010 base year, which included five counties and a small portion of a sixth.

For greater compatibility with DaySim, both regions developed multiperiod highway assignment methods rather than maintaining their current all-day assignments. In addition, both regions updated auxiliary demand models related to external flows, truck traffic, and visitors. Like the Sacramento model, both NFTPO and FDOT-D7 models utilized the Cube Voyager travel demand modeling package, minimizing the need to consider differences in assignment algorithms or other software specifics when making comparisons. This enabled the study team to estimate and calibrate parameters using common path-building methods.

Assessing Transferability

The goals of this project were to assess the transferability of parameters between regions and to provide guidance to agency modelers who might want to do the same in order to avoid the costs of a potentially expensive household interview survey (HIS) and parameter estimation work. The availability of the NHTS data and Florida Add-On Survey was viewed as an economical alternative to larger-scale survey collection efforts; and a secondary objective of this study was to determine to what extent the NHTS data would be useful for this purpose.

To determine the practicality of transferability, the study team sought to assess transferability from the standpoint of both statistical differences in parameter values and model performance in validation tests. In doing so, the team focused on answering the following questions:

- What are the statistically significant differences between the DaySim model parameter estimated for the Sacramento model specification and the same parameters estimated using the Jacksonville and Tampa models?
- Will there be any model components that cannot be estimated due to smaller sample sizes?
- Will there be significant differences between Jacksonville and Tampa parameters, when the data are sufficient to estimate those parameters?
- Can a DaySim model system, using parameters transferred from Sacramento, produce credible results such that calibration to Jacksonville or Tampa regional target values can pass validation tests?
- How much calibration is required to provide acceptable results?
- What are the barriers to transferring a model and how might they be overcome?

The answers to these questions have implications for the validity of transferring a model as a general strategy. The study team expected to find that some parameter values for certain model components could be significantly different from one region to the next due to different levels of transit availability. This is especially true in the case of values derived from region-specific transportation system supply variables, such as transit skims. In addition, the spatial distribution of activity centers is region specific, which may lead to significant differences in mean trip lengths and propensities toward nonmotorized travel.

At the same time, the team expected that long-term choices (such as auto ownership, basic household structures, and individual daily activity-travel patterns—including time spent in various activities and the times of day when individuals engage in these activities) should be very similar between two regions and should lead to very similar parameter estimates. This assumes that relevant cultural norms and business hours are more or less the same for people living in cities of similar size and density in the United States. To be transferable, a model should not have too many statistically significant differences; the similarities should dominate the predicted behavioral patterns such that only a modest amount of calibration is needed to overcome supply-side differences in transportation system level of service and differences in the spatial distribution of activity centers. However, if the level of effort required to achieve a calibrated and validated model approaches the level of effort required to estimate parameters from scratch, then it may be concluded that transferring a model is not an economical model development strategy.

Confounding Factors

A number of important factors must be taken into consideration when making an assessment of model transferability because they confound a scientific comparison.

1. The survey and count data used to estimate and calibrate the transferred model, the source of the variable specification, will be different from the survey data used to calibrate and

validate the recipient models, varying in both quality and sample validity. For example, the transferred Sacramento model was developed from a 2000 survey of 3,942 households. The 2008–2009 NHTS Florida Add-On Survey captured responses from 1,335 households in the Jacksonville region and 2,517 households in the Tampa Bay region and did not include separate records of household members younger than 5 years of age (FHWA 2009). Moreover, many of the household diary days in the Jacksonville and Tampa Bay samples were weekends, which could not be used for estimating models of daily patterns, tours, or trips due to the weekday focus of the model specification.

2. The effort put into the development of the source model specification will play a large role in its transferability. The Sacramento DaySim model has a very rich variable specification in nearly every model component. On one hand, this is generally viewed as beneficial, because it explains more variation in behavior across the population. To the extent that household and person-level decision making with respect to activities and travel is similar from one region to the next, this should enable the source model specifications to produce results in the recipient model system that demonstrate similar behavioral patterns and levels of variation among households and persons with the same attributes. A specification that was too sparse or simplistic would not be expected to transfer well, because it would leave out important explanatory variables. On the other hand, some model components may have been over-specified in the Sacramento model, meaning they unintentionally capture idiosyncrasies of the survey sample or supply-side variable inputs that are not true measures of activity-travel behavior decision making. This might lead to distortions in travel patterns when applied in another region.
3. The first two factors—when combined—can lead to a situation in which the survey data used to calibrate and validate the recipient model may not be adequate in every dimension to handle the specification provided by the source model. The study team recognized this as a minor concern in calibrating and validating the Jacksonville model and, to a lesser extent, the Tampa Bay regional model; the relatively small number of observations in the NHTS Add-On samples and the missing observations on very young household members may not provide adequate benchmarks across the market segments specified in the Sacramento model. This mismatch in survey sample quality and quantity was an even greater concern to the team for the purposes of estimating Jacksonville- and Tampa-specific model parameters corresponding to the Sacramento model variable specifications. The team anticipated that many model variables would not be estimable due to insufficient variation in observations and that significance levels would be low.
4. An additional factor with a large influence on model performance is the network-based supply models, both highway and transit, and the quality of the land-use and socioeconomic data inputs. The presumption is that the agency, and external consultants who work on these model components, are faithfully modeling existing conditions to the extent possible, thus minimizing errors in routing, travel times, and the locations of households and activity centers; however, the possibility of errors in these processes must be acknowledged. Further, since traffic counts and transit boarding counts are central to the validation of travel models, it is important to minimize logical inconsistencies that are often identified when, for example, counts on adjacent links are in sharp disagreement. It is also important to recognize that the counts themselves are subject to error, particularly when collected over a limited time span.

To synthesize, the principal challenge in assessing the validity of a model transfer exercise is to determine

- How much the differences we observe in model behavior and statistical fit are due to true differences in the underlying behavior between regions;
- How much is due to differences in transportation systems and urban spatial structure; and
- How much is due to confounding factors related to estimation and calibration approaches, survey sample quality, and supply-side models and data.

The remainder of this report attempts to untangle these factors in the context of this study and to provide guidance to modeling practitioners who may be contemplating an activity-based model transfer for their region. To begin, a summary is provided of the research approach used to develop the two model systems in preparation for the analysis.

CHAPTER 2

Research Approach

The outcomes of parameter transferability tests are just one aspect of assessing the validity of model transfer as an approach to model development. Another important consideration is the level of effort required to develop an activity-based model in a region where it has not previously existed, which may require assembling more detailed data and creating or modifying other procedures in support of the activity-based model. These same steps would be required irrespective of whether parameters were transferred or estimated from scratch. An agency that decides to transfer a model from another region should recognize that a substantial amount of work will be involved, regardless of the parameter transfer.

In this research, the consultant team developed close partnerships with the modeling staffs of the two subject agencies, NFTPO and FDOT-D7. With each group, there was an established division of labor in which the agency staff members were responsible for developing and providing

- Parcel-level land-use data, including housing units, commercial floor space, and establishment-level employment by industry type;
- Household and employment control values at the travel analysis zone (TAZ) level;
- Socioeconomic data, such as school enrollment and hotels and motels;
- Highway and transit network model inputs;
- Paid parking spaces; and
- Auxiliary demand models, such as external-internal, external-external, and truck trip models and tables.

The consultant team was responsible for developing the DaySim activity-based travel demand model components, including estimation and calibration, and for integrating all of the pieces provided by the partner agencies into a complete regional model system. In addition, the consultant team developed synthetic 2010 populations for both regions. Full integration of system components was necessary before estimation or calibration could begin; this was necessary because the DaySim specification required several accessibility-related variables that are derived from land-use inputs and skims. In addition, new network assignment procedures needed development to move from agencies' all-day assignments to four periods and to provide travel time and cost skims for model variables.

Data Development and Integration

Integration of the activity-based modeling components with the supply-side and auxiliary demand model components involved numerous steps, some more complex than others, with frequent back-and-forth communication among the consultant team, agency staff members, and local consultants. An abbreviated summary of the major tasks follows.

Parcel-Based Land-Use Data

The Sacramento version of DaySim was notable for being, among other things, the first activity-based modeling system in the United States to use parcel-level land-use inputs. The primary benefit of this approach is greater spatial precision in terms of activity locations, pedestrian and bicycle travel time estimation, and walk access to transit. Although it would have been possible to transfer the Sacramento model to a system that used more aggregate spatial units, it was necessary to develop DaySim accessibility variables at the parcel level in the recipient regions to provide the most mathematically consistent comparison between regions. In addition, both Florida agencies expressed an interest in having parcel-level land-use and accessibility resolution.

Both NFTPO and FDOT-D7 worked with the consultant team to develop geographic information system (GIS)–based point and polygon layers of land use for each of the counties in the model area. This process was the most time-consuming of

Table 2.1. Summary of Critical Parcel Attributes for Tampa and Jacksonville DaySim Models

Attribute	Tampa Model	Jacksonville Model
Number of single-family housing units	821,242	405,574
Number of multifamily housing units	433,495	165,017
Number of other type housing units (retirement home, mobile-house, etc.)	181,404	65,155
Number of paid parking spaces	36,117	3,124
K–12 school enrollment	449,905	249,010
Postsecondary (college/university) enrollment	139,470	121,885

the integration steps, primarily because staff for both agencies viewed this as the development of an operational regional modeling system and wanted to perform thorough reviews and quality assurance checks. This process involved reconciling logical inconsistencies between tax assessors' records for housing units and commercial square footage, Census records for households, and establishment-level employment data purchased from a commercial vendor, InfoGroup. Although the Florida Department of Revenue has a set of consistent definitions for coding tax assessor database entries, adherence to these standards was inconsistent between regions. In addition, in some cases there were multiple versions of the GIS layers, which varied in the extent to which polygon slivers had been cleaned and recoded based on previous work efforts.

For the DaySim model, the critical parcel attribute fields were the number of single-family, multifamily, and "other" housing units; number of paid parking spaces; and K–12 school enrollment and postsecondary (college/university) enrollment. A summary of these attribute quantities is shown in Table 2.1. Parking and enrollment data were added to the base parcel layer by agency staff and local consultants. Households and employment were also assigned to parcels; however, the processes were more complicated due to the need to maintain regional control totals.

Regional Households and Employment

To support the development of synthetic populations and to control the spatial distribution of regional employment within the region, the consultant team worked with the local agencies to develop regional control totals for households and employment. Once control totals were established, the consultant team developed synthetic populations for each region and allocated populations and regional employment to parcels.

Households

The consultant team developed regional household control totals by multiple attributes and attribute levels, using the 2010 Census at the Block Group level. These control totals were then reallocated to each region's TAZ system for consistency with past practices and future forecasts. Control totals were developed for three separate population groups: permanent residents living in households, seasonal resident households, and group quarters residents (such as residents of group homes, college dormitories, retirement homes, and military quarters). Table 2.2 shows the number of households by type in each region. Both NFTPO and FDOT-D7 reviewed these data at the TAZ level and provided recommendations for minor adjustments, primarily to the locations of group quarters and seasonal populations, based on local knowledge. The consultant team used these regional control totals, along with household sample data from the ACS Public Use Microdata Sample (PUMS), to produce synthetic 2010 populations for each region; the team used the open-source program PopGen 1.1 to simultaneously control both household- and person-attribute levels.

Once a set of synthetic households and persons was created at the TAZ level, the consultant team applied a utility program to allocate them to the parcel level, using the locations of housing units found in the parcel data. This allocation process revealed additional inconsistencies between the spatial distribution of households and the number and locations of single-family, multifamily, and group quarters housing units. These discrepancies were rectified through manual examination by agency staff members, who provided recommendations to the consultant team for reallocation.

Employment

Because of differences in the ways that employment data are collected and classified by various sources, multiple sources of employment were used in both the NFTPO and FDOT-D7 regions. Both regions purchased 2010 establishment-level data from the commercial vendor, InfoGroup; these data were then geocoded to individual parcel locations.

For the Tampa Bay region, FDOT-D7 staff inspected these records and attempted to find and correct missing employment and North American Industrial Classification System

Table 2.2. Number of Households by Type

Household Type	Tampa Model	Jacksonville Model
Permanent residents	1,092,571	553,265
Group quarters	73,306	16,854
Seasonal residents	52,579	28,328

(NAICS) codes and compared these records with other in-house sources. To set regional control totals, FDOT-D7 staff used a combination of sources to determine regional control totals by county and industry group; sources included 2010 data from the Quarterly Census of Employment and Wages (QCEW) program, sole proprietor data from the U.S. Bureau of Economic Analysis (BEA), and military employment data from BEA. Regionwide, the disaggregate InfoGroup data summed to 83% of the regional control totals, varying somewhat by industry and county.

NFTPO used regional employment control totals provided by the Florida Bureau of Economic and Business Research (BEBR). These corresponded roughly with the regionwide totals for InfoGroup, but they varied by industry and county. Summaries of employment by industry from each source and the final employment numbers may be found in Tables 2.3 (Jacksonville) and 2.4 (Tampa).

For both regions, the consultant team developed a program to synthesize missing employment and randomly remove disaggregate employment records in places where county control totals for a particular industry segment were exceeded. Missing jobs by industry group were added to parcels with appropriate land-use designations, favoring locations where such jobs already existed, so that in the aggregate they matched county-level control totals. Agency staff performed extensive reviews of these synthesized disaggregate job records and specified manual re-allocations, as necessary.

Network Models

Both NFTPO and FDOT-D7 took responsibility for updating their respective 2010 highway and transit networks, such as link coding, facility and area type designations, speed-capacity parameters, and transit travel time factors. To maximize compatibility with the Sacramento DaySim specifications, the consultant team worked with agency staff to develop a.m. peak, midday, p.m. peak, and evening network assignment procedures. Before this project, both agencies had maintained

Table 2.3. Employment Data by Industry Type and Source, Jacksonville

Industry	Florida BEBR	2010 QCEW	InfoGroup	Final Number Used in Model
Agriculture, forestry, fishing, and hunting	1,771	1,901	1,646	2,080
Mining	97	124	421	420
Utilities	788	3,427	1,935	1,937
Construction	28,199	27,815	54,486	51,998
Manufacturing	28,839	28,772	47,356	47,509
Wholesale trade	23,346	23,168	27,729	26,443
Retail trade	71,137	71,707	92,234	90,336
Transportation and warehousing	24,919	30,172	27,065	27,083
Information	10,013	9,996	16,892	16,832
Finance and insurance	45,324	45,172	45,485	46,078
Real estate rental and leasing	8,797	8,618	18,455	16,952
Professional, scientific, and technical services	32,531	33,256	37,163	35,687
Management of companies and enterprises	5,705	5,701	488	5,746
Administrative and support and waste management and remediation services	41,940	42,088	25,722	40,938
Educational services	8,854	40,922	44,031	43,066
Healthcare and social assistance	75,649	77,662	77,199	76,661
Arts, entertainment, and recreation	8,770	9,549	8,448	9,299
Accommodation and food services	56,301	56,391	63,433	61,204
Other services (except public administration)	17,274	16,862	34,002	31,374
Public administration	0	33,967	69,396	60,337
Total	490,254	567,270	693,586	691,980

Note: BEBR = Bureau of Economic and Business Research; QCEW = Quarterly Census of Employment and Wages.

Table 2.4. Employment Data by Industry Type and Source, Tampa

Industry	InfoGroup	Final Number Used in Model
Agriculture, forestry, fishing, and hunting; mining; construction	75,593	101,100
Utilities; manufacturing; wholesale trade; transportation; delivery and warehousing; waste and remediation services	177,293	200,600
Retail trade	176,707	192,900
Postal services; arts, entertainment, and recreation; accommodations; other services	107,693	128,700
Information; finance and insurance; real estate, rental and leasing; professional, scientific, and technical services; management of companies and enterprises; administration and support	255,443	355,200
Educational services	95,972	106,600
Healthcare and social services	173,934	198,100
Food services	96,161	106,100
Public administration, government services, and military	52,419	70,100
Total	1,211,215	1,459,400

planning models that performed all-day highway and transit assignments, which occasionally were modified to create peak-period assignments, as needed, for special projects. In addition, the consultant team modified the speed-feedback loop systems in both models, using skim-averaging methods that improved convergence rates in both model systems after integration with DaySim. The speed-feedback loop was modified to account for multiple (four) network-assignment time periods. This was necessary because the original trip-based model setups had just one all-day assignment with feedback to trip distribution; the 2005 Jacksonville-DaySim model used TRANSIMS as the network model, which uses a very different feedback system.

Auxiliary Demand Models

NFTPO and FDOT-D7 assumed responsibility for updating auxiliary demand models in their systems, including the following:

- Truck trip tables and embedded procedures;
- Generation and distribution of internal-external (IE), external-internal (EI), and external-external (EE) vehicle trips; and
- Modification of special generators.

While accounting for all sources of auxiliary demand is important for model validation, the consulting team had a limited influence on this process, mainly helping to rebalance the external trip tables to match new counts in the Jacksonville region. NFTPO and FDOT-D7 chose not to change the methods used to produce EE/IE and truck trip tables, which they considered within their purview. In addition, both agencies believed it would be easier for them to compare differences between the activity-based model results and their trip-based models if the auxiliary demand components and networks were consistent.

IE/EI trips are intriguing because, in theory, they overlap with activities and travel generated by households through DaySim. For example, persons who live within a region but who work or attend school outside of the region have IE tour and trip patterns. In DaySim, a fixed portion of workers and students are assumed to have usual work or school locations outside of the study area; these IE work and school commutes are predicted, and the entire day pattern for these individuals is *not* used in subsequent model steps to create trip tables because that would duplicate the IE flows that already exist in the model. The portion of workers in each TAZ that work outside the region is derived from ACS journey-to-work data. Intuitively, persons who live near the edges of a study region are more likely to work outside of it than those who live closer to the center.

Likewise, DaySim assumes that a portion of the jobs within the region will be filled by workers who live outside the region. To accommodate this market, EI work trips are fixed for workplace destinations, thus reducing the availability of those jobs for workers living within the region. The usual workplace location choice is affected by DaySim's shadow-pricing mechanism, which compares the total employment within each zone to the number of workplace locations predicted for each zone and adjusts the attractiveness of that zone through a series of iterations to balance job supply with worker demand. For both Tampa and Jacksonville models, trial-and-error revealed that a 10-iteration approach to shadow-pricing for employment yielded the best results.

Because the DaySim model theoretically covers the portion of special generator travel market that comes from local residents working or patronizing these facilities, some special generators, such as regional shopping malls and hospitals, were not used. Other special generators, such as beaches, amusement parks, and airports draw travel from both local residents and visitors; therefore, these special generators were kept active, and their trip-generating rates were adjusted based on validation outcomes, as necessary.

In terms of auxiliary demand's impacts on transferability analysis, it seems to have the most noticeable impact on the extent to which DaySim trips need to be redistributed across time periods and overall tour/trip rates. It is not clear that the results of this study would have changed in a meaningful way had the consulting team exerted more control over the process. The effects of auxiliary demand on tour and trip mode and destination choice models were negligible.

Urban Form and Accessibility Variables

DaySim uses parcels as the main spatial unit; therefore, it is important to have measures not only of what lies on any particular parcel, but also what lies in the area immediately surrounding each parcel. These measures are created by defining a buffer area around each parcel and counting what lies inside the buffer. These variables can then be used in DaySim in a way similar to how zonal land-use and density variables are used in TAZ-based models, with the advantage that the buffer is defined in exactly the same way for each parcel. The buffer variables that DaySim uses include the following:

- Number of households in the buffer;
- Employment (number of jobs) in the buffer in various employment sectors;
- Enrollment in schools in the buffer, segmented by grade schools and colleges;
- Number of spaces and average price of paid, off-street parking in the buffer;
- Number of transit stops within the buffer (segmented by mode, if relevant);
- Number of street intersections in the buffer, segmented by 1-node (dead-end or cul-de-sac), 3-node (T-junction), and 4+-node intersections; and
- Area within the buffer that is public, open space (parks, etc.).

A special set of buffering programs was created to establish the buffering variables for each parcel. These programs combined the GIS parcel layer (complete with the attributes in the preceding list), along with the all-streets network, to calculate the variables. The buffering calculations require the input of an "all streets" network to count all local streets and intersections, not just the higher-level facilities used in the regional highway network model. NAVTEQ networks from both NFTPO and FDOT-D7 were obtained for this purpose. The buffering program permits different methods of calculating buffers; however, these projects used a logistic distance-decay formulation. Compared with a flat, uniform buffer with a predetermined cutoff point (e.g., ¼ or ½ mi), a distance-decay formulation has the advantage of weighting nearer attractions more than more distant attractions and avoids the "cliff effects" at the edges of the buffer radius. The buffering program also calculates the distance from the parcel to the nearest transit stop (by transit mode, if relevant) and the distance to the nearest open space area.

Model Estimation

Once all of the model system components were in place, the consultant team took the lead in calibrating DaySim model components and in estimating model parameters using the NHTS data. The DaySim application software was operated in estimation mode, which enables the user to produce estimation data sets for any particular model component, given household diary records and a set of variable specifications. DaySim includes a data processing step to create transportation system level-of-service variables from skim tables and accessibility variables from combinations of land-use attributes and transportation skims. These are placed in the estimation data set for each survey record in which those variables are specified. DaySim is configured to integrate with ALogit, a commercial estimation software package. This integration includes accepting a variable specification file in a format compatible with ALogit's "F12" output file format and returning a data set and configuration files in the formats used by ALogit. (The F12 output file format is text-based and is also output by the open-source discrete choice model estimation program Biogeme.) It is incumbent on users to run ALogit to estimate the models and to manually specify any changes to the specification that may be different from the original specification. Manual changes could include removing variables, adding new variables, making linear and nonlinear transformations of variables, and constraining parameter values.

Model Calibration

Model calibration is the process of applying the estimated models, comparing the results to observed values, and adjusting either the model specification or the alternative specific constants. This process uses the application mode of the DaySim software, and the comparisons of results are produced by calibration reports developed for this purpose. The process is complicated by the fact that the various model components in DaySim are not isolated: long-term decisions restrict how people plan their days and where, when, and how they travel; lower-level decisions also can influence the higher-level choices through the log-sum, an explanatory variable in the long-term choice models. As a result, a change in the share of one model is likely to influence the outcome of other models. Therefore, the general approach is to calibrate model components in the order in which they are applied, which generally means that the higher-level models are calibrated before the lower ones. In this instance, the consultant team calibrated the long-term choice models first, followed by the daily activity scheduling models, tour-level models, and trip-level models. In addition, the calibration process must be done in an iterative manner to incorporate all the interactions between models until the model, performing as a system, converges to a stable set of parameter values for all of the model components.

For both the Jacksonville and Tampa regional models, the consultant team performed numerous iterations of calibration until all traveler decision modules matched their respective target values and regional demand patterns were well-represented. Target values for long-term choice models were perhaps the best informed because the study team was able to use data from ACS and CTPP for work location choice and auto ownership choice models, respectively. For other models, expanded NHTS data provided the only benchmark values. In addition, validation to traffic count data by time periods was used to refactor some of the NHTS-derived target values to better represent time-of-day choices and what the consultant team and agency staff perceived to be underrepresentation of non-work travel. Finally, transit system boarding count data were used to refactor mode choice target values, which was especially important considering that observed transit trips were not well-represented in the NHTS data for either region.

Many different model components and parameters were evaluated as part of the calibration process. The degree of fit that can be tolerated depends on the model and the market segment and how much available data there are for calibration. Moreover, the focus is on fit to individual parameters, not a global fit measure. For example, the consultant team strived for a tighter fit for models that individually have greater impact on the model system—such as auto ownership shares, which applies to all households and persons and has just four constants. In contrast, a lower degree of precision was tolerated for model parameters of some of the more obscure variables in which the confidence in the benchmark data was not so high, such as coefficients on the propensity to make intermediate stops on work-based sub-tours. Often the amount of effort needed to match the more obscure parameter benchmarks does not pay off and can even distort other parameters.

CHAPTER 3

Findings and Applications

As described in Chapter 1, assessment of the effectuality of transferring the Sacramento activity-based model specification to the Jacksonville and Tampa regions followed two primary avenues of inquiry. The first was a strict test of the transferability of estimated parameters, with the overall objective of finding out whether the behavioral sensitivities that drive model specification in one region (Sacramento) are also evident when one tries to estimate parameters for the same specification in other regions (Jacksonville and Tampa Bay) and where the differences lie. The second test was designed to represent what an agency would actually do if it was to transfer a model. This involved starting with the Sacramento specification, calibrating regional models for Jacksonville and Tampa Bay, determining whether target values could be met for each region with a reasonable amount of effort, and identifying where the calibrated parameter revealed regional differences.

Estimation of Model Components to Test Transferability

The consultant team tested reestimation of the models, keeping the specification of the Sacramento models but reestimating all of the parameters using the 2009 NHTS data for the Jacksonville and Tampa regions and comparing the estimated coefficients to the Sacramento-based coefficients to look for significant differences in the estimates. This is a somewhat stricter test of transferability because it tests the transferability of every coefficient in a model, rather than the predictive accuracy of the model as a whole. As it is a stricter test of transferability, it relies on larger survey sample sizes than are needed simply for calibration of the marginal distributions. In that regard, the rather small sample sizes available from the NHTS data for the Florida regions made the estimation-based transferability tests inconclusive, as will be discussed in the next section.

The DaySim activity-based model software is designed to be used in both model estimation and model application, with the same code used to specify the models in each case. This has several advantages:

- It avoids coding errors when estimated models are prepared for application.
- It is easy to go back and change the models slightly by adding or deleting new variables and reestimating.
- It is efficient to estimate previously specified models on new survey data when such data become available.

For this project, the code for the existing DaySim models for the Sacramento region activity-based model system (SACSIM) was used to estimate models with the same specification on new survey data for the Jacksonville and Tampa Bay regions of Florida. The survey data for both regions are from the 2008–2009 National Household Travel Survey (FHWA 2009).

Transferability Tests for Tampa and Jacksonville

There are more data for the Florida regions than for most regions of the United States, because the State of Florida paid for an add-on sample as part of the NHTS. The transferred Sacramento model (called SACSIM) was developed from a 2000 survey of 3,942 households. The 2008–2009 NHTS Florida Add-On Survey captured responses from 1,335 households in the Jacksonville region and 2,517 households in the Tampa Bay region; however, it did not include separate records of household members younger than 5 years of age, and some adults did not provide complete diaries. Moreover, 28% of the household diary days in the Jacksonville and Tampa Bay samples were weekends, which could not be used for estimating models of daily patterns, tours, or trips due to the weekday focus of the model specification. Only the auto ownership model could be estimated using the full sample.

For each model component in DaySim, the approach was to estimate separate models on the data from the three regions

(Sacramento, Tampa, Jacksonville) and then compare the estimated coefficients along with the standard errors of those estimates to identify cases in which the estimated coefficients were significantly different across regions. There were six model components that were not included in the estimation process. Three of these were not included because the NHTS data do not have data to estimate three models that are in the SACSIM system. Those are (1) usual school location for all students, (2) transit pass ownership for all adults, and (3) availability of free parking at work for all workers. Three additional models were not included in this particular analysis because they proved too difficult to estimate on the new data, and the consultant team had previous results for those models from a similar FHWA project on model transferability (discussed later in this chapter). Those models are (1) usual work location for all workers; (2) work-tour destination choice, conditional on usual work location; and (3) day-pattern choice.

Seventeen component models were included in this analysis. Detailed estimation results and comparisons for those models are provided in Appendix A for three models:

- A model estimated on the 2000 Sacramento regional household travel survey data (the basis for the revised SACSIM activity-based model implementation);
- A model estimated on the Tampa region 2009 NHTS (weekday) survey data; and
- A model estimated on the Jacksonville region 2009 NHTS (weekday) survey data.

Each table in Appendix A represents a separate model and includes six sets of values. The first three sections are the estimated coefficients and *t*-statistics for the original Sacramento model and the new Tampa and Jacksonville models, respectively. The next three column groups show differences between parameters, expressed as pairwise *t*-tests for each pair of models:

- Jacksonville versus Tampa;
- Tampa versus Sacramento; and
- Jacksonville versus Sacramento.

The results indicate whether a difference between an estimated parameter for each region is statistically significant, either positive (green shades) or negative (red shades). For each pair, there are two sets of *t*-statistics, one using one city's standard errors as a base and the other using the other city's standard errors as a base. For most parameters the test outcomes are the same irrespective of which set of standard errors is used. In the discussion that follows, summaries of sample sizes, numbers of statistically significant parameters, common statistically significant parameters, and significant differences in estimated parameter values for all 17 model components and each region are shown in Tables 3.1–3.5.

Sample Size

In Appendix A, the relevant sample size (number of observations) is given at the top of each table for each model. As already mentioned, sample sizes were reduced due to incomplete diaries and unusable weekend observations.

A summary of the sample sizes used to estimate various model components appears in Table 3.1. For example, for the work-tour-mode choice model (Appendix A, Table A.10), there are 3,313 relevant work tours in the Sacramento data, compared with just 844 in the Tampa data and 506 in the Jacksonville data. Thus, even the combined sample size for the Florida regions is less than half as large as the Sacramento sample size. The small sample sizes are problematic for this study for a number of reasons, including those already mentioned in the previous paragraphs.

Another drawback of limited sample sizes is that there are sometimes not enough cases in which particular choice alternatives in the models are chosen to be able to estimate utility coefficients for those alternatives. The coefficients that were constrained at a particular value rather than estimated were a result of too few observations to estimate the particular variable from the data. For example, in the mode choice models, there were very few observations in the Florida NHTS where "bike" or "transit" were chosen; so many of those parameters could not be estimated for the Florida regions. It is not possible to say anything about model transferability in cases where parameters cannot be estimated. In such a case, the only options are to (a) transfer parameters from an existing model, such as the Sacramento models, or (b) collect additional travel survey data, preferably oversampling in specific geographic areas to obtain more transit, bike, and walk trips data.

Statistical Significance of Estimated Parameters

The effects of sample size on the ability to estimate statistically significant parameters are reflected in the results shown in Table 3.2. The 17 models that were estimated as part of this study ranged in complexity from a model with just 14 parameters to models with more than 100. For this study a statistical significance level of 0.05 is used, implying a threshold of $|t\text{-statistic}| \geq 1.96$ and corresponding to a 95% confidence interval, a fairly conservative standard. As can be seen in the table, in the original Sacramento specification more than one-third of the model parameters were not statistically significant at the 0.05 level. Of these nonsignificant parameters, a majority of parameters were estimated but did not achieve the 0.05 level, while many others were constrained to specific

Table 3.1. Number of Observations Used to Estimate Tampa and Jacksonville DaySim Models

Tables in Appendix A	Name of Choice Model Component	Number of Observations (% of sample size of corresponding Sacramento model)	
		Tampa	Jacksonville
A.1–A.2	Household auto ownership	2,517 (63.9%)	1,335 (33.9%)
A.3–A.5	Person exact number of tours	3,820 (38.1%)	2,195 (21.9%)
A.6–A.8	Nonmandatory-tour destination	2,912 (46.8%)	1,601 (25.7%)
A.9	Work-based sub-tour generation	513 (21.5%)	331 (13.9%)
A.10	Work-tour mode	844 (25.5%)	506 (15.3%)
A.11	School-tour mode	211 (13.5%)	166 (10.6%)
A.12	Escort-tour mode	353 (24.7%)	229 (16%)
A.13	Other home-based-tour mode	2,569 (57.1%)	1,373 (30.5%)
A.14	Work-based sub-tour mode	107 (18%)	81 (13.6%)
A.15–A.17	Work-tour arrival and departure times	846 (25.4%)	511 (15.4%)
A.18–A.19	School-tour arrival and departure times	155 (10.9%)	113 (7.9%)
A.20–A.22	Other home-based-tour arrival and departure times	3,006 (50.6%)	1,609 (27.1%)
A.23–A.24	Work-based sub-tour arrival and departure times	106 (18.1%)	83 (14.1%)
A.25–A.27	Intermediate-stop generation and purpose	7,625 (33.3%)	4,370 (19.1%)
A.28–A.30	Intermediate-stop destination	1,487 (18.5%)	1,062 (13.2%)
A.31–A.32	Trip-level mode	9,876 (33.3%)	5,741 (19.4%)
A.33–A.34	Intermediate-stop departure time	3,894 (43.4%)	2,009 (22.4%)

values to maintain theoretical relationships. For example, some choice alternatives were made effectively unavailable by setting alternative-specific constants to −10.

In total, 64% of the parameters specified in the 17 Sacramento models were statistically significant at the 0.05 level or better. In comparison, 40% of the Tampa and 36% of the Jacksonville models' estimated parameters were significant. The models that had the largest numbers of statistically significant parameters included the nonmandatory-tour destination choice, intermediate-stop generation and purpose choice, and intermediate-stop destination choice models. Proportionally, there were more significant parameters estimated for the trip-level mode choice and intermediate-stop departure time choice models. Each of these models has more than 1,000 observations for all three model regions. Interestingly, these models are all tour- or trip-level decision contexts that do not focus on work or school.

In contrast, the models at the top of Table 3.2 are long-term or day-level choice models. Despite having large numbers of observations and total parameters, the "person exact number of tours model" and the "household auto ownership model" have relatively fewer significant parameter estimates. The work-, school-, and escort-tour mode choice models have both fewer observations and proportionally fewer significant estimated parameters. Among these models, there are many fewer significant parameters in the Tampa and Jacksonville models compared with the Sacramento model. An additional observation is that, with the exception of the work-based sub-tour arrival and departure time model, which is an anomaly due to too few observations, the time-of-day choice models seem to have relatively more significant parameter estimates.

Tour- and trip-level choice models are observed more times per person than household-level and day-pattern decisions. In addition, work- and school-related choices are typically observed just once per day. Fewer observations lead to fewer significant parameter estimates. This is only part of the story, however. As shown in Table 3.1, the "person exact number of tours model" and the "household auto ownership model" have more than 1,000 observations in each model region. These models rely primarily on specifications in which household and person attributes explain variations in choice behavior and are further removed from the direct effect of transportation

Table 3.2. Statistically Significant Estimated Parameters in Sacramento, Tampa, and Jacksonville DaySim Models

Tables in Appendix A	Name of Choice Model Component	Total Parameters in Model	Number of Model Parameters Estimated at 0.05 Significance: $\lvert t\text{-Statistic}\rvert \geq 1.96$		
			Sacramento	Tampa	Jacksonville
A.1–A.2	Household auto ownership	60	38	29	27
A.3–A.5	Person exact number of tours	101	39	16	11
A.6–A.8	Nonmandatory tour destination	94	79	52	45
A.9	Work-based sub-tour generation	14	9	6	2
A.10	Work-tour mode	36	25	3	1
A.11	School-tour mode	41	23	6	9
A.12	Escort-tour mode	15	8	7	8
A.13	Other home-based-tour mode	44	28	23	20
A.14	Work-based sub-tour mode	16	11	3	5
A.15–A.17	Work-tour arrival and departure times	71	48	39	29
A.18–A.19	School-tour arrival and departure times	59	38	15	14
A.20–A.22	Other home-based-tour arrival and departure times	92	57	45	37
A.23–A.24	Work-based sub-tour arrival and departure times[a]	47	0	5	7
A.25–A.27	Intermediate-stop generation and purpose	106	88	62	61
A.28–A.30	Intermediate-stop destination	92	60	21	32
A.31–A.32	Trip-level mode	62	48	34	29
A.33–A.34	Intermediate-stop departure time	49	39	30	27
	Sum (%) of all 17 models	999	638 (64%)	396 (40%)	364 (36%)

[a] The Sacramento version of the work-based sub-tour arrival and departure time choice model has only constrained parameters because work-based sub-tours are observed for only a limited portion of the day, the majority being around lunch times.

system level-of-service variables, despite including a composite accessibility variable. As shown in Table 3.2, the "person exact number of tours model" in particular has more than 100 parameters, nearly all of which are constants that represent interactions between tour purposes or day-pattern dimensions and person types. A relatively small proportion of these parameters are significant, particularly in the Tampa and Jacksonville models. Nonsignificant parameters are retained in these models to represent theoretically desirable segmentation of person and household types and can be affected by which alternative is selected as the base alternative with constant of zero, or by which person type is chosen as the reference person type, for example. Since decision-maker attributes such as household and person demographics do not vary across choice alternatives, using them to explain variation requires estimating bias constants that are alternative specific or that represent subsets of alternatives. For alternative-specific parameters to be statistically significant, there must be a sufficient number of observations in which an attribute varies for the same chosen alternative. For example, if all of the persons observed to make choice "A" came from the same income group "X," then it would not be possible to estimate a parameter for the effect of income on the propensity to choose "A."

In contrast, the intermediate-stop, non-work/school tour destination, trip-mode, and arrival and departure time choice models are less dependent on constants and make more direct use of travel time and cost variables in their specification. Since travel times and costs vary over alternatives, a generic coefficient (e.g., the marginal utility of travel time) may be estimated and applied to multiple alternatives; that is a more efficient way to represent variation in choices and much easier in terms of obtaining statistically significant coefficient estimates.

Comparing the model regions in Table 3.2, all of the Sacramento model components have more statistically significant parameters than the corresponding Tampa and Jacksonville model components, which is to be expected because Sacramento was the source specification and had nearly as many observations as the other two regions combined. In addition, the Tampa model has more statistically significant estimated parameters than the Jacksonville model for all but a few models, which was also expected due to its larger sample sizes. The one noteworthy exception is the intermediate-stop destination choice model for which Jacksonville has 10 more significant parameters than the corresponding Tampa model, an observation that is explored in more detail in the next section.

Commonality of Statistically Significant Parameters

Several interesting questions arise. How many statistically significant parameters do these regions have in common? And which models have the most significant parameters in common? The answers to these questions may be found in Table 3.3. Aggregating over all 17 model components in Table 3.3, the regional combination of Jacksonville-Tampa has 27% agreement in terms of statistically significant estimated parameters, the lowest percentage of the three possible combinations. The Tampa-Sacramento combination has the highest percentage of common statistically significant estimated parameters with 33%. The Jacksonville-Sacramento combination has 31% in common. These values are shown in the row third from the bottom of Table 3.3.

If the joint occurrence of statistically significant parameters were random, then the probability of any pair of models having a statistically significant parameter in common would be the product of the individual probabilities. For example, from Table 3.2 it may be seen that the proportion of statistically significant parameters in the Jacksonville and Tampa models were 0.36 and 0.40, respectively. Thus, the joint probability of the Jacksonville and Tampa models having a statistically significant parameter in common under the assumption of independence is $0.36 * 0.40 = 0.14$. Joint probability calculations under assumptions of independence are shown on the row second from the bottom of Table 3.3, including the three-way combination for all three models in the right-most column.

The last row of Table 3.3 shows the ratio of observed-to-expected ratios (OE ratios) for each pair of regional models

Table 3.3. Statistically Significant Estimated Parameters That Sacramento, Tampa, and Jacksonville DaySim Models Have in Common

Tables in Appendix A	Name of Choice Model Component	Number of Estimated Parameters That Were Significant at 0.05 Level Common to Pairs and All Three Models			
		JAX and TPA	TPA and SAC	JAX and SAC	All Three
A.1–A.2	Household auto ownership	22	24	21	20
A.3–A.5	Person exact number of tours	9	12	8	7
A.6–A.8	Nonmandatory tour destination	28	45	39	24
A.9	Work-based sub-tour generation	2	6	2	2
A.10	Work-tour mode	1	3	1	1
A.11	School-tour mode	4	4	6	3
A.12	Escort-tour mode	7	5	6	5
A.13	Other home-based-tour mode	17	18	17	15
A.14	Work-based sub-tour mode	3	3	4	3
A.15–A.17	Work-tour arrival and departure times	28	35	29	28
A.18–A.19	School-tour arrival and departure times	6	10	10	3
A.20–A.22	Other home-based-tour arrival and departure times	27	36	29	25
A.23–A.24	Work-based sub-tour arrival and departure times	2	0	0	0
A.25–A.27	Intermediate-stop generation and purpose	49	57	57	48
A.28–A.30	Intermediate-stop destination	14	19	29	13
A.31–A.32	Trip-level mode	25	31	27	24
A.33–A.34	Intermediate-stop departure time	21	26	24	18
	P1: Percent of 999 total parameters in all 17 models	27%	33%	31%	24%
	P2: Joint probability if independent (see Table 3.2)	14%	25%	23%	9%
	OE ratio: observed-to-expected (*P1*/*P2*)	1.84	1.32	1.33	2.59

and for all three in combination, where P1 is observed proportion and P2 is the expected proportion under independence assumptions. As a rough indicator of correlation between common components, OE ratios indicate that the Jacksonville and Tampa models are more strongly correlated than either the Jacksonville-Sacramento combination or the Tampa-Sacramento combination. For example, the table indicates that the Jacksonville-Tampa pair is 84% more likely to have statistically significant parameters in common than would be expected under the independence assumption, whereas the Jacksonville-Sacramento and Tampa-Sacramento combinations are only one-third more likely. While this could say something about the underlying behavior of households and travelers in each region, it does not indicate the direction of correlation, and is more likely measuring the effect of commonalities in the survey instruments and sampling of households. Both Florida regions used the same 2008–2009 NHTS Add-On Survey instrument and sampling methodology, whereas the Sacramento model used a separate 2000 household survey.

The OE ratio for the pairs of regional model systems also suggests the degree to which certain parameters that are common to these models are more consistently estimated than others. Here, consistency of estimation refers to the ability to measure the variable of interest consistently and to obtain observations with sufficient variation in values over the observed choices. Considering the joint probability of common significant parameter estimates in all three regional models, the OE ratio of 2.59 indicates a much higher than expected (159%) correspondence between statistically significant parameters than if the three were independent, despite the fact that two different survey instruments were used. This smaller set of statistically significant parameters that are common to the trio of models may be assessed with even greater confidence.

Table 3.3 also shows the number of common, significant parameters for each of the 17 model components. Intuitively, the model components that had the largest numbers of statistically significant estimated parameters, as shown in Table 3.2, also tend to have more significant parameters in common with the same model component in other regions, as shown in Table 3.3. The intermediate-stop generation and purpose model, nonmandatory-tour destination, work-tour arrival and departure times, and trip-level mode choice models stand out as having many statistically significant parameters in common.

OE ratio analysis was applied to each of the 17 model components as well, and these results are summarized in Table 3.4. For all 17 model components, the Tampa-Sacramento and Jacksonville-Sacramento pairs have very similar OE ratios, and the Jacksonville-Tampa combination has a higher OE ratio in every case, sometimes much higher. The work-tour-mode choice model stands out for the following reason. Out of 36 modeled parameters, 25 were statistically significant in the Sacramento model, but only three in the Tampa specification and just *one* in the Jacksonville specification (see Table 3.2). Nevertheless, that one statistically significant parameter was significant in all three regional models, as shown in Table 3.3. As may be seen in Appendix A, Table A.10, this parameter was the "mode nest log-sum," a coefficient applied to the composite utility of nested mode alternatives. Its significance across all three regions is related to the effect it has of rescaling utilities; thus this one parameter is extremely important in this model because it influences its sensitivity to changes in level of service for every mode alternative.

The "person exact number of tours" model also stands out in Table 3.4. Despite a total of 101 parameters, the number of statistically significant estimated parameters in the models for Sacramento, Tampa, and Jacksonville were 39, 16, and 11, respectively, as shown in Table 3.2. There were seven parameters, however, that were statistically significant in all three regional models (see Table 3.3). As shown in Tables A.3–A.5 of Appendix A, six of these parameters were alternative-specific constants referring to the propensity to make multiple tours of common types: two work tours, three-plus work tours, two school tours, two meal tours, two social/recreational tours, and three-plus social/recreational tours. The other common statistically significant parameter was an interaction effect between two-plus escort tours and being an adult female in a household with school-age children. Thus, it would seem that the propensity to make multiple tours in a single day is significant for each region, and the one demographic variable that consistently shows up as significant is the effect of being female in a household with school-age children on the propensity to make multiple escort tours.

To summarize, the OE ratio is a measure of the information value of statistically significant estimated parameters that are common across pairs of models and is analogous to the signal-to-noise ratio. This has implications for determining which model components and parameters to focus on when assessing model transferability. A large OE ratio is evidence that those statistically significant parameters which are common to multiple regions are important predictors of behavior and deserve relatively greater scrutiny when assessing regional transferability. A large OE ratio will tend to occur in choice model components that have proportionally fewer statistically significant estimated parameters. A lower OE ratio simply says that there is not as much information value in any individual parameter, typically because it is one of many common statistically significant parameters that appear in both regional models. There also may be cases of OE ratios in which regional models have many statistically significant parameters individually, but the pair has proportionally few in common, as is the case with the nonmandatory-tour destination choice model.

Table 3.4. Observed-to-Expected Ratios of Statistically Significant Estimated Parameters That Sacramento, Tampa, and Jacksonville DaySim Models Have in Common

Tables in Appendix A	Name of Choice Model Component	Observed-to-Expected Ratios of Statistically Significant Estimated Parameters Common to Pairs and All Three Models			
		JAX and TPA	TPA and SAC	JAX and SAC	All Three
A.1–A.2	Household auto ownership	1.69	1.31	1.23	2.42
A.3–A.5	Person exact number of tours	5.16	1.94	1.88	10.40
A.6–A.8	Nonmandatory tour destination	1.12	1.03	1.03	1.15
A.9	Work-based sub-tour generation	2.33	1.56	1.56	3.63
A.10	Work-tour mode	12.00	1.44	1.44	17.28
A.11	School-tour mode	3.04	1.19	1.19	4.06
A.12	Escort-tour mode	1.88	1.34	1.41	2.51
A.13	Other home-based-tour mode	1.63	1.23	1.34	2.25
A.14	Work-based sub-tour mode	3.20	1.45	1.16	4.65
A.15–A.17	Work-tour arrival and departure times	1.76	1.33	1.48	2.60
A.18–A.19	School-tour arrival and departure times	1.69	1.04	1.11	1.31
A.20–A.22	Other home-based-tour arrival and departure times	1.49	1.29	1.27	2.23
A.23–A.24	Work-based sub-tour arrival and departure times	2.69	0	0	0
A.25–A.27	Intermediate-stop generation and purpose	1.37	1.11	1.13	1.62
A.28–A.30	Intermediate-stop destination	1.92	1.39	1.39	2.73
A.31–A.32	Trip-level mode	1.57	1.18	1.20	1.95
A.33–A.34	Intermediate-stop departure time	1.27	1.09	1.12	1.37
OE ratio for all models (same as Table 3.3)		1.84	1.32	1.33	2.59

Statistically Significant Differences

Statistically significant differences between statistically significant estimated parameter values are summarized in Table 3.5 for each of the possible pairs of models. This tally counts only estimated parameters that were statistically significant in both models. Statistically significant differences were based on pairwise *t*-tests (0.05 level of significance), using the standard errors from the regional model with the fewer observations. For most parameters this was the larger standard error and is therefore a more conservative test of significant differences. Thus, the Jacksonville standard error estimates were used in comparisons with the other two regions, and the Tampa standard error estimates were used in comparisons with Sacramento.

Summing across all 17 models, the most striking pattern found in Table 3.5 is a much higher proportion of significant differences between Tampa and Sacramento (42%) than between either Jacksonville-Tampa (29%) or Jacksonville-Sacramento (28%), using the total common significant parameters in Table 3.3 as the normalizing factor. For purposes of considering transferability from Sacramento to the two Florida regions, these results suggest that the Tampa model may be less similar to Sacramento than Jacksonville.

To learn where and why these differences occur, it is necessary to study individual model components and parameters. While there are many statistically significant differences, this discussion focuses on the parameters in models with high OE ratios for each model pair, and for the trio, as already discussed and shown in Table 3.4. For example, in the "work tour mode choice model," discussed for the high OE ratio, there is a statistically significant difference between the Jacksonville and Tampa values for the previously mentioned "mode nest log-sum" parameter. The estimated coefficient value for Sacramento actually lies between the estimated values for the two Florida cities, as may be found in Table A.10 of Appendix A. The lower coefficient value in the Tampa estimation suggests greater levels of substitution between alternatives in the same nest (more unobserved attributes in common), whereas the values in the Sacramento and Jacksonville estimates, which are close to 1.0, imply independence. Nests include Auto [single-occupancy vehicle (SOV), high-occupancy vehicle,

Table 3.5. Statistically Significant Differences in Estimated Parameters Between Sacramento, Tampa, and Jacksonville DaySim Models

Tables in Appendix A	Name of Choice Model Component	Number of Significant Differences in Estimated Parameter Values Using Pairwise *t*-Tests at 0.05 Significance Level for Parameters Significant in Both Models (0.05 level)		
		JAX versus TPA	TPA versus SAC	JAX versus SAC
A.1–A.2	Household auto ownership	4	8	5
A.3–A.5	Person exact number of tours	2	2	2
A.6–A.8	Nonmandatory tour destination	11	28	12
A.9	Work-based sub-tour generation	0	1	1
A.10	Work-tour mode	1	0	0
A.11	School-tour mode	4	3	1
A.12	Escort-tour mode	1	4	3
A.13	Other home-based tour mode	3	10	9
A.14	Work-based sub-tour mode	0	1	1
A.15–A.17	Work-tour arrival and departure times	7	4	2
A.18–A.19	School-tour arrival and departure times	2	3	3
A.20–A.22	Other home-based-tour arrival and departure times	4	11	4
A.23–A.24	Work-based sub-tour arrival and departure times	0	0	0
A.25–A.27	Intermediate-stop generation and purpose	4	23	16
A.28–A.30	Intermediate-stop destination	7	13	8
A.31–A.32	Trip-level mode	8	3	4
A.33–A.34	Intermediate-stop departure time	18	25	14
Number (%) of parameter pairs significantly different, given both are significant estimated parameters		36 (29%)	81 (42%)	40 (28%)

2 occupants (HOV2), high-occupancy vehicle, 3 or more occupants (HOV3+)], Transit (Walk Access, Drive Access), and Non-motorized (Bike, Walk). When calibrating a mode choice model, the usual process is to adjust alternative-specific constants. Other coefficients are typically left alone. Without an estimation exercise such as this, this difference in intra-nest substitution would go unnoticed during calibration; however, it could be detected and adjusted in subsequent sensitivity testing if it were found that mode shifts due to changes in level of service were not appropriately sensitive.

Also, as already discussed, the "person exact number of tours" model was found to have a significant positive propensity toward two work tours in Jacksonville relative to Tampa, and a significant positive propensity toward two and three-plus social/recreational tours for both Florida models relative to Sacramento. (See Tables A.3–A.5 of Appendix A for details.) Both of these differences suggest lifestyle differences that are more leisure oriented in the Florida cities, Tampa more so than Jacksonville. Because these parameters are day-pattern component constants (similar to alternative-specific constants), it is important that they be calibrated in a transferred model specification to adjust for such differences between regions. It is also worth noting that there was no significant difference between regions in the impact of being an adult female in a household with young children and the propensity to make multiple escort tours, and it would have been surprising had there been a difference.

In models with lower OE ratios, interpreting significant differences in individual parameters may prove difficult; however, it may still be informative to look for trends among groups of similar variables, such as those affecting a particularly choice alternative or demographic group. For example, the auto ownership model does not have a particularly high OE ratio, but it has several variables in which there are significant differences related to the one-auto alternative and households with just one driver. As shown in Tables A.1–A.2 in Appendix A, there are significant positive differences between the Tampa model and the Sacramento model and between the

Tampa model and the Jacksonville model with respect to these parameters. These differences are likely due to the larger proportion of retirees, who are more likely to have a single car and live in a single-driver household. This is further supported by a significant positive difference for the interaction between the retiree-household variable and the one-auto alternative.

In other models, there may be no obvious, meaningful pattern to the differences in parameter values. In the "nonmandatory tour destination choice model," for example, there are 28 parameters that are significant and significantly different between the Tampa and Sacramento models, as shown in Table 3.5. There are less than half that many significant differences between Jacksonville and Sacramento or between Jacksonville and Tampa. Despite the larger numbers of significant differences, the types of variables in this model are mostly piecewise–linear distance variables and attraction variables (also called "size" terms) related to various types of employment; and most of these interact with various activity/trip purposes. This model has a very low OE ratio for each of the regional pairs, making it fallacious to read too much into any one parameter. Moreover, the compensating effects of so many distance-terms are difficult to interpret. There is one clear group-parameter trend in this model, however. As shown in Table A.7 in Appendix A, the presence or absence of children in the household affects the "escort" trip purpose and many employment-related size terms in the model. The effect is significantly lower in the Tampa model than in the Sacramento model. The effect is not quite so significant when comparing Tampa and Jacksonville, but the direction of the difference is the same. This lends further credence to the notion that the different sociodemographic makeup of the Tampa region is playing a role. In Tampa, escort tours are more likely to involve providing rides to other adults, whereas in Sacramento and Jacksonville escort trips are more likely to involve chauffeuring children, which may lead to different destination patterns and preferences. That there are so many significant differences in other parameters without a clear group pattern suggests that this model should be reestimated using local data, if available, rather than simply transferred and recalibrated to match trip lengths. This is particularly important because the nonmandatory-tour destination choice model will have a large impact on regional origin–destination patterns and is singly constrained, unlike work and school destinations which can be doubly constrained through shadow pricing in DaySim.

As shown in Table 3.4, the model that has the highest OE ratio (1.56) for comparisons between either Jacksonville or Tampa and Sacramento is the work-based sub-tour generation model. As shown in Table A.9 of Appendix A, the "no more sub-tours if one or more sub-tours already simulated" variable is significantly more positive for the Florida regions than for Sacramento, meaning that cases of two or more work-based sub-tours reported in the same day are rarer in the Florida surveys. This may be an artifact of the NHTS survey design, as reporting of work-based travel seems lower in general, and is also why the other models of work-based sub-tours have few cases for the Florida regions and thus many nonestimable coefficients and few significant differences. In this case, because there is no reason to think that the propensity of workers to make sub-tours would differ significantly between regions and because underreporting of work-based sub-tours in the NHTS survey is suspected, then the analyst should take care when transferring a model not to put too much faith in the NHTS target values for calibration and remain truer to the original Sacramento specification.

The remainder of this section comprises observations on the significant parameter differences in other models listed in Table 3.5.

School-tour-mode choice (Appendix A, Table A.11). The only significant differences are between Tampa and Jacksonville, in which the Tampa model shows a much higher propensity toward the school bus mode and shared-ride alternatives (HOV2 and HOV3+ in the model), based on differences in alternative-specific constants. These differences in values may reflect the lower auto ownership levels in the Tampa region, or they may reflect differences in school-bus provision and district boundaries.

Escort-tour-mode choice (Appendix A, Table A.12). There are significant negative differences between both Florida models and Sacramento in alternative-specific constants related to HOV2 and HOV3+ and the "logsum from the path type choice model," which is a composite utility of auto and transit skim values. The effect of being over age 50 on choosing to walk was also significantly lower in the Tampa region compared with both Jacksonville and Sacramento, which again may point to lifestyle differences.

Other home-based tour-mode choice (Appendix A, Table A.13). Further supporting the regional lifestyle differences, there are significant negative differences between both Tampa or Jacksonville and Sacramento for alternative-specific constants pertaining to HOV3+ and significant positive differences for the effects of one-car and one-person households on choosing shared rides. There are also significant negative differences in interaction effects between meal tours and shared-ride alternatives as well as significant positive differences in interaction effects between social/recreational tours and bicycling. The "path type model log-sum" variable is also significantly different between the two Florida cities and Sacramento. For Tampa-Sacramento only, there is a significant difference in the effect of zero-car households on the walk-transit alternative. Jacksonville and Tampa differ significantly from each other for the effect of the shared-ride path choice variable, which may be attributed to differences in skims.

Work-based sub-tour mode choice (Appendix A, Table A.14). There is only one significant difference between Tampa and Sacramento in a shared-ride-2 alternative-specific constant.

Tour-arrival and departure-time-choice models (Appendix A, Tables A.15–A.24). These models include constants referring to specific time intervals of an hour or more and shifts in time between these time intervals. In general, these parameters work as a set and should mimic observed diurnal distributions, which should be similar for all regions for the same tour type. They include tour-purpose or tour-context effects on shifting time or duration as well as person attribute effects on shifting time or duration. To respond to changes in congestion, each model includes an auto-tour path type log-sum parameter, which influences tour duration. For nonmandatory-tour time choices, there are also "time window" variables that effectively constrain choices. As shown in Table 3.4, these models have relatively low OE ratios, making it difficult to find meaningful differences. Where there are significant differences between models for these constants, they are difficult to interpret in isolation because their meaning is in relation to each other. For the work-tour departure and arrival time choice model, there were no significant differences for any of the person attribute effects. For the other home-based-tour arrival and departure- time choice model, there were some significant differences between Tampa and Sacramento for shopping tour duration. Because tour departure and arrival times should be fairly similar within regions, the large number of differences is probably due to insufficient observations for certain tour purposes during certain time intervals in both Tampa and Jacksonville. For this reason, it would be better to simply transfer the Sacramento specification with minimal recalibration. During model validation, these models could be adjusted to respond to regionwide differences in time-period-specific traffic counts.

Intermediate-stop generation and purpose choice models (Appendix A, Tables A.25–A.27). As shown in Table 3.5, this is a model with relatively low OE ratios and numerous statistically significant differences between Tampa and Sacramento (23) and between Jacksonville and Sacramento (16), but few significant differences between the two Florida regions (4). Again, trends in differences between groups of parameters are the most telling. A closer inspection of the tables in Appendix A reveals a clear pattern of negative differences for adding various types of personal business, shopping, escort, and meal stops on tours of all purposes; a lower effect of tour duration on stop propensity; and a stronger effect of an intermediate stop occurring on the first half of a tour. The most likely explanation for these differences is an underreporting of intermediate stops in the NHTS survey data rather than any true behavioral difference. Even the significantly greater propensity to place intermediate stops on the first half of a tour before the primary stop, rather than after the primary stop on the second half of the tour, runs counter to what is typically observed in household travel diaries and probably reflects underreporting of stops on the way home. The implication for model transfer is that calibration to the NHTS target values may result in underrepresentation of intermediate-stop making, which will likely show up during model validation as underprediction of travel volumes relative to counts regionwide, particularly in the post-p.m. peak evening period. Since intermediate stops tend to have shorter average trip lengths than home-based stops for the same purpose, average trip lengths will be biased upward. For these reasons, remaining closer to the original source coefficient values during calibration may be preferred for this model.

Intermediate-stop destination choice (Appendix A, Tables A.28–A.30). As already mentioned, this model is interesting because it is the one model in which the Jacksonville and Sacramento models had many more statistically significant parameters in common than Tampa and Sacramento (29 versus 19); yet there were significantly fewer significant differences between the Jacksonville and Sacramento models compared with the Tampa and Sacramento models (8 versus 13). This would seem to be further evidence that the two Florida regions may be less similar in terms of travel behavior and that Jacksonville may actually be more similar to Sacramento.

The intermediate-stop destination choice model also has a low-to-medium OE ratio (see Table 3.4), which suggests that it will be difficult to separate signal from noise in interpreting the reasons for these differences. The most important may be the difference on a generalized travel time parameter. There are scalar, squared, and cubed variables used in the specification, and the differences on all three parameters would seem to indicate a nonlinear relationship that is similar in both of the Florida models, but significantly different from the Sacramento model. These differences are partially offset by differences in other parameters, such as hourly parking, making interpretation difficult. This might reflect a greater level of effort in coding land-use variables in the Sacramento region, or it could actually reflect more mixed-use land uses and paid parking; the reasons are unclear. In addition, the parameter on the log-size function, a weight placed on all of the size-term variables, is significantly lower in both Florida regions compared with Sacramento; and this parameter would offset travel impedance to a large degree. There are also significant differences in parameters related to shopping and meal destinations, but with offsetting differences in signs that challenge interpretation. In summary, it would seem that, like nonmandatory-tour destination choice, the intermediate-stop destination choice is a model that would be better reestimated on local data rather than transferred and calibrated to match trip lengths, particularly since this model will be singly constrained. When there are many significant differences in parameters that have offsetting effects, it is not clear what those differences portend for forecasting.

Trip-level mode choice (Appendix A, Tables A.31–A.32). Another model with a low OE ratio, the trip-level mode choice model does show some clear trends among groups of parameters, which makes explaining significant differences easier. There are more significant differences between the Tampa and Jacksonville models than between either of the Florida models and Sacramento. In particular, most of the significant differences are related to the HOV3+ alternative. Shared rides involving more than two persons occur much less often in the Tampa data set and somewhat less in Jacksonville, relative to Sacramento. This is consistent with the regional demographic differences in which there are more retirees and fewer households with children in the Tampa region, compared with Jacksonville and Sacramento. In addition, the positive coefficient placed on the composite impedance term called "path type model log-sum" is significantly lower in the two Florida models, compared with Sacramento, meaning that it has less influence on mode choice, perhaps because of the relative strengths of the mode-specific bias constants.

Intermediate-stop departure time (Appendix A, Tables A.33–A.34). This model actually models the arrival time of stops on the outbound half of a tour and the departure times for stops on the inbound half of a tour. It is composed of numerous alternative-specific constants representing specific hours of the day as well as duration shift variables that are interacted with either person attributes or tour-purpose attributes. It also includes two composite impedance terms, one for auto path type log-sums and another for transit path type log-sums. It has the second lowest set of OE ratios shown in Table 3.4. It also has the highest number of significantly different parameters between Tampa and Jacksonville (18) and the second highest number of significantly different parameters between Tampa and Sacramento (25), as shown in Table 3.5. There are many parameters that work together and are offsetting, making this a difficult model to interpret in terms of transferability. There is a clear grouping of duration constants that are all negative in the Sacramento model, significantly more negative in the Tampa model; and these same constants are all positively valued and significantly different in the Jacksonville model. Similarly, there is an offsetting group of duration shift constants interacted with tour purposes that are all negative in the Tampa model, all positive in the Jacksonville model, and mixed in the Sacramento model. As with other models, the low signal-to-noise (OE) ratio of this model with so many significant differences makes it difficult to assess transferability other than to say that the differences are not necessarily due to differences in underlying behavior but more likely insufficient observations for certain activity types during certain time periods. Unlike with destination choice, which is more sensitive to regional idiosyncrasies in forecasting trip tables, arrival and departure time patterns should be fairly stable from one region to the next. Similar to the tour-level timing choice models, it should be possible to borrow a model specification from Sacramento, which was estimated from a larger sample size, and obtain more realistic outcomes, even without recalibration. As with the tour-based time-of-day choice models, these models could be adjusted to respond to regionwide differences in time-period-specific traffic counts during model validation.

Key Findings from Estimation Tests

The relatively low sample sizes for the Tampa and Jacksonville NHTS data made it difficult to make conclusive statements about the transferability of the Sacramento model to Tampa and Jacksonville; however, there was a consistent set of significant differences noted between the Tampa model and the Sacramento model which suggested that regional lifestyle differences may have a noticeable effect on the transfer and would need to be accounted for. Moreover, the analysis produced several useful observations that could guide future activity-based model system transfers:

- Decision contexts that are observed once per household or per person day (or less often) will have fewer observations and thus be more difficult to estimate with statistically significant parameters.
- Long-term household decisions, such as auto ownership, and daily-pattern choice models will rely heavily on alternative-specific constants or other choice dimension constants (e.g., number of tours by purpose), interacted with various household or person attributes. These models will have proportionally fewer statistically significant parameters compared with models that make more extensive use of transportation level-of-service and land-use variables, which will vary over alternatives and can be estimated using generic coefficients. Tour- and trip-level destination and mode choice models tend to fall into this latter category.
- Comparing the occurrence of statistically significant parameters in 17 pairs of regional models, the regions studied here tend to have many more statistically significant parameters in common than would be expected if such commonalities were random occurrences.
- Relatively high observed-to-expected ratios (OE ratios) of common significant parameters in pairs of models are indicators of the information value provided by specific significant parameters. For purposes of assessing meaningful differences, low OE ratios may indicate excessive noise when doing a paired comparison, although meaningful information may still be gained by studying groups of parameters with similar attributes that consistently show the same direction in differences.
- Comparing OE ratios, the Tampa-Jacksonville pair has a significantly higher proportion of common statistically significant parameters than either Florida region when

paired with Sacramento. The most likely reason for this is the common NHTS surveys used in the Tampa and Jacksonville estimations.

- Using pairwise *t*-tests, there were substantially more statistically significant differences between Tampa and Sacramento (42%) than between Tampa and Jacksonville (29%) or between Jacksonville and Sacramento (28%), aggregated over all 17 models, normalized by the total parameters that were statistically significant in both regions.
- The nesting log-sum parameter in the work-tour-mode choice model was significantly different among the three regions. This parameter is important because it affects sensitivity to changes in level of service for all modes; therefore, in a model transfer it could be adjusted during sensitivity testing.
- Looking across the various model components, there are several statistically significant differences that suggest the influence of regional differences in lifestyle that set Tampa apart from Sacramento and, to a lesser extent, from Jacksonville:
  - Higher propensity in Tampa to make social/recreational tours and a lower propensity for work tours;
  - Stronger influence in Tampa on auto ownership of the single-driver and retiree-household variables, and a higher market share of single-auto households;
  - A significant dampening of the effect of the presence of children in households on escort-tour destination choices; and
  - A lower share of shared rides with more than two persons and stronger influence of zero-car households on mode choice in the Tampa model, compared with Sacramento and Jacksonville.
- Destination choice models, which lack alternative-specific constants and are only singly constrained for non-work/school purposes, will be more difficult to calibrate to match regional origin–destination patterns and therefore should be reestimated if possible. This study found many statistically significant differences between regions for these models. If reestimation is not possible, then these models should receive greater attention during model calibration and sensitivity testing.
- The NHTS sample provided an insufficient number of observations to represent multidimensional choices with many alternatives, such as with departure- and arrival-time choice models. Since diurnal patterns are relatively stable between regions, it would be better to transfer such a model from a region that has enough observations, such as Sacramento, and perform minimal calibration, possibly to adjust to regionwide traffic demand by time period during model validation.

A more scientifically credible scenario would have been to estimate a simpler activity-based or tour-based model using the Sacramento NHTS data and then use that to study behavioral transferability. In this way differences between survey methods would not be an issue and the likely resulting specification would reflect similar levels of data availability. FHWA has recently funded an extension of the STEP project, which will provide a better basis for comparison. A summary of findings relevant to this project from already completed STEP work may be found in Appendix C of this report. The STEP project extension will study seven regions, including Sacramento, Tampa, and Jacksonville, all using DaySim and NHTS survey data. The project will use more aggregate land-use units, most likely TAZs, and much simpler model specifications that can be estimated using sample sizes comparable to that of Jacksonville. With this more level basis, it should be possible to make more scientifically valid comparisons of activity-travel behavior in different regions.

However, estimating a simplified version of the Sacramento model was not part of the scope of the C10A extension which required the study team to deliver production-version models to both Jacksonville and Tampa. To meet the C10A extension deliverable, the study team viewed the transferred version of the Sacramento model as being a more behaviorally realistic and useful starting point than what could have been obtained from the Florida NHTS data, and chose to calibrate it from there. The study team concluded that it would not be beneficial to estimate and apply models based on the pooled NHTS survey data from Jacksonville and Tampa, which had been one of this project's original objectives. The reasons for this decision are as follows:

- As shown in Table 3.1, even the pooled weekday NHTS data from Jacksonville and Tampa were much smaller than the sample size necessary for reliable estimation of models such as those in the DaySim model system. Even the original Sacramento sample of nearly 4,000 households was smaller than ideal, with a sample size of 5,000 or more being more typical for surveys in major regions in the United States.
- Compounding the small sample size issue is the fact that the data lack certain types of households and types of choice behavior. There are few, if any, bicycle or transit trips reported in the NHTS data for most tour purposes. There are few households in the data with very low incomes or households who do not own vehicles. There are also very few university students or other young, single households. While these types of survey nonresponse problems may be somewhat typical, especially in regions where actual nonauto trips are scarce, it nevertheless leaves important gaps in the ability to estimate key model parameters for the data.
- There are a few additional drawbacks of using the NHTS data, including some missing data items (e.g., usual school location, transit pass ownership), incomplete households, and a scarcity of observed school tours and work-based

sub-tours. These types of issues tend to exacerbate the problem of limited sample sizes.
- Although there seem to be similarities in the coefficients estimated separately on the Tampa and Jacksonville region data, there are also some large differences; and the limited sample sizes make it very difficult to estimate separate but significant parameters in those cases.

The study team's recommendation for the regional agencies in Tampa and Jacksonville was to use the NHTS data only for calibration of some key constants and parameters for the Sacramento models applied to the Florida regions and to postpone complete reestimation of the models until new survey data are available. Ideally, that survey will provide sample sizes for weekday travel at least twice as large as the NHTS add-on sample and will use targeted oversampling more aggressively and more successfully to ensure adequate representation of "rare" households and persons and behaviors, such as the following:

- Non-car-owning households;
- Very-low-income households;
- University students and other young, single-person households;
- Young children under age 5 who typically require parental supervision, thus creating and constraining activities and travel of adults;
- Transit users (including park-and-ride); and
- People who commute by bike and by foot.

Calibration of Regional Models to Test Transferability

This section evaluates the performance of the Tampa and Jacksonville models from a transferability standpoint by comparing the calibrated coefficients of these two models with the Sacramento model. First, it should be noted that the Sacramento model parameters are those that were estimated from sample data and do not include calibrated coefficient values. Starting with estimated constants from another region, rather than some combination of estimated and calibrated values, avoids the complexity that could be introduced by another region's calibration process. The other region's calibration process may be subject to multiple benchmark data sources and possibly the kind of ad hoc adjustments that are sometimes done to match traffic count targets.

The measure used here for comparison of model coefficients is the Absolute Percentage Logit Difference (APLD), defined as follows:

$$\text{APLD} = \left| e^{(\beta_{\text{Tampa}} - \beta_{\text{SACOG}})} - 1 \right|$$

This is an equation in which zero difference in parameters results in a statistic of zero, and larger differences result in larger positive values. APLD is preferred over absolute percentage arithmetic difference because a positive difference in parameters will have a larger effect on probability calculations than a negative difference due to the exponentiation of utilities in the logit models. Using the absolute value also avoids the more complex discussion of sign changes and their net effect. Rather, APLD focuses on "how different" the sets of coefficients may be, making it more of a distance metric ("how far" the calibrated model is from the original model). An overall mean APLD, which is the arithmetic mean of the APLDs across all calibrated variables, was computed for each model.

To better understand the calibration effort required to transfer models across regions, one should consider the overall APLD as well as the number of parameters that were calibrated. In the subsequent sections, summaries of such comparisons are made for the Tampa (Table 3.6) and Jacksonville (Table 3.7) models, respectively. Appendix B presents detailed tables comparing the model calibration results for Tampa and Jacksonville with the Sacramento models for each calibrated model parameter. In each of these tables, there are columns which indicate whether the calculated APLD was in one of three ranges:

- Low: APLD ≤ 20%,
- Medium: 20% < APLD ≤ 50%, or
- High: 50% < APLD.

Tampa Model Calibration

The Tampa Bay regional model calibration statistics for each of the DaySim model components are shown in Table 3.6. The first model listed—the usual work location choice model—required a modest level of calibration, as evidenced by the small number of coefficients (5 out of 73) required for calibration and the overall APLD of the calibrated coefficients falling in the medium range (34%). Because the dependent variable in this model is zones, there are no alternative-specific constants, and the calibration parameters represent various impacts on travel distance. (See Appendix B, Table B.1, for details on individual parameters.)

In contrast, the auto ownership model required relatively more calibration effort, with nearly half of the estimated parameters used in calibration and an overall APLD of 84%, which is on the high side. As shown in the Appendix B, Table B.2, the coefficients that were calibrated may be grouped into two types of variables: number of drivers per household and household income. The calibrated Tampa model coefficients, for the most part, are noticeably different from the Sacramento model coefficients, reflecting differences in the socioeconomic makeup of the two regions. For example, 58% of households in the Sacramento region have two or more vehicles, and 25%

Table 3.6. Tampa Model Calibration Effort Relative to Sacramento Starting Values

Tables in Appendix B	Name of Choice Model	Calibrated/ Total Parameters	Calibrated Overall APLD (%)	Number of Parameters by Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
B.1	Usual work location	5/73	33.9	1	3	1
B.2	Auto ownership	28/60	83.5	4	4	20
B.3–B.4	Individual person-day pattern	57/350	75.1	15	13	29
B.5	Work-based sub-tour generation	7/15	33.3	3	2	2
B.6–B.7	Exact number of person tours	47/295	50.3	21	4	22
B.8	Intermediate-stop generation	30/106	64.3	8	8	14
B.9	Nonmandatory-tour destination	19/101	515.6	2	5	12
B.10	Tour mode: work	6/36	2.8	6	0	0
B.10	Tour mode: school	6/42	154.8	0	1	5
B.10	Tour mode: escort	3/15	86.8	0	0	3
B.10	Tour mode: hb-other	5/45	77.8	0	1	4
B.10	Tour mode: wb-sub-tour	5/17	57.7	0	3	2
B.11	Tour time of day: work	10/74	38.6	4	1	5
B.11	Tour time of day: school	10/68	92.4	4	1	5
B.12	Tour time of day: hb-other	10/95	10.7	8	2	0
B.12	Tour time of day: wb-sub-tour	10/50	57.1	4	0	6
B.13	Trip time of day	10/55	5.1	9	1	0

Note: hb = home-based; wb = work-based.

of households fall into the $75,000+ income category. The corresponding statistics for the Tampa region are 48% and 17%, respectively (U.S. Census Bureau 2010). Because auto ownership choice has a large effect on downstream models, the extra effort expended to fit benchmark values may be well justified.

For similar reasons, more calibration effort was put into the individual day-pattern model, the work-based sub-tour generation model, and the exact number of person tours model, which together create the daily activity structures and generate daily tours within DaySim. The person-day pattern and exact number of tours models have large numbers of estimated parameters: 350 and 295, respectively. As a consequence, they also have large numbers of calibration coefficients: 57 and 47, respectively, most of which are interaction terms between activity pattern dimensions and person and household attributes. As already described earlier in this chapter, it was not possible to estimate the person-day pattern model using the NHTS data. In addition, the person exact number of tours model was estimated but had low statistical significance for the vast majority of its parameters. Given these outcomes, it should not be surprising that considerably more effort would be needed to align model forecasts with benchmark values.

In the day-pattern choice model, calibrated variables include tour/stop purpose-specific constant, employment and student status, and age. (See Appendix B, Table B.3 and Table B.4.) The APLD between Sacramento and Tampa model coefficients are low to medium for work, school, and escort purposes; for other tour purposes (e.g., personal business, shopping, meal, and social/recreation) these values differ by more than 50%. One of the factors that contributed toward this discrepancy is that variables such as interactions between tour purpose and nonworking adults/retired adults were not included in the Sacramento model specification. Interactions between tour purpose and certain person attributes, namely nonworking adult status for certain day patterns, were not included in the original Sacramento model specification either because they were not statistically significant or because they were overlooked. Regardless of the reason for that omission, when transferring a model to a new region, it is important to consider whether there are any important explanatory variables that may have been excluded from the original specification. In this particular instance, it was found that the retiree market segment, which is more important in the Tampa region, was not well-represented in the original specification; therefore, parameters were added and calibrated to provide this additional variation across household and person types.

Table B.5 in Appendix B presents calibration results for the work-based sub-tour generation model. Also in Appendix B, Table B.6 and Table B.7 show similar results for the exact number of tours by purpose. A comparison between Sacramento model coefficients and calibrated Tampa model coefficients indicates that work-based sub-tour models for these two regions are reasonably similar (i.e., the overall mean APLD is 33.3%); however, this is not the case for all tour generation models. For example, the Sacramento and Tampa model coefficients corresponding to variables that include interaction with work, shopping, and meal tour purposes seem to be more similar than other coefficients in the exact number of person tours model, perhaps because these purposes are more commonly observed in both surveys. In the intermediate-stop generation model, the interaction terms for work, school, personal business, and escort purposes were more similar in both regions.

As shown in Table 3.6, non-work destination, tour-mode choice, and time-of-day choice models require calibrating a relatively smaller set of variables. In particular, tour-mode choice and time-of-day choice models require only alternative-specific constants to be adjusted. Most of the models had low to medium APLDs, with the exception of the school and escort purposes, which had high APLDs. This is likely due to an underrepresentation of university students and children in the NHTS data that was used to calibrate the Tampa model. When calibrating the school-tour generation models for university and K–12 students, tour generation rates were factored up by 2.16 and 1.15, respectively, over the original NHTS data to compensate for this underrepresentation; however, the lack of observations on the actual school-tour destinations (trip lengths) and mode shares is likely to be less accurate for these tour types.

Finally, Table 3.6 shows results for just one trip model (time-of-day choice), which required calibration. Within the trip time-of-day choice model, only a small number of coefficients required some minor adjustment (overall mean APLD is 5.1%). In the Tampa model, the trip-mode choice model required no real adjustment, as mode share targets were met solely through calibration of the upper-level tour models. This relatively low level of calibration at the trip level results from the combined effect of two factors: (1) the models were calibrated one at a time in a top-down manner. That is, the upper-level models—such as usual work location and auto ownership, day-pattern, and tour models—were calibrated before the lower-level trip models; and (2) in the DaySim activity-based model, the upper-level models are connected to the lower-level, trip-based models through log-sum variables, which represent the composite utility of lower-level choices.

The order in which the models are calibrated matters. When calibrating hierarchical activity-based model systems such as this, the usual practice is to begin at the top of the hierarchy and to calibrate downward. This means calibrating long-term choice models, such as usual work location and auto ownership, first, followed by day-pattern models, tour-level models, and finally trip-level models. The upper-level models condition the lower-level model choices. Because of this conditioning effect, more calibration effort spent on the upper-level models indirectly calibrates the lower-level models to some extent. The most obvious example is that calibration of tour-mode shares does a good portion of the work needed to calibrate trip-mode shares. Some of the regional differences are due to these upper-level models. For example, as already mentioned, the addition of day-pattern bias constants for retirees in the Tampa model resulted in different preferences for tour purposes being expressed. In turn, that conditioned the lower-level destination, time-of-day, and mode choices, thus less calibration was needed at these lower levels.

Jacksonville Model Calibration

The model calibration efforts for Jacksonville are summarized in Table 3.7. When compared with the Sacramento model coefficients, similar patterns emerge. Considering that the Sacramento coefficients were estimated, not calibrated, it is not clear to what extent the differences reflect socioeconomic characteristics as opposed to differences in the survey instruments, which were the same for the two Florida models.

The usual work location and auto ownership model calibration efforts for Jacksonville were very similar to Tampa. The overall greater difference in APLD (182%) for Jacksonville simply indicates that the calibration coefficients were adjusted further away from the Sacramento starting points than Tampa (84%), but it does not indicate in which direction; indeed, a mix of negative and positive adjustments were made across 28 parameters.

The individual person-day pattern model for Jacksonville, presented in Appendix B, Table B.16 and Table B.17, indicates that the differences between the Sacramento and Jacksonville model coefficients are relatively small for variables corresponding to work, school, and personal business tour purposes, and relatively large for variables corresponding to shopping and meal tour purposes. A closer inspection of the calibrated results shows that person-level socioeconomic attributes such as student status, employment status, and age are the key contributing factors to these differences. Fewer parameters were adjusted in the Jacksonville model, compared with Tampa (48 versus 57), but they were adjusted by a greater distance (84% versus 75% APLD). Similarly, the exact number of person tour model for Jacksonville used many fewer calibration parameters than the Tampa model (8 versus 47), but these

Table 3.7. Jacksonville Model Calibration Effort Relative to Sacramento Starting Values

Tables in Appendix B	Name of Choice Model	Calibrated/ Total Parameters	Calibrated Overall APLD (%)	Number of Parameters by Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
B.14	Usual work location	9/73	36.7	4	2	2
B.15	Auto ownership	28/60	182.3	5	8	15
B.16–B.17	Individual person-day pattern	48/350	85.4	14	13	21
B.18	Work-based sub-tour generation	8/15	71.7	1	5	2
B.19	Exact number of person tours	8/295	324.5	0	1	7
B.20	Intermediate-stop generation	8/106	62.8	0	0	8
B.21	Nonmandatory-tour destination	24/101	110.7	1	5	18
B.22	Tour mode: work	8/36	43.4	3	1	4
B.22	Tour mode: school	7/42	75	2	1	4
B.22	Tour mode: escort	3/15	106.3	0	0	3
B.23	Tour mode: hb-other	18/45	653.0	2	5	11
B.23	Tour mode: wb-sub-tour	6/17	27.8	4	1	1
B.24	Tour time of day: work	16/74	42.1	2	10	4
B.25	Tour time of day: school	11/68	70.3	2	3	6
B.26	Tour time of day: hb-other	5/95	15.3	3	2	0
B.26	Tour time of day: wb-sub-tour	10/50	95.5	0	1	9
B.27	Trip mode	1/65	633.7	0	0	1
B.28	Trip time of day	17/55	77.0	4	5	8

Note: hb = home-based; wb = work-based.

eight parameters were on average adjusted by a greater distance (325% versus 50% APLD). The intermediate-stop generation model also had fewer parameters (8 versus 30) but with nearly identical APLD (64% versus 63%).

The differences between the Tampa and Jacksonville calibration efforts, in part, reflect differences in how two different analysts approached the calibration exercise: one choosing to adjust more parameters (Tampa) and the other choosing to adjust fewer but by larger amounts (Jacksonville). Although different, both approaches matched desired target levels to a similar level of precision. While some of these differences may be attributed to differences in analysts' judgment, it should be recognized that the NHTS sample data for Tampa was considerably larger than that of Jacksonville, which allowed more confident identification of and calibration to subsegments of the population.

As may be seen in Table 3.7, overall, calibration of the models pertaining to tour destination, mode, and time of day required more calibration parameters in the Jacksonville model than in the Tampa model (Table 3.6). With the exception of the nonmandatory-tour destination choice model, these models also diverge more from the Sacramento coefficients (larger calibrated APLD). One reason for this divergence could be that several interaction terms (e.g., interaction between tour purpose and person-level information or land-use characteristics) were needed to calibrate the Jacksonville tour-level models that were not found to be statistically significant in the Sacramento model. These terms were left out of the Sacramento model but introduced in the Jacksonville model. This was also observed in the case of the Tampa model for certain demographic segments, highlighting the fact that while there are some common factors that drive the demand for travel in Sacramento, Tampa, and Jacksonville, there are also a number of region-specific factors.

Another consideration is that because the upper-level day-pattern models (individual person-day pattern, exact number of person tours, and intermediate-stop generation models) were calibrated using fewer support parameters in Jacksonville than in Tampa, this created more work for the analyst to do at the tour level to compensate. It is not clear, however, whether the smaller sample size of the Jacksonville sample made this inevitable.

Finally, Table 3.7 provides calibration results for the Jacksonville trip models. The calibration efforts were confined primarily to alternative-specific constants included in the trip time-of-day model, with only a single parameter calibrated in the trip-mode choice model (transit-walk access). As discussed previously, the DaySim model structure and the top-down calibration approach adopted here are the main reasons trip models required relatively low calibration efforts.

Key Findings from Calibration Tests

The calibration tests provide a means to consider which aspects of the Tampa and Jacksonville models needed to be adjusted to better match the NHTS observed data for each region. The tests determined

- Work location models are similar for both Tampa and Jacksonville.
- Auto ownership models for Tampa and Jacksonville are less similar to the Sacramento model due to regional differences in socioeconomic characteristics. For example, there are more households in Sacramento with higher vehicle ownership and higher income than in Tampa, leading to differences in the auto ownership model coefficients for these two study areas.
- Work and school-tour pattern models are similar to Sacramento models in both Tampa and Jacksonville, but shopping and meal tour patterns are quite different from Sacramento in both regions. A closer inspection of the calibrated results shows that person-level socioeconomic attributes such as student status, employment status, and age are the key contributing factors for these differences. One significant difference in Tampa is the effect of retired persons; since this effect was not included in the original Sacramento models, it is not adequately represented in the Tampa model.
- Work-based sub-tour models for Tampa were reasonably similar to Sacramento, but were not similar for Jacksonville. Differences may be due to smaller sample sizes in Jacksonville rather than differences in attributes or behavior.
- The calibrated exact number of person-tour models, intermediate-stop generation models, and non-work-tour destination models appear to diverge more than the tour-mode and time-of-day choice models from their corresponding Sacramento models. While there are common factors that drive the demand for travel in the Sacramento, Tampa, and Jacksonville regions, there are also a number of region-specific factors.
- The trip models required minimal calibration. The DaySim model structure and the top-down calibration approach adopted here are the main reasons trip models required relatively low calibration effort.
- While the average distances between model parameters in the Sacramento model compared with the Tampa and Jacksonville models might suggest that the Tampa model is more similar to the original Sacramento source, and thus a better transfer, this may be a specious conclusion. The comparatively fewer household observations and reduced variation in the Jacksonville household survey sample undoubtedly played a role in making that model more difficult to calibrate. If models that started from a simpler base specification were used or if a larger household sample were available for Jacksonville, different conclusions could likely be drawn.

As a side note, when calibrating models using only the NHTS, CTPP, and ACS-derived target values, the modeling team avoided alternative-specific constants with respect to specific geographies. When the projects reached the validation stage, however, it was necessary to account for bridge-crossing bias constants in destination choice models to correct for traffic-flow differentials crossing the St. John's River in the Jacksonville region and Tampa Bay in the Tampa region. These types of bias constants are commonly included in both trip-based and tour-based models and to represent psychological barriers related to traveling beyond a certain physical threshold such as a large body of water. Network-based generalized costs simply do not capture these biases.

These calibration tests were able to identify changes in individual coefficient values and alternative-specific constants that explain "how different" from the original Sacramento model specification were the calibrated Tampa and Jacksonville models. The calibration of the individual models met expectations for planning purposes. Interestingly, in estimation it is the trip- and tour-level models of destination and mode choice that are expected to be the most disparate between regions because of differences in transportation networks and urban spatial structure. Due to the strategy of calibrating models from the top down in the activity-based modeling hierarchy, however, the amount of calibration that had to be performed on the lowest-level models (trip and tour-mode choices) was significantly less than the amount of calibration effort performed on the upper-level long-term choice models. This is advantageous because the long-term choice models for work location choice and auto-ownership choice were calibrated more reliably to multiple data sources such as ACS and CTPP.

CHAPTER 4

Conclusions

A broader understanding of transferability includes understanding how model specifications and available data should be appropriately matched. Typically, transferring a model means borrowing specifications (such as model structures, variables, and parameters) from a source model so that the recipient agency does not have to develop these specifications itself, usually for lack of funding and available local data. If the recipient agency had good survey data and funding to estimate its own model parameters, then it would do so, and this process would not be considered a transfer. This project followed the usual process of transferring a model specification from another region but then went one step further by attempting to estimate new model coefficients for the same source specification. Two different questions of transferability have been researched in this study:

- *Does the model represent local travel behavior?* This question has been researched by reestimating each model component of the transferred model using local data and comparing it with the original model components.
- *Can the model reproduce observed local data?* This question has been researched by calibrating each component of the transferred model to local data and comparing it with the original model components.

There are no standard practice tests for transferability; most transferred models have relied on the second question to determine credibility for a transferred model. Both questions are important to providing credibility for travel forecasting.

Reestimation Tests

The reestimation transferability tests provided some important lessons learned regarding local travel behavior (and the coefficient values that represent this behavior):

1. Models estimated with small sample surveys may not produce reliable coefficient estimates.
2. Models estimated with small samples for rare household types or travel behaviors may not adequately represent these behaviors.
3. Models estimated without key data available will be limited in forecasting these behaviors.
4. Key differences in coefficient values are more difficult to discern with smaller sample size surveys.

Despite these problems with small sample sizes, this study was able to identify statistically significant differences in enough model components to begin to characterize the travel patterns in the Tampa region as being heavily influenced by lifestyles that are significantly different from those of Sacramento and Jacksonville. Looking across pairings of regional models in which the same parameter was significant in both regions, there were proportionally far more differences in the Tampa-Sacramento pairing than either Jacksonville-Sacramento or Tampa-Jacksonville. These differences pointed to the influence of that region's large population of retirees as evidenced by significant effects of retiree-household and single-driver-household variables, single-auto households, and a lower consideration of the presence of children on escort tour destination choices. In addition, the models estimated for the Tampa region had significantly higher propensities toward leisure tours as well as lower propensities toward work tours and shared rides involving more than two persons.

This study also illustrated how certain types of activity-based model components need to be treated differently when transferring a model system. Models representing household-level and person-day pattern choices tend to be specified using many alternative-specific constants, or groups thereof, interacted with various household attributes requiring estimation of separate coefficients. In such models, reference cases influence parameter significance (difference from zero), which can be tricky when comparing regions. Such models are challenging to estimate even with larger sample sizes for complex multidimensional choices; this is often the case with day-pattern models and departure and arrival time choice models, which may include many nonsignificant parameters that are retained to maintain theoretical continuity between household and person market segments. If small sample sizes are a concern as they were in this study, it would be better to borrow these models from another region for which parameters were estimated using a sufficiently large sample. Such models could be calibrated using local data that can be aggregated to provide target values. With day-pattern models, including tour and stop frequency models, the analyst should look for important market segments that may have been left out of the original specification or underrepresented, such as the retiree market segment in the Tampa region. Time-of-day choice models, such as tour and trip departure and arrival times, should be fairly stable from one region to the next and can probably be transferred with little extra calibration required, other than adjustments to meet time-period-specific demand during validation.

In contrast, tour- and trip-level decisions (such as destination and mode choices) make greater use of transportation level-of-service variables; these vary over alternatives and can be estimated using fewer generic coefficients, which makes it easier to obtain statistically significant outcomes. Mode choice models are often easier to calibrate, as they typically utilize a small number of alternative-specific constants. Extra care should be taken if there are nesting parameters, such as found in the work-tour-mode choice model here, because regional differences might go undetected. Sensitivity testing is recommended postcalibration to determine whether nesting coefficients, which rescale mode utilities, are appropriately sensitive to changes in level-of-service variables.

Although relatively easy to estimate, destination and location choice models can be tricky because they do not utilize alternative-specific constants and are typically calibrated to trip-length distributions. When applied in forecasting, work and school location choice models can be doubly constrained using shadow pricing or similar methods, allowing for a greater degree of control over trip tables. Other/nonmandatory tour and trip purposes are singly constrained, however, which provides less control when forecasting trip tables. Origin–destination patterns are inherently region specific. If it is suspected that there are significant differences in destination choice model specifications, then it would be better to reestimate nonmandatory-tour and intermediate-stop destination choice models using local data, provided there is a sufficient local sample.

In this research, the study team found that the NHTS sample size was insufficient to reestimate many of the model components found in the original Sacramento specification. For purposes of delivering production-ready versions of model systems to both regions, the study team concluded that it would be better to start with the Sacramento specification, which was at least a holistic description of variation in regional travel behavior across a representative population, rather than to piece together versions of models that were a partial blend of estimated parameters from multiple regions. In particular, the team found that the NHTS samples lacked adequate representation of certain submarkets, such as young children, and also underreported evening and non-work travel and non-auto modes.

Calibration Tests

The work conducted during the model calibration tests presents a systematic and statistical approach to determining the transferability results from a calibration effort to match observed local data. The calibration effort succeeded in transferring a behaviorally rich model that was estimated elsewhere and calibrating its behavior to local data. Despite some sampling deficiencies in the NHTS survey, the study team was able to identify shortcomings in the model outputs and supplement the NHTS data with other data sources in what can best be described as an iterative calibration and validation exercise.

In general, the upper-level models require more calibration than lower-level models, because they are more sensitive to regional differences and because the lower-level models are affected by the improved results of the upper-level models. The process of working from the top down in a model system in which the upper-level models condition lower-level model outcomes would seem to be appropriate. That process places more emphasis on the model components that have the greatest effect on overall system performance, and these upper-level components tend to be better supported in terms of available data.

Socioeconomic variations in the population can have a significant impact on the ability to transfer a model. For example, the Tampa region has a large percentage of retired persons that are not as evident in Sacramento and are therefore not adequately represented by the variables in the Sacramento model. Work and school travel tends to be more transferable than other travel, because the differences in socioeconomic factors are more important for non-work/school travel than they are for work and school travel. For these reasons, some socioeconomic interaction effects that were left out of the Sacramento specification were inserted and calibrated in both the Tampa and Jacksonville models. Accordingly, it will be important for agencies that transfer a model from another region and then calibrate it to match local targets to study the specification of the source model to see if there are any important demographic or travel context—variables that seem to be missing or that may be important in their region. Figuring out what may have been left out of the model may reveal deficiencies and opportunities to improve forecasting.

Final Recommendations

This study also provided useful information for future household interview survey (HIS) data collection. The smaller sample sizes and more limited data in the NHTS data did not produce reliable reestimation of the Sacramento models. Many variables were constrained due to the smaller sample sizes, and the results were therefore not conclusive regarding transferability. Using a household survey sample that is appropriately sized to the task of estimating an activity-based model is an important lesson of this study. This research pushed the limits of how far one can go with a limited sample size and a complex model specification.

It is not always clear how large a sample is large enough until one gets into the analysis. When this project was conceptualized, the study team expected that the NHTS data would not be sufficient to estimate some of the model parameters in the original specification but expected greater concurrence than was obtained. There were many models to consider and many parameters representing different behavioral proclivities to explore. Moreover, the data source was an important context for this study. The NHTS data, which included add-on samples for Florida, have been offered to the public as a source of HIS data that could be used for model estimation. Various parties involved in this project were interested in testing the data for the development of an activity-based model. Moreover, NHTS is generally viewed as an economical alternative for agencies that lack the means to conduct their own HIS. This project showed that for a more complex activity-based travel model specification, the NHTS sample did not provide sufficient variation across enough model dimensions to make it useful for parameter estimation.

Despite this limitation in the NHTS data, there would seem to be more to gain than to lose by transferring a model from another region, followed by calibration to local target values, provided the regions are similar enough in terms of their lifestyles. A great deal may be learned just by running an activity/tour-based model and going through the calibration and validation exercises. Even regions that develop an activity-based model from scratch using a large local survey sample will spend many months, if not a couple of years, getting to know their model system and fine tuning its behavior.

There are two remedies for the mismatch between model specification and the sample data used to develop it: larger and more robust survey samples or simpler and more parsimonious model specifications. When models are specified and estimated from scratch, the ability to estimate statistically significant parameters governs the richness of the model specification. With a transferred model, however, the specification of the source model may or may not be supported by the data available to reestimate or calibrate the recipient region's model. There can be some deficiencies in a traditional HIS in how questions are asked, how responses are coded, and consistency checking. For this study, the lack of data on young household members was problematic, which is a sampling design issue. The most profound issue, however, was simply the lack of enough observations to represent enough of the variation in travel patterns that were desired for the model design. The necessary variation can be found in a traditional HIS, as was used in Sacramento and other places.

When designing a sampling plan for a traditional HIS that will be used for a trip-based model, there is careful delineation of targeted numbers of households of various demographic levels. These attributes and stratification often correspond to traditional trip-based model trip-generation segmentation. For activity-based surveys, stratified random sampling is also needed; but stratifying by all of the household and person attributes that one would like to have for, say, a day-pattern model, can be challenging. Given the limited resources that most agencies face, more strategy is required in designing the sampling plan due to the effort and cost needed to ensure adequate representation across these segments. In addition, a greater emphasis on non-auto modes sometimes requires targeted oversampling or choice-based sampling.

Finally, when transferring a model from one region to another, it is a good idea to summarize the HIS and supporting data that were developed to estimate the source model along key demographic and travel dimensions (e.g., household size, age, income, auto ownership, race; trip purposes, lengths, time-of-day distributions, and mode shares) to determine how similar these basic measures are to the recipient region. Assuming that the transfer involves a borrowed specification that is calibrated to local target values, the recipient agency may want to consider borrowing models from regions that are more similar to its own and that have sufficiently parsimonious specifications to avoid using a model that was perhaps overspecified or too region specific. In addition, the recipient agency should consider what sources of calibration data are available and to what extent they can produce a set of calibration target values that is up to the task presented by the transferred model specification.

References

FHWA. 2009. NHTS Florida Add-On Survey. *National Household Travel Survey: Our Nation's Travel.* Federal Highway Administration, U.S. Department of Transportation. http://nhts.ornl.gov/download.shtml.

U.S. Census Bureau. 2010. *American Fact Finder.* U.S. Department of Commerce. http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.

APPENDIX A

Detailed Model Estimation Results

Each table contains estimated coefficients and *t*-statistics for three models:

- A model estimated on the Sacramento region 2000 household travel survey data (the basis for the revised SACSIM AB model implementation);
- A model estimated on the Tampa region 2009 NHTS (weekday) survey data; and
- A model estimated on the Jacksonville region 2009 NHTS (weekday) survey data.

There are six columns with *t*-statistics that gauge the significance of the differences between the estimated parameters:

- The Jacksonville coefficient minus the Tampa coefficient, with the difference divided by the standard error from the Tampa model;
- The Jacksonville coefficient minus the Tampa coefficient, with the difference divided by the standard error from the Jacksonville model;
- The Tampa coefficient minus the Sacramento coefficient, with the difference divided by the standard error from the Sacramento model;
- The Tampa coefficient minus the Sacramento coefficient, with the difference divided by the standard error from the Tampa model;
- The Jacksonville coefficient minus the Sacramento coefficient, with the difference divided by the standard error from the Sacramento model; and
- The Jacksonville coefficient minus the Sacramento coefficient, with the difference divided by the standard error from the Jacksonville model.

Other notes relevant to the model estimation results include the following:

- The *t*-statistic columns in the tables are shaded according to their difference from zero, with red for negative values or differences, green for positive values or differences, and darker shades for values that are farther from zero.
- In general, the darker the shading in the six columns on the right side of the tables, the more significant the differences between the coefficient estimates in question. Overall, there are a large number of significant differences, although somewhat fewer when comparing the two Florida regions than when comparing them each to the Sacramento region. This may be partly a function of sample sizes.
- "Cons" in the *t*-statistic column indicates that the coefficient was constrained at a particular value rather than estimated. This was often because there were not enough observations to estimate the particular variable from the data. (For example, in the mode choice models, there were very few observations in the Florida NHTS where "bike" or "transit" were chosen, so many of those parameters could not be estimated for the Florida regions.)

Table A.1. Household Auto Ownership Choice Model—Part 1

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		3942 –5314.6 0.1623 –0.3572		2517 –3242.1 0.1997 –0.2979		1335 –1805.2 0.1598 –0.2866		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Alternative	**Description**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
0 autos	HH has 1Driver	–3.68981	–7.6	–2.01018	–4.12	–2.89972	–4.08	–1.82	–1.25	3.46	3.44	1.63	1.11
2 autos	HH has 1Driver	–1.89173	–15.68	–0.66439	–5.35	–1.03707	–5.77	–3	–2.07	10.17	9.88	7.08	4.76
3 autos	HH has 1Driver	–3.01751	–16.61	–2.18802	–10.73	–2.1159	–8.28	0.35	0.28	4.57	4.07	4.96	3.53
4+ autos	HH has 1Driver	–4.48541	–12.9	–3.63433	–9.22	–2.98298	–8.23	1.65	1.8	2.45	2.16	4.32	4.14
0 autos	HH has 2Driving Age Members	–4.42927	–9.11	–3.3324	–6.55	–3.25433	–4.41	0.15	0.11	2.26	2.16	2.42	1.59
1 auto	HH has 2Driving Age Members	–1.63925	–9.57	–1.38138	–6.41	–1.18758	–5.18	0.9	0.84	1.51	1.2	2.64	1.97
3 autos	HH has 2Driving Age Members	–1.39816	–12.85	–1.61315	–10.23	–1.30819	–6.57	1.93	1.53	–1.98	–1.36	0.83	0.45
4+ autos	HH has 2Driving Age Members	–2.22857	–13.74	–2.51952	–9.46	–2.36345	–7.92	0.59	0.52	–1.79	–1.09	–0.83	–0.45
0 autos	HH has 3Driving Age Members	–3.82535	–5.57	–2.39406	–2.97	–2.81661	–2.72	–0.52	–0.41	2.08	1.78	1.47	0.97
1 auto	HH has 3Driving Age Members	–1.3697	–5.24	–1.44864	–3.87	–1.59785	–3.11	–0.4	–0.29	–0.3	–0.21	–0.87	–0.44
2 autos	HH has 3Driving Age Members	–0.36387	–1.78	–0.19898	–0.67	–0.28579	–0.81	–0.29	–0.25	0.81	0.56	0.38	0.22
4+ autos	HH has 3Driving Age Members	–0.51589	–2.53	–1.12126	–3.16	–0.83316	–2.18	0.81	0.75	–2.97	–1.71	–1.56	–0.83
0 autos	HH has 4OrMoreDriving Age Members	–5.1334	–4.21	–1.20381	–1.15	–2.28249	–1.63	–1.03	–0.77	3.22	3.74	2.34	2.04
1 auto	HH has 4OrMoreDriving Age Members	–1.81829	–4.62	–2.14852	–2.51	–1.8183	cons	0.39	cons	–0.84	–0.39	0	cons
2 autos	HH has 4OrMoreDriving Age Members	–1.10945	–3.67	–0.4346	–0.86	–2.43968	–2.25	–3.98	–1.85	2.23	1.34	–4.4	–1.23
3 autos	HH has 4OrMoreDriving Age Members	–1.09279	–3.61	–0.26026	–0.54	–0.72169	–1.28	–0.96	–0.82	2.75	1.74	1.23	0.66
0–4+	Household has at least as many cars as workers	0.39954	3.21	0.80353	3.6	0.83236	2.47	0.13	0.09	3.24	1.81	3.47	1.28
0 autos	HH PartTimeWorkers per Driving Age Member	0.69903	1.73	–1.22138	–1.61	–0.42788	–0.38	1.05	0.71	–4.77	–2.53	–2.8	–1.01
1 auto	HH PartTimeWorkers per Driving Age Member	0.32485	1.59	0.31851	1.36	0.79582	2.12	2.03	1.27	–0.03	–0.03	2.31	1.26
4+ autos	HH PartTimeWorkers per Driving Age Member	–0.43856	–1.38	–1.37266	–2.1	–0.43244	–0.74	1.44	1.61	–2.94	–1.43	0.02	0.01
1 auto	HH RetiredAdults per Driving Age Member	0.23902	2.01	1.28307	10.26	0.42824	2.3	–6.84	–4.6	8.8	8.35	1.59	1.02
3 autos	HH RetiredAdults per Driving Age Member	–0.30116	–1.91	–0.23992	–1.24	–0.655	–2.64	–2.14	–1.67	0.39	0.32	–2.25	–1.43
4+ autos	HH RetiredAdults per Driving Age Member	–0.56374	–2.23	–0.6008	–1.71	–0.70967	–1.83	–0.31	–0.28	–0.15	–0.11	–0.58	–0.38
1 auto	HH UniversityStudents per Driving Age Member	0.3196	1.4	0.93908	0.98	2.52138	2.13	1.66	1.34	2.71	0.65	9.63	1.86
3 autos	HH UniversityStudents per Driving Age Member	0.57069	2.02	1.31205	1.28	1.965	1.89	0.64	0.63	2.62	0.72	4.93	1.34
0 autos	HH DrivingAgeStudents per Driving Age Member	2.92501	2.28	–0.19238	–0.08	0	cons	0.08	cons	–2.43	–1.3	–2.28	cons
1 auto	HH DrivingAgeStudents per Driving Age Member	1.29697	2.34	1.79045	1.96	2.27422	2.1	0.53	0.45	0.89	0.54	1.77	0.9
4+ autos	HH DrivingAgeStudents per Driving Age Member	–2.59112	–3.82	–0.5699	–0.54	0.53073	0.48	1.03	1	2.98	1.9	4.61	2.84
0 autos	HH HomeBasedPersons per Driving Age Member	–1.06364	–1.58	–0.38232	–0.49	–0.51774	–0.41	–0.17	–0.11	1.01	0.88	0.81	0.44
1 auto	HH HomeBasedPersons per Driving Age Member	–0.53661	–1.87	–0.07281	–0.24	–0.25303	–0.56	–0.59	–0.4	1.62	1.51	0.99	0.63
3 autos	HH HomeBasedPersons per Driving Age Member	0.28589	1.06	0.40553	1.31	0.36296	0.9	–0.14	–0.1	0.44	0.39	0.29	0.19
4+ autos	HH HomeBasedPersons per Driving Age Member	0.64784	1.73	0.33032	0.61	0.63164	1.08	0.55	0.52	–0.85	–0.58	–0.04	–0.03
3 autos	HH ChildrenUnder5 per Driving Age Member	–0.47289	–1.63	–0.70904	–1.56	0.00979	0.04	1.58	2.58	–0.81	–0.52	1.66	1.73
4+ autos	HH ChildrenUnder5 per Driving Age Member	–1.73045	–2.87	–0.20003	–0.31	–0.02176	–0.05	0.28	0.44	2.54	2.38	2.84	4.17

Table A.2. Household Auto Ownership Choice Model—Part 2

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		3942 –5314.6 0.1623 –0.3572		2517 –3242.1 0.1997 –0.2979		1335 –1805.2 0.1598 –0.2866		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Alternative	**Description**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
0 autos	HH has 0To15KIncome	2.07181	8.25	1.73681	6.31	1.40195	3.32	–1.22	–0.79	–1.33	–1.22	–2.67	–1.59
1 auto	HH has 0To15KIncome	0.60728	3.35	0.58676	2.94	0.11689	0.46	–2.36	–1.84	–0.11	–0.1	–2.7	–1.92
3 autos	HH has 0To15KIncome	–0.71462	–2.23	–0.23001	–0.58	–0.18436	–0.43	0.11	0.11	1.51	1.22	1.66	1.23
4+ autos	HH has 0To15KIncome	–1.43568	–2.51	–1.22827	–1.17	–0.71098	–0.91	0.49	0.66	0.36	0.2	1.27	0.92
0 autos	HH has 50To75KIncome	–1.4535	–3.6	–1.22785	–2.26	–2.37103	–2.26	–2.11	–1.09	0.56	0.42	–2.27	–0.87
1 auto	HH has 50To75KIncome	–1.09308	–8.65	–0.39049	–2.5	–1.45695	–5.69	–6.82	–4.16	5.56	4.49	–2.88	–1.42
3 autos	HH has 50To75KIncome	0.14078	1.17	0.53502	2.77	0.08068	0.32	–2.36	–1.82	3.27	2.04	–0.5	–0.24
4+ autos	HH has 50To75KIncome	0.18861	1.11	0.24994	0.76	0.09669	0.27	–0.46	–0.43	0.36	0.19	–0.54	–0.26
0 autos	HH has 75KPlusIncome	–0.58492	–1.49	–0.95563	–2.07	–1.96118	–2.52	–2.18	–1.29	–0.94	–0.8	–3.51	–1.77
1 auto	HH has 75KPlusIncome	–1.00587	–6.32	–1.14041	–6.96	–1.76366	–7.19	–3.81	–2.54	–0.85	–0.82	–4.76	–3.09
3 autos	HH has 75KPlusIncome	0.2256	1.66	0.38606	2.24	0.54305	2.6	0.91	0.75	1.18	0.93	2.34	1.52
4+ autos	HH has 75KPlusIncome	0.34302	1.85	0.48696	1.79	0.60123	2.02	0.42	0.38	0.78	0.53	1.39	0.87
0 autos	HH has MissingIncome	–0.53538	–1.16	0.12366	0.36	0.66496	1.46	1.56	1.19	1.42	1.9	2.6	2.63
1 auto	HH has MissingIncome	–0.52697	–2.41	–0.38855	–2.12	–0.69626	–2.51	–1.68	–1.11	0.63	0.75	–0.77	–0.61
3 autos	HH has MissingIncome	0.21518	0.87	–0.09768	–0.33	–0.17509	–0.45	–0.26	–0.2	–1.27	–1.06	–1.58	–1
4+ autos	HH has MissingIncome	–0.97821	–1.75	0.08618	0.19	–0.41403	–0.64	–1.08	–0.77	1.9	2.3	1.01	0.87
0 autos	(workTourModeLog-sumWithFullCarOwnership – workTourModeLog-sumWithNoCarOwnership)	–0.42496	–4.56	–0.01056	–0.15	0.02297	0.17	0.48	0.25	4.45	5.98	4.81	3.38
autos < HH adults	(workTourModeLog-sumWithFullCarOwnership – workTourModeLog-sumWithNoCarOwnership)	–0.11124	–5.76	–0.08817	–3.63	–0.06545	–1.89	0.94	0.66	1.19	0.95	2.37	1.32
0 autos	(schoolTourModeLog-sumWithFullCarOwnership – schoolTourModeLog-sumWithNoCarOwnership)	–1.26275	–1.09	–1.2627	cons	–1.2627	cons	cons	cons	0	cons	0	cons
0 autos	LN(distance To Nearest Transit Stop)	–0.18288	–1.99	–0.41522	–3.85	–0.2651	–1.86	1.39	1.05	–2.53	–2.15	–0.9	–0.58
autos < HH adults	LN(1 + Residence Parcel Buffer 1 Transit Stops)	0.14811	2.47	–0.01352	–0.21	0.18335	1.47	3.04	1.58	–2.69	–2.5	0.59	0.28
0 autos	Residence Parcel Buffer 1 Off Street Paid Parking Daily Price	0.00071	3.74	–0.21937	–0.61	0.00774	0.12	0.63	3.46	–1153.06	–0.61	36.81	0.11
0 autos	LN(1 + Residence parcel Buffer1 Food empl. + Retail empl. + Service empl. + Medical empl.)	0.29598	3.75	0.10363	1.08	0.22079	1.77	1.22	0.94	–2.44	–2	–0.95	–0.6
1 auto	LN(1 + Residence parcel Buffer1 Food empl. + Retail empl. + Service empl. + Medical empl.)	0.19796	5.8	0.19055	3.18	0.14362	2.26	–0.78	–0.74	–0.22	–0.12	–1.59	–0.86
0 autos	(workTourModeLog-sumWithFullCarOwnership – workTourModeLog-sumWithNoCarOwnership) in Rural areas	0.27817	1.56	–0.3276	–2.17	0.07015	0.54	2.64	3.04	–3.4	–4.02	–1.17	–1.59
0 autos	HH in rural area	–0.77256	–1.7	0.0259	0.1	–0.39566	–0.8	–1.58	–0.85	1.76	3	0.83	0.76

Table A.3. Person Exact Number of Tours Choice Model—Part 1

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		10030 –3788 0.6562 –0.1373		3820 –1543.7 0.6322 –0.0412		2195 –855.2 0.6454 –0.0937		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Alternative	**Description**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
2+ work tours	FulltimeWorker	–0.07383	–0.46	0.69935	2.07	–1.36038	–3.16	–6.11	–4.78	4.83	2.29	–8.04	–2.99
2+ work tours	0To25KIncome	0.17678	0.86	0.31134	0.74	–0.81078	–0.75	–2.68	–1.04	0.66	0.32	–4.82	–0.91
2+ work tours	Female Adult No ChildrenUnder16	–0.30075	–2.01	–0.09655	–0.37	–0.01406	–0.04	0.32	0.21	1.36	0.78	1.91	0.72
2+ work tours	Female Adult ChildrenUnder5	–0.70169	–1.7	–0.69932	–0.87	–0.08205	–0.07	0.76	0.54	0.01	0	1.5	0.54
2+ work tours	AgeIsBetween18And25	–0.4212	–1.43	0.37939	0.68	–0.4604	–0.54	–1.5	–0.99	2.72	1.43	–0.13	–0.05
2+ work tours	AgeIsBetween26And35	–0.38146	–1.77	0.34419	0.82	–1.09434	–0.98	–3.43	–1.29	3.37	1.73	–3.31	–0.64
2+ work tours	WorksAtHome	1.47171	4.35	0.80531	1.68	1.52377	2.28	1.5	1.08	–1.97	–1.39	0.15	0.08
2 work tours	Mode choice log-sum to usual work location	0.32053	4.11	0.41746	2.69	0.26556	1.3	–0.98	–0.74	1.24	0.63	–0.71	–0.27
3+ work tours	Mode choice log-sum to usual work location	0.0731	0.26	–0.37298	–1.08	–0.79821	–1.16	–1.23	–0.62	–1.62	–1.29	–3.16	–1.27
2+ work tours	Pattern includes SchoolTours	–0.08565	–0.19	0	cons	0	cons	cons	cons	0.19	cons	0.19	cons
2+ work tours	Pattern includes EscortTours	0.25692	1.8	0.15273	0.45	0.48305	1.16	0.97	0.79	–0.73	–0.31	1.58	0.54
2+ work tours	Pattern includes WorkStops	0.12535	1.9	0.3521	2.86	0.30708	1.77	–0.37	–0.26	3.44	1.84	2.75	1.05
2+ work tours	Pattern includes PersonalBusinessStops	0.25789	3.49	0.12097	0.35	–0.00385	–0.01	–0.36	–0.24	–1.85	–0.4	–3.54	–0.5
2+ work tours	Pattern includes MealStops	–0.34399	–2.02	0.01203	0.05	–0.84085	–1.54	–3.51	–1.56	2.09	1.46	–2.91	–0.91
2 work tours	Constant	–3.01657	–13.32	–3.71592	–8.74	–2.15068	–4.07	3.68	2.96	–3.09	–1.65	3.82	1.64
3+ work tours	Constant	–5.45259	–9.78	–6.13485	–8.85	–4.76227	–4.38	1.98	1.26	–1.22	–0.98	1.24	0.64
2+ school tours	PartTimeWorker	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2+ school tours	UniversityStudent	1.29702	4.4	1.48341	1.26	0	cons	–1.26	cons	0.63	0.16	–4.4	cons
2+ school tours	DrivingAgeStudent	0.72981	2.08	1.31793	1.75	0.44401	0.37	–1.16	–0.72	1.67	0.78	–0.81	–0.24
2+ school tours	ChildUnder5	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2+ school tours	0To25KIncome	0.80278	3.02	0.62302	0.55	1.42246	1.19	0.71	0.67	–0.68	–0.16	2.33	0.52
2+ school tours	cars Per Adult in HH	0.59354	2.11	–0.42205	–0.57	–0.29558	–0.27	0.17	0.11	–3.62	–1.38	–3.17	–0.8
2 school tours	Mode choice log-sum to usual school location	0.22409	1.1	0.2241	cons	0.2241	cons	cons	cons	0	cons	0	cons
3+ school tours	Mode choice log-sum to usual school location	0.47204	0.73	0.472	cons	0.472	cons	cons	cons	0	cons	0	cons
2+ school tours	Pattern includes SchoolStops	0.50142	1.38	0.98189	0.86	0	cons	–0.86	cons	1.33	0.42	–1.38	cons
2 school tours	Constant	–4.23143	–12.85	–3.56034	–4.4	–3.86323	–3.44	–0.37	–0.27	2.04	0.83	1.12	0.33
3+ school tours	Constant	–6.90105	–9.72	–6.901	cons	–6.901	cons	cons	cons	0	cons	0	cons
2+ escort tours	NonworkingAdult	0.39173	1.93	0.57252	1.25	0.3663	0.79	–0.45	–0.44	0.89	0.39	–0.13	–0.05
2+ escort tours	0To25KIncome	0.3066	1.51	0.6296	1.43	–0.97352	–1.41	–3.63	–2.31	1.59	0.73	–6.31	–1.85
2+ escort tours	25To45KIncome	0.27156	1.43	0.20408	0.55	0.48964	0.93	0.77	0.54	–0.35	–0.18	1.15	0.41
2+ escort tours	Female Adult ChildrenAge5Through15	1.37145	7.06	0.95089	2.34	0.99252	2.34	0.1	0.1	–2.16	–1.03	–1.95	–0.89
2+ escort tours	Male Adult ChildrenAge5Through15	0.80961	3.33	0.97404	1.6	–0.31357	–0.44	–2.12	–1.79	0.68	0.27	–4.62	–1.56

(continued on next page)

Table A.3. Person Exact Number of Tours Choice Model—Part 1 (continued)

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		10030 –3788 0.6562 –0.1373		3820 –1543.7 0.6322 –0.0412		2195 –855.2 0.6454 –0.0937		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Alternative	**Description**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
2+ escort tours	AgeIsBetween18And25	–0.58586	–1.45	1.0596	0.73	0	cons	–0.73	cons	4.06	1.13	1.45	cons
2+ escort tours	AgeIsBetween26And35	–0.4927	–1.89	1.12139	2.08	–0.98508	–1.34	–3.91	–2.86	6.2	2.99	–1.89	–0.67
2+ escort tours	AgeIsBetween51And65	–0.1663	–0.78	0.00445	0.01	–0.46437	–0.94	–1.04	–0.95	0.8	0.38	–1.4	–0.61
2+ escort tours	WorksAtHome	0.25268	0.86	2.3827	3.89	1.35257	2.22	–1.68	–1.69	7.24	3.48	3.74	1.8
2 escort tours	Aggregate mode/destination log-sum for escort tour	0.10853	2.1	0.08311	0.66	0.08734	0.56	0.03	0.03	–0.49	–0.2	–0.41	–0.14
3+ escort tours	Aggregate mode/destination log-sum for escort tour	0.02898	0.33	0.02749	0.11	0.20881	0.76	0.7	0.66	–0.02	–0.01	2.03	0.66
2+ escort tours	Pattern includes WorkTours	–0.89626	–5.05	–0.19409	–0.4	–0.18138	–0.38	0.03	0.03	3.96	1.44	4.03	1.5
2+ escort tours	Pattern includes SchoolTours	–1.5884	–4.05	1.1365	0.8	–0.70538	–1	–1.29	–2.61	6.95	1.91	2.25	1.25
2 escort tours	Constant	–2.28521	–4.27	–2.94873	–2.08	–2.34545	–1.33	0.43	0.34	–1.24	–0.47	–0.11	–0.03
3+ escort tours	Constant	–3.01209	–3.54	–4.17115	–1.48	–5.16402	–1.69	–0.35	–0.32	–1.36	–0.41	–2.53	–0.7

Table A.4. Person Exact Number of Tours Choice Model—Part 2

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		10030 –3788 0.6562 –0.1373		3820 –1543.7 0.6322 –0.0412		2195 –855.2 0.6454 –0.0937		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Alternative	**Description**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
2+ pers.bus. tours	DrivingAgeStudent	0.41799	0.69	0	cons	0	cons	cons	cons	–0.69	cons	–0.69	cons
2+ pers.bus. tours	ChildAge5Through15	–0.73146	–1.22	0	cons	–1.53433	–1.4	cons	–1.4	1.22	cons	–1.34	–0.73
2+ pers.bus. tours	0To25KIncome	–0.57008	–2.7	–0.37536	–0.94	0.35932	0.74	1.85	1.51	0.92	0.49	4.41	1.91
2+ pers.bus. tours	OnlyAdult in HH	0.24623	1.16	0.46813	1.36	0.18276	0.42	–0.83	–0.65	1.05	0.65	–0.3	–0.14
2+ pers.bus. tours	Female Adult No ChildrenUnder16	0.29086	1.83	0.2601	0.85	–0.13557	–0.38	–1.29	–1.1	–0.19	–0.1	–2.68	–1.18
2+ pers.bus. tours	Female Adult ChildrenUnder5	0.01841	0.04	0.23383	0.28	0	cons	–0.28	cons	0.43	0.26	–0.04	cons
2 pers.bus. tours	Aggregate mode/destination log-sum for pers.bus. tour	0.06154	1.08	–0.09394	–0.77	0.02931	0.24	1.01	0.99	–2.73	–1.27	–0.57	–0.26
3+ pers.bus. tours	Aggregate mode/destination log-sum for pers.bus. tour	0.08327	0.57	0.07282	0.23	–0.26954	–0.64	–1.07	–0.81	–0.07	–0.03	–2.43	–0.83
2+ pers.bus. tours	Pattern includes WorkTours	–0.77291	–3.59	0.4511	1.2	0.48833	1.1	0.1	0.08	5.69	3.26	5.86	2.83
2+ pers.bus. tours	Pattern includes SchoolTours	–0.87761	–1.74	0	cons	–0.58877	–0.53	cons	–0.53	1.74	cons	0.57	0.26
2+ pers.bus. tours	Pattern includes EscortTours	–0.30648	–2.09	–0.34402	–0.74	–0.92918	–1.39	–1.26	–0.87	–0.26	–0.08	–4.25	–0.93
2+ pers.bus. tours	Pattern includes ShoppingTours	–0.35587	–1.89	0.41066	1.78	–0.65265	–1.55	–4.61	–2.52	4.07	3.32	–1.58	–0.7
2+ pers.bus. tours	Pattern includes PersonalBusinessStops	0.29444	4.05	0.17605	0.75	0.11603	0.38	–0.26	–0.2	–1.63	–0.51	–2.45	–0.58
2 pers.bus. tours	Constant	–2.39212	–3.47	–1.11611	–0.73	–2.0238	–1.34	–0.59	–0.6	1.85	0.83	0.53	0.24
3+ pers.bus. tours	Constant	–4.70753	–2.68	–5.1013	–1.26	–1.47196	–0.3	0.9	0.75	–0.22	–0.1	1.84	0.67
2+ shopping tours	FulltimeWorker	0.33855	1.12	0.09811	0.25	–0.03336	–0.07	–0.33	–0.29	–0.8	–0.61	–1.23	–0.82
2+ shopping tours	ChildAge5Through15	–1.11201	–1.06	0.39313	0.56	–0.35095	–0.3	–1.06	–0.63	1.44	2.15	0.73	0.64
2+ shopping tours	75KPlusIncome	0.06802	0.23	0.46403	1.83	0.04037	0.12	–1.67	–1.28	1.34	1.56	–0.09	–0.08
2+ shopping tours	OnlyAdult in HH	0.3117	1.18	0.32773	1.4	–0.56976	–1.48	–3.83	–2.33	0.06	0.07	–3.35	–2.29
2+ shopping tours	Female Adult ChildrenAge5Through15	–0.03681	–0.08	–0.27218	–0.57	–1.4052	–1.34	–2.37	–1.08	–0.53	–0.49	–3.1	–1.31
2+ shopping tours	Male Adult ChildrenAge5Through15	0.98636	2.45	0.6273	1.14	0.02836	0.03	–1.09	–0.72	–0.89	–0.65	–2.38	–1.16
2+ shopping tours	AgeIsBetween26And35	–0.88291	–1.4	0.75453	1.66	0	cons	–1.66	cons	2.6	3.6	1.4	cons
2+ shopping tours	WorksAtHome	0.51157	1.25	–0.19678	–0.35	–0.6857	–1.01	–0.88	–0.72	–1.73	–1.28	–2.93	–1.76
2 shopping tours	Aggregate mode/destination log-sum for shopping tour	0.45304	3.1	–0.04329	–0.46	0.07813	0.55	1.28	0.86	–3.4	–5.25	–2.57	–2.65
3+ shopping tours	Aggregate mode/destination log-sum for shopping tour	0.79727	1.45	0.2591	0.81	0.68696	1.36	1.33	0.84	–0.98	–1.67	–0.2	–0.22
2+ shopping tours	Pattern includes WorkTours	–1.66969	–3.63	–0.83084	–1.49	–0.73576	–1.23	0.17	0.16	1.82	1.51	2.03	1.56
2+ shopping tours	Pattern includes PersonalBusinessTours	–0.00865	–0.04	0.05247	0.23	0.35083	1.2	1.33	1.02	0.29	0.27	1.7	1.22
2+ shopping tours	Pattern includes EscortStops	–0.0616	–0.22	–0.36313	–0.81	0	cons	0.81	cons	–1.07	–0.67	0.22	cons
2+ shopping tours	Pattern includes PersonalBusinessStops	–0.07629	–0.55	0.0742	0.35	–0.71472	–1.43	–3.73	–1.58	1.08	0.71	–4.56	–1.28
2+ shopping tours	Pattern includes ShoppingStops	0.14783	1.45	0.02902	0.34	–0.00078	–0.01	–0.35	–0.23	–1.16	–1.39	–1.46	–1.13
2+ shopping tours	Pattern includes Social/recreationStops	0.50826	2.26	–0.30815	–0.76	–0.07271	–0.13	0.58	0.43	–3.63	–2.02	–2.58	–1.07
2 shopping tours	Constant	–6.85138	–4.93	–1.74547	–1.81	–2.52591	–1.69	–0.81	–0.52	3.68	5.29	3.12	2.89
3+ shopping tours	Constant	–12.54953	–2.36	–7.20691	–2.13	–10.72217	–1.93	–1.04	–0.63	1.01	1.58	0.34	0.33

Table A.5. Person Exact Number of Tours Choice Model—Part 3

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		10030 –3788 0.6562 –0.1373		3820 –1543.7 0.6322 –0.0412		2195 –855.2 0.6454 –0.0937		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Alternative	**Description**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
2+ meal tours	FulltimeWorker	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2+ meal tours	PartTimeWorker	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2+ meal tours	UniversityStudent	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2+ meal tours	DrivingAgeStudent	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2+ meal tours	ChildAge5Through15	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2+ meal tours	ChildUnder5	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2+ meal tours	0To25KIncome	0.66047	1.27	–1.65433	–1.49	0	cons	1.49	cons	–4.45	–2.08	–1.27	cons
2+ meal tours	OnlyAdult in HH	–1.29954	–1.65	1.20593	1.85	–0.98081	–0.9	–3.35	–2	3.19	3.84	0.41	0.29
2+ meal tours	Pattern includes WorkTours	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2+ meal tours	Pattern includes SchoolTours	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2+ meal tours	Pattern includes EscortTours	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2 meal tours	Constant	–2.29922	–7.51	–1.61965	–4.12	–2.01494	–5.35	–1.01	–1.05	2.22	1.73	0.93	0.76
3+ meal tours	Constant	–20	cons	–20	cons	–20	cons	cons	cons	cons	cons	cons	cons
2+ social/rec tours	ChildUnder5	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
2+ social/rec tours	OnlyAdult in HH	0.79501	2.76	0.51519	2.21	–0.03369	–0.08	–2.36	–1.37	–0.97	–1.2	–2.88	–2.06
2+ social/rec tours	Female Adult ChildrenUnder5	–0.91545	–0.85	0.05134	0.06	–0.14956	–0.18	–0.25	–0.25	0.9	1.19	0.71	0.94
2+ social/rec tours	Female Adult ChildrenAge5Through15	–1.3686	–1.74	–0.41886	–0.7	–1.07931	–1.27	–1.1	–0.78	1.21	1.58	0.37	0.34
2+ social/rec tours	AgeIsBetween18And25	0.48229	1.15	0	cons	–0.93647	–0.88	cons	–0.88	–1.15	cons	–3.39	–1.33
2+ social/rec tours	AgeIsBetween26And35	0.57329	1.09	0.23183	0.46	1.61365	2.77	2.73	2.37	–0.65	–0.67	1.98	1.78
2+ social/rec tours	AgeIsBetween51And65	0.44917	1.58	0.1658	0.71	0.48299	1.45	1.35	0.95	–1	–1.21	0.12	0.1
2+ social/rec tours	Pattern includes WorkTours	–1.67622	–3.6	–1.23291	–3.49	–0.86771	–1.91	1.03	0.8	0.95	1.25	1.73	1.78
2+ social/rec tours	Pattern includes EscortTours	0.62325	3	0.11557	0.52	0.07929	0.18	–0.16	–0.08	–2.44	–2.29	–2.62	–1.21
2+ social/rec tours	Pattern includes MealStops	0.02536	0.09	–0.44821	–1.55	0.51389	1.32	3.33	2.47	–1.67	–1.64	1.72	1.25
2+ social/rec tours	Pattern includes Social/recreationStops	0.70204	3.76	–0.04794	–0.22	–0.19207	–0.45	–0.65	–0.34	–4.02	–3.4	–4.79	–2.11
2 social/rec tours	Constant	–2.87126	–14.8	–2.4718	–16.34	–2.19189	–9.14	1.85	1.17	2.06	2.64	3.5	2.83
3+ social/rec tours	Constant	–5.63127	–11.87	–4.47713	–15.38	–4.2919	–9.51	0.64	0.41	2.43	3.97	2.82	2.97

Table A.6. Nonmandatory-Tour Destination Choice Model—Part 1

Variables	Region						Difference					
	Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only	6224 –7606.5 0.6853 0.5101		2912 –1584.2 0.8295 0.7759		1601 –1526.5 0.7001 0.5601		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
sampling AdjustmentFactor	1	cons	1	cons	1	cons	cons	cons	cons	cons	cons	cons
HomeBasedTour * timePressure	14.64626	6.8	0.06927	0.83	0.87644	0.3	9.71	0.27	–6.77	–175.38	–6.4	–4.64
_secondary * _workOrSchoolPattern * distanceFromOrigin0	0.22201	0.86	–1.92165	–4.84	–1.4713	–2.82	1.13	0.86	–8.32	–5.4	–6.57	–3.24
_secondary * _otherPattern * distanceFromOrigin5	–0.02815	–0.1	–1.11415	–2.85	–0.74437	–1.34	0.95	0.67	–3.67	–2.78	–2.42	–1.29
_secondary * _otherPattern * distanceFromOrigin0	0.09804	0.32	0.03483	0.09	–0.37464	–0.72	–1.1	–0.79	–0.21	–0.17	–1.55	–0.91
_secondary * _otherPattern * distanceFromOrigin3	0.42673	3.01	–0.68976	–4.28	–0.13116	–0.65	3.46	2.77	–7.89	–6.92	–3.94	–2.76
WorkBasedTour * distanceFromOriginLog	–1.79699	–6.3	–1.41449	–2.41	–1.58152	–2.18	–0.29	–0.23	1.34	0.65	0.76	0.3
household.has0To15KIncome * distanceFromOriginLog	1.43513	6.52	0.92587	3.08	–0.21638	–0.57	–3.8	–3	–2.31	–1.69	–7.5	–4.33
household.hasMissingIncome * distanceFromOriginLog	0.75753	2.85	0.07643	0.28	0.60816	1.49	1.95	1.31	–2.56	–2.5	–0.56	–0.37
person.IsRetiredAdult * distanceFromOriginLog	–0.30291	–2.21	–0.17968	–1.12	0.4865	2.33	4.14	3.2	0.9	0.77	5.76	3.79
person.IsChildAge5Through15 * distanceFromOriginLog	–0.87304	–3.16	–0.76747	–1.84	–0.38203	–0.99	0.92	1	0.38	0.25	1.78	1.27
person.IsChildUnder5 * distanceFromOriginLog	–1.05054	–3.56	–1.0505	cons	–1.0505	cons	cons	cons	0	cons	0	cons
HomeBasedTour * distanceFromSchoolLog	–0.48293	–2.52	–0.4829	cons	–0.4829	cons	cons	cons	0	cons	0	cons
distanceFromWorkLog	–0.23955	–2.15	–0.60694	–3.1	–0.10764	–0.51	2.55	2.36	–3.3	–1.88	1.19	0.62
carCompetition * destinationParcel.ParkingSufficiency	1.81085	5.1	0	cons	0	cons	cons	cons	–5.1	cons	–5.1	cons
noCarCompetition * destinationParcel.ParkingSufficiency	0.83659	2.86	–1.33107	–0.49	0	cons	0.49	cons	–7.4	–0.79	–2.86	cons
escortPurpose * tourLog-sum	0.62608	9.43	0.58528	7.19	0.76091	6.57	2.16	1.52	–0.61	–0.5	2.03	1.16
escortPurpose * distanceFromOrigin4	–10.57176	–4.9	–6.48564	–1.38	–10.94478	–1.67	–0.95	–0.68	1.89	0.87	–0.17	–0.06
escortPurpose * distanceFromOrigin8	–3.55337	–7.29	–5.27019	–5.47	–1.64587	–1.15	3.76	2.54	–3.52	–1.78	3.91	1.34
escortPurpose * distanceFromOrigin9	–2.28678	–8.01	–1.58901	–3.25	–2.49718	–4.18	–1.86	–1.52	2.44	1.43	–0.74	–0.35
escortPurpose * householdhasChildren * STUDK12B	0.20799	9.07	0.30163	7.12	0.18758	3.93	–2.69	–2.39	4.09	2.21	–0.89	–0.43
escortPurpose * EMPTOT_B	–0.13975	–5.6	0.00622	0.11	–0.09163	–1.52	–1.72	–1.62	5.85	2.57	1.93	0.8
personalBusiness * tourLog-sum	0.83837	5.73	0.47208	2.45	0.31217	1.9	–0.83	–0.97	–2.5	–1.9	–3.6	–3.2
personalBusiness * distanceFromOrigin4	–11.87891	–5.45	–31.06448	–7.66	–24.46566	–5.16	1.63	1.39	–8.81	–4.73	–5.78	–2.66
personalBusiness * distanceFromOrigin8	–3.26071	–6.66	–3.50759	–3.62	–2.78047	–2.33	0.75	0.61	–0.5	–0.25	0.98	0.4
personalBusiness * distanceFromOrigin9	–1.81429	–7.67	–2.82518	–7.15	–2.65313	–6.1	0.44	0.4	–4.27	–2.56	–3.54	–1.93
personalBusiness * distanceFromOrigin3	–0.43998	–2.8	–0.85989	–3.45	–0.93792	–4.71	–0.31	–0.39	–2.67	–1.68	–3.16	–2.5
personalBusiness * EMPEDU_B	0.14322	5.83	0.10013	2.29	–0.00148	–0.03	–2.32	–1.79	–1.75	–0.98	–5.89	–2.55
personalBusiness * EMPSVC_B	–0.14827	–4.89	–0.33581	–5.91	0.06472	0.89	7.05	5.53	–6.18	–3.3	7.02	2.94
personalBusiness * EMPMED_B	0.18526	8.32	0.43281	8.1	0.21562	3.96	–4.06	–3.99	11.12	4.63	1.36	0.56
personalBusiness * HOUSES_B // also psrc	–0.10345	–3.75	–0.08722	–1.73	–0.19716	–2.94	–2.18	–1.64	0.59	0.32	–3.39	–1.4
personalBusiness * STUDUNIB	0.0751	4.6	0.03976	1.22	–0.08218	–1.96	–3.74	–2.91	–2.16	–1.08	–9.63	–3.76
shoppingPurpose * tourLog-sum	1.11264	6.11	1.30258	6.86	0.04975	0.26	–6.6	–6.65	1.04	1	–5.84	–5.64
shoppingPurpose * distanceFromOrigin4	–9.37239	–4.27	3.1472	0.82	–10.66871	–2.2	–3.61	–2.85	5.7	3.27	–0.59	–0.27
shoppingPurpose * distanceFromOrigin8	–7.00238	–13.26	–3.14909	–4.22	–7.16374	–7.5	–5.38	–4.2	7.3	5.17	–0.31	–0.17
shoppingPurpose * distanceFromOrigin9	–2.0972	–7.26	–2.47964	–7.11	–3.29737	–8.26	–2.34	–2.05	–1.32	–1.1	–4.15	–3.01
shoppingPurpose * distanceFromOrigin3	–0.26816	–1.27	–0.1683	–0.67	–1.69105	–6.83	–6.03	–6.15	0.47	0.4	–6.74	–5.75
shoppingPurpose * EMPEDU_B // also psrc	–0.13917	–6.34	–0.01581	–0.53	–0.08059	–1.98	–2.18	–1.59	5.62	4.16	2.67	1.44
shoppingPurpose * EMPRET_B // also psrc	0.51094	15.65	0.34667	8.59	0.51425	9.78	4.15	3.19	–5.03	–4.07	0.1	0.06

Table A.7. Nonmandatory-Tour Destination Choice Model—Part 2

	Region						Difference					
Variables	**Sacramento**		**Tampa**		**Jacksonville**		**Jacksonville vs. Tampa**		**Tampa vs. Sacramento**		**Jacksonville vs. Sacramento**	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only	6224 –7606.5 0.6853 0.5101		2912 –1584.2 0.8295 0.7759		1601 –1526.5 0.7001 0.5601		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
mealPurpose * tourLog-sum	0.71812	4.24	0.17722	0.55	0.19886	0.79	0.07	0.09	–3.2	–1.68	–3.07	–2.06
mealPurpose * distanceFromOrigin4	–15.74356	–5.85	–1.7355	–0.24	–15.71537	–2.31	–1.93	–2.06	5.2	1.93	0.01	0
mealPurpose * distanceFromOrigin8	–5.06528	–7.53	–4.11032	–3.29	–4.74658	–3.15	–0.51	–0.42	1.42	0.77	0.47	0.21
mealPurpose * distanceFromOrigin9	–2.19232	–7.02	–3.95944	–7.4	–3.28931	–6.12	1.25	1.25	–5.65	–3.3	–3.51	–2.04
mealPurpose * distanceFromOrigin3	–0.38055	–1.95	–1.34318	–3.25	–1.37643	–4.45	–0.08	–0.11	–4.92	–2.33	–5.09	–3.22
mealPurpose * EMPFOO_B // psrc	0.18771	5.19	0.49464	7.61	0.29752	3.9	–3.03	–2.58	8.49	4.72	3.04	1.44
socialRecreationPurpose * tourLog-sum	0.75868	4.05	0.36155	2.77	0.13872	0.94	–1.71	–1.52	–2.12	–3.05	–3.31	–4.22
socialRecreationPurpose * distanceFromOrigin4	–14.07822	–5.96	–24.34818	–6.99	–29.6412	–7.42	–1.52	–1.32	–4.35	–2.95	–6.59	–3.9
socialRecreationPurpose * distanceFromOrigin8	–3.7711	–6.41	–2.76691	–2.42	–3.83512	–3.78	–0.93	–1.05	1.71	0.88	–0.11	–0.06
socialRecreationPurpose * distanceFromOrigin9	–1.76811	–6.11	–2.64753	–8.61	–3.28212	–8.17	–2.06	–1.58	–3.04	–2.86	–5.23	–3.77
socialRecreationPurpose * distanceFromOrigin3	–0.23281	–1.23	–0.8396	–4.27	–1.12164	–5.39	–1.43	–1.36	–3.22	–3.09	–4.71	–4.28
socialRecreationPurpose * EMPOFC_B // also psrc	0.21263	5.25	0.39804	11.98	0.21955	3.72	–5.37	–3.02	4.58	5.58	0.17	0.12
socialRecreationPurpose * EMPSVC_B // also psrc	0.43456	9.84	0.05718	1.26	0.34194	5.25	6.27	4.37	–8.55	–8.31	–2.1	–1.42
socialRecreationPurpose * HOUSES_B // also psrc	–0.77182	–17.23	–0.61114	–11.01	–0.58065	–9.5	0.55	0.5	3.59	2.89	4.27	3.13
socialRecreationPurpose * STUDUNIB // psrc	0.07733	3.74	0.13494	5.12	0.03824	1	–3.67	–2.54	2.79	2.19	–1.89	–1.03
log size function coefficient	0.28212	24.7	0.15498	44.8	0.24399	10.34	25.73	3.77	–11.13	–36.75	–3.34	–1.62
escort * no Children in HH * EmploymentEducation												
escort * no Children in HH * EmploymentFood	–3.71465	–3.31	–19.28149	–3.46	–8.71438	–1.8	1.9	2.18	–13.86	–2.8	–4.45	–1.03
escort * no Children in HH * EmploymentGovernment	–2.36825	–1.87	–203.7442	0	–30	cons	0	cons	–158.83	0	–21.79	cons
escort * no Children in HH * EmploymentOffice	–2.61357	–3.79	–11.69547	–6.05	–3.90557	–1.73	4.03	3.45	–13.16	–4.69	–1.87	–0.57
escort * no Children in HH * EmploymentRetail	–3.2784	–4	–13.03137	–5.74	–0.44557	–0.18	5.55	5.14	–11.91	–4.3	3.46	1.16
escort * no Children in HH * EmploymentService	–2.78645	–3.8	–30	cons	–2.94714	–1.09	cons	10.04	–37.11	cons	–0.22	–0.06
escort * no Children in HH * EmploymentMedical	–2.43974	–2.72	–19.08671	–9.55	1.13304	0.53	10.11	9.42	–18.53	–8.32	3.98	1.66
escort * no Children in HH * EmploymentIndustrial&Construction	–3.86182	–5.03	–10.98948	–4.81	–30	cons	–8.32	cons	–9.29	–3.12	–34.07	cons
escort * no Children in HH * Households	–21.72185	–15.58	–30	cons	–22.76468	–6.52	cons	2.07	–5.94	cons	–0.75	–0.3
escort * Children in HH * EmploymentEducation	–1.01264	–1.4	–15.0962	–5.05	5.80841	3.09	7	11.11	–19.45	–4.72	9.42	3.62
escort * Children in HH * EmploymentGovernment	–5.17664	–2.3	–30	cons	–30	cons	cons	cons	–11.01	cons	–11.01	cons
escort * Children in HH * EmploymentOffice	–2.28857	–3.9	–16.33829	–8.61	–0.27331	–0.14	8.46	8.34	–23.96	–7.4	3.44	1.05
escort * Children in HH * EmploymentRetail	–3.40027	–4.71	–92.88962	–0.11	–0.37365	–0.18	0.11	43.8	–123.99	–0.1	4.19	1.43
escort * Children in HH * EmploymentService	–1.58241	–2.91	–102.1336	–0.03	0.50669	0.26	0.03	52.1	–184.65	–0.03	3.84	1.06
escort * Children in HH * EmploymentMedical	–3.84726	–4.24	–21.95375	–10.48	–3.36234	–1.18	8.87	6.53	–19.95	–8.64	0.53	0.17
escort * Children in HH * EmploymentIndustrial&Construction	–3.10312	–5.02	–12.20641	–6.95	–5.0416	–2.39	4.08	3.39	–14.74	–5.18	–3.14	–0.92
escort * Children in HH * Households	–19.56042	–16.2	–30	cons	–15.9122	–5.72	cons	5.06	–8.64	cons	3.02	1.31
escort * Children in HH * StudentsK12												

Table A.8. Nonmandatory-Tour Destination Choice Model—Part 3

Variables	Region						Difference					
	Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only	6224 −7606.5 0.6853 0.5101		2912 −1584.2 0.8295 0.7759		1601 −1526.5 0.7001 0.5601		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
personalBusiness * EmploymentEducation	−5.39983	−6.29	−30	cons	−30	cons	cons	cons	−28.67	cons	−28.67	cons
personalBusiness * EmploymentFood	−17.42194	−4.83	−30	cons	−16.08799	−3.6	cons	3.11	−3.49	cons	0.37	0.3
personalBusiness * EmploymentOffice	−10.16155	−11.71	−30	cons	−30	cons	cons	cons	−22.87	cons	−22.87	cons
personalBusiness * EmploymentRetail	−0.87415	−2.31	4.83537	6.35	−1.99018	−1.81	−8.96	−6.2	15.06	7.5	−2.94	−1.01
personalBusiness * EmploymentService	−0.7408	−1.88	−4.36368	−3.14	−0.25596	−0.24	2.95	3.79	−9.19	−2.6	1.23	0.45
personalBusiness * EmploymentMedical												
personalBusiness * EmploymentIndustrial&Construction	−10.78006	−11.06	−30	cons	−58.64131	−0.09	cons	−0.04	−19.71	cons	−49.08	−0.07
personalBusiness * Households	−17.5983	−18.63	−30	cons	−17.37736	−8.08	cons	5.87	−13.13	cons	0.23	0.1
personalBusiness * StudentsK12	−7.33999	−7.61	−9.90852	−2.07	−6.93527	−2.69	0.62	1.15	−2.66	−0.54	0.42	0.16
shoppingPurpose * EmploymentFood	−11.81349	−10.18	−30	cons	−6.23217	−4.93	cons	18.82	−15.67	cons	4.81	4.42
shoppingPurpose * EmploymentOffice	−12.07073	−15.33	−30	cons	−12.52164	−7.44	cons	10.39	−22.77	cons	−0.57	−0.27
shoppingPurpose * EmploymentRetail												
shoppingPurpose * EmploymentService	−11.32857	−14.55	−17.84246	−10.98	−7.57843	−6.04	6.32	8.17	−8.37	−4.01	4.82	2.99
mealPurpose * EmploymentFood												
mealPurpose * EmploymentOffice	−12.62362	−10.16	−30	cons	−30	cons	cons	cons	−13.99	cons	−13.99	cons
mealPurpose * EmploymentTotal	−12.93674	−18.22	−30	cons	−15.01772	−8.16	cons	8.14	−24.03	cons	−2.93	−1.13
mealPurpose * Households	−21.74874	−9.65	−30	cons	−30	cons	cons	cons	−3.66	cons	−3.66	cons
socialRecreationPurpose * EmploymentFood	−1.1771	−0.99	−2.47949	−1.12	3.15843	2.12	2.54	3.79	−1.09	−0.59	3.64	2.91
socialRecreationPurpose * EmploymentGovernment	−1.09149	−0.48	7.91663	4.02	−43.51275	−0.04	−26.13	−0.05	3.97	4.58	−18.69	−0.04
socialRecreationPurpose * EmploymentOffice	−6.63967	−5.02	−13.95761	−2.9	0.17376	0.11	2.94	9.2	−5.53	−1.52	5.15	4.44
socialRecreationPurpose * EmploymentRetail	−6.16801	−4.02	−13.08579	−2.5	1.27374	0.64	2.74	7.18	−4.51	−1.32	4.85	3.72
socialRecreationPurpose * EmploymentService	−2.92876	−3.63	−30	cons	3.6241	3.33	cons	30.9	−33.53	cons	8.12	6.02
socialRecreationPurpose * Households												
socialRecreationPurpose * StudentsUniversity												
socialRecreationPurpose * StudentsK12	−5.43682	−2	8.55463	2.12	−30	cons	−9.57	cons	5.14	3.47	−9.03	cons

Table A.9. Work-Based Sub-Tour Generation Choice Model

Variables		Region: Sacramento		Region: Tampa		Region: Jacksonville		Difference: Jacksonville vs. Tampa		Difference: Tampa vs. Sacramento		Difference: Jacksonville vs. Sacramento	
Number of observations		2386		513		331		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Final log-likelihood		–1566.3		–301.2		–207.9							
Rho-squared versus 0 coefficients		0.318		0.3418		0.2941							
Rho-squared versus constants only		–0.1382		–0.1631		–0.1722							
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
work sub-tour	Constant	–0.22601	–0.98	–0.53745	–0.58	0.04704	0.05	0.63	0.6	–1.35	–0.34	1.18	0.28
school sub-tour	Constant	–2.18949	–3.53	–2.23639	–1.58	–2.0895	cons	0.1	cons	–0.08	–0.03	0.16	cons
escort sub-tour	Constant	–3.13634	–6.28	–4.26504	–3.07	–2.65778	–1.98	1.16	1.2	–2.26	–0.81	0.96	0.36
pers. bus. sub-tour	Constant	–1.40037	–5.95	–2.03245	–2.2	–0.68694	–0.72	1.46	1.4	–2.69	–0.68	3.03	0.74
shopping sub-tour	Constant	–1.79618	–7.37	–2.37389	–2.68	–1.81157	–1.94	0.63	0.6	–2.37	–0.65	–0.06	–0.02
meal sub-tour	Constant	–0.27147	–1.22	–1.03982	–1.16	0.21157	0.23	1.39	1.34	–3.46	–0.86	2.18	0.52
social/rec sub-tour	Constant	–1.72975	–6.55	–2.58374	–2.7	–1.30415	–1.31	1.34	1.28	–3.23	–0.89	1.61	0.43
no more sub-tours	One or more sub-tours already simulated	1.57466	11.31	2.70959	5.97	2.62145	5.65	–0.19	–0.19	8.15	2.5	7.52	2.26
no more sub-tours	LN(# of home-based tours in pattern)	0.37706	3.4	0.27456	0.9	0.11999	0.33	–0.51	–0.43	–0.92	–0.34	–2.32	–0.71
no more sub-tours	Pattern has 2+ work tours	0.73553	4.5	1.32597	2.92	1.09163	1.54	–0.52	–0.33	3.61	1.3	2.18	0.5
no more sub-tours	No cars in HH	0.0289	0.06	0.0289	cons	0.37977	0.28	cons	0.26	0	cons	0.78	0.26
no more sub-tours	Cars in HH, but fewer cars than adults	0.02831	0.24	0.24425	0.61	0.02037	0.04	–0.56	–0.43	1.85	0.54	–0.07	–0.02
no more sub-tours	Aggregate mode/destination log-sum for work-based sub-tours	–0.05502	–2.08	–0.10397	–1.09	0.00647	0.06	1.15	1.1	–1.85	–0.51	2.32	0.61
escort sub-tour	Buffer 1 K–12 school enrollment	0.11888	1.32	0.18673	0.84	0.07979	0.32	–0.48	–0.43	0.75	0.3	–0.43	–0.16
all—upper level	Log-sum across all stop purposes vs no more stops	1.33662	13.51										

Table A.10. Work-Tour-Mode Choice Model

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		3313 –3185.9 0.4457 –0.4349		844 –576.7 0.6052 –0.4469		506 –343 0.5739 –0.4735		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Parking cost utility	0.52879	2.76	0.5288	cons	–188.13417	–1.45	cons	–1.46	0	cons	–986.16	–1.46
All	Path type model log-sum	0.55879	5.84	0.4422	1.99	1.09404	1.51	2.94	0.9	–1.22	–0.53	5.59	0.74
drive to transit	Constant	–1.60381	–2.16	–10	cons	–1.6038	cons	cons	cons	–11.3	cons	0	cons
drive to transit	No cars in HH	–2	cons	–2	cons	–2	cons	cons	cons	cons	cons	cons	cons
drive to transit	Cars in HH, but fewer cars than workers	–1.01072	–0.95	–1	cons	–1.0107	cons	cons	cons	0.01	cons	0	cons
walk to transit	Constant	–1.91816	–1.73	3.01303	1.05	–1.9182	cons	–1.73	cons	4.44	1.73	0	cons
hov3	Constant	–0.96958	–1.34	2.99452	1	4.69404	0.8	0.57	0.29	5.49	1.32	7.84	0.96
hov3,hov2	#HH children under age 5	0.32332	2.22	0.70998	1.41	–0.14078	–0.41	–1.69	–2.46	2.66	0.77	–3.19	–1.34
hov3,hov2	#HH children age 5–15	0.27883	3.35	0.33712	1.19	0.07227	0.45	–0.94	–1.64	0.7	0.21	–2.48	–1.28
hov3,hov2	LN(hov path auto distance)	–0.13582	–2.42	–0.47008	–1.68	–0.09662	–0.56	1.33	2.18	–5.96	–1.19	0.7	0.23
hov3	One person HH	–0.61753	–1.98	–1	cons	–0.6175	cons	cons	cons	–1.22	cons	0	cons
hov3	Two person HH	–1.24533	–5.84	–1.4901	–2.98	–0.74351	–1.72	1.49	1.73	–1.15	–0.49	2.35	1.16
hov2	Constant	–0.43668	–0.61	3.59657	1.2	5.22651	0.89	0.54	0.28	5.63	1.35	7.91	0.96
hov3,hov2	No cars in HH	–3.10628	–3.8	–2.08923	–1.12	–4.88763	–1.34	–1.49	–0.77	1.24	0.54	–2.18	–0.49
hov3,hov2	Cars in HH, but fewer cars than adults	0.43342	2.59	0.49302	0.91	–0.79197	–1.41	–2.38	–2.29	0.36	0.11	–7.32	–2.18
hov2	One person HH	–0.39332	–1.62	–0.26393	–0.46	–1.12006	–1.39	–1.48	–1.06	0.53	0.22	–2.99	–0.9
sov	Constant	2.20033	2.55	6.01696	1.53	7.28401	1.24	0.32	0.22	4.42	0.97	5.89	0.86
sov	Cars in HH, but fewer cars than workers	–1.27744	–4.46	–3.21419	–1.84	–1.57557	–1.35	0.94	1.41	–6.77	–1.11	–1.04	–0.26
sov	HH income less than 25K	–0.17415	–1.11	–0.44942	–0.85	–0.72538	–1.35	–0.52	–0.51	–1.76	–0.52	–3.52	–1.03
bike	Constant	–9.5721	–5.79	–10	cons	–9.5721	cons	cons	cons	–0.26	cons	0	cons
bike	Male	0.76617	2.2	0.7662	cons	0.7662	cons	cons	cons	0	cons	0	cons
bike	Age over 50	–0.66188	–1.84	–0.6619	cons	–0.6619	cons	cons	cons	0	cons	0	cons
walk	Male	–0.65971	–2.02	–0.6597	cons	2.50599	1.42	cons	1.79	0	cons	9.69	1.79
transit	origin parcel buffer 1 mixed-use density	2.00231	2	17.74557	0.78	2.0023	cons	–0.69	cons	15.72	0.69	0	cons
transit	destination parcel buffer 1 net intersections	0.01099	1.94	–0.03423	–0.78	0.011	cons	1.03	cons	–7.99	–1.03	0	cons
transit	destination parcel buffer 1 total employment	0.0001	4.25	0.0001	cons	0.0001	cons	cons	cons	0.08	cons	0.08	cons
sov	escort stops per tour in the pattern	–2.21704	–3.36	48.77236	0.02	–2.217	cons	–0.02	cons	77.32	0.02	0	cons
sov	other stops per tour in the pattern	–0.03177	–0.38	0.26661	0.43	31.48649	0.01	50.57	0.01	3.59	0.48	378.73	0.01
hov3,hov2	escort stops per tour in the pattern	3.7031	4.79	58.28783	0.02	3.7031	cons	–0.02	cons	70.61	0.02	0	cons
hov3,hov2	other stops per tour in the pattern	0.24299	2.51	0.45109	0.7	31.70606	0.01	48.27	0.01	2.15	0.32	325.32	0.01
bike	fraction of distance on class 2 bike lanes	0.47993	2.01	0.4799	cons	0.4799	cons	cons	cons	0	cons	0	cons
bike	origin parcel buffer 2 mixed-use density	2.40963	3.13	2.4096	cons	2.4096	cons	cons	cons	0	cons	0	cons
bike	destination parcel buffer 2 total employment	0.00015	4.96	0.0002	cons	0.0002	cons	cons	cons	1.51	cons	1.51	cons
bike	destination parcel buffer 2 mixed-use density	7.17103	4.73	7.171	cons	7.171	cons	cons	cons	0	cons	0	cons
walk	destination parcel buffer 1 mixed-use density	0.92527	1.74	2.74796	1.43	4.1059	1.17	0.71	0.39	3.43	0.95	5.98	0.91
all	mode nest log-sum	0.95969	6.41	0.74871	2.05	1.19739	6.36	1.23	2.38	–1.41	–0.58	1.59	1.26

Table A.11. School-Tour-Mode Choice Model

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		1568 –2400.4 0.1218 –0.2427		211 –277.8 0.2177 –0.1999		166 –226.3 0.1633 –0.2714		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Parking cost utility	0.08271	0.43	0.0827	cons	3.22511	0.02	cons	0.02	0	cons	16.44	0.02
All	Path type model log-sum	1.02204	4.88	0.71517	2.72	2.20936	3.91	5.68	2.64	–1.46	–1.17	5.67	2.1
school bus	Constant	–1.19447	–3.57	6.96913	2.69	–1.83695	–2.15	–3.39	–10.31	24.42	3.15	–1.92	–0.75
school bus	Child under 5	–0.37388	–0.58	–0.3739	cons	–0.3739	cons	cons	cons	0	cons	0	cons
school bus	University student	–2.15522	–2.83	–1.88077	–1.73	–2.90766	–2.69	–0.95	–0.95	0.36	0.25	–0.99	–0.7
walk to transit	Constant	–3.89062	–2.19	–10	cons	–3.8906	cons	cons	cons	–3.45	cons	0	cons
walk to transit	No cars in HH	1.02925	1.8	0	cons	1.0292	cons	cons	cons	–1.8	cons	0	cons
walk to transit	Cars in HH, but fewer cars than adults	0.28476	0.86	0	cons	0.2848	cons	cons	cons	–0.86	cons	0	cons
walk to transit	Child under 5	–5	cons	–5	cons	–5	cons	cons	cons	cons	cons	cons	cons
walk to transit	University student	1.61893	2.9	0	cons	1.6189	cons	cons	cons	–2.9	cons	0	cons
walk to transit	Driving age student	1.44186	3.01	0	cons	1.4419	cons	cons	cons	–3.01	cons	0	cons
hov3	Constant	–0.43633	–1.81	6.67228	2.57	–1.91634	–2.24	–3.31	–10.06	29.56	2.74	–6.16	–1.73
hov3	Two person HH	–1.17062	–3.81	–1.73007	–1.62	–1.54996	–1.41	0.17	0.16	–1.82	–0.52	–1.23	–0.34
hov2	One person HH	–0.50005	–0.68	–2	cons	–0.5001	cons	cons	cons	–2.03	cons	0	cons
hov2	Constant	–1.07632	–4.43	6.10585	2.35	–2.56567	–3	–3.34	–10.12	29.55	2.77	–6.13	–1.74
hov3,hov2	No cars in HH	–1.74511	–2.57	–1.7451	cons	–1.7451	cons	cons	cons	0	cons	0	cons
hov3,hov2	HH income less than 25K	–0.26427	–1.55	0.08631	0.14	–2.02942	–2.35	–3.47	–2.45	2.05	0.58	–10.35	–2.04
hov3,hov3	HH income 25–50K	–0.26347	–1.99	0.23261	0.59	–0.16303	–0.34	–1	–0.84	3.74	1.25	0.76	0.21
hov3,hov4	Child under 5	1.37562	2.73	1.3756	cons	1.3756	cons	cons	cons	0	cons	0	cons
sov	Constant	1.21451	3	8.76969	3.28	–0.27177	–0.25	–3.38	–8.47	18.68	2.82	–3.68	–1.39
sov	Cars in HH, but fewer cars than adults	–1.01886	–3.48	–0.93431	–1.64	–1.81686	–1.97	–1.55	–0.96	0.29	0.15	–2.73	–0.87
sov	HH income less than 25K	–0.78348	–2.55	–1	cons	–0.7835	cons	cons	cons	–0.7	cons	0	cons
sov	HH income over 75K	0.30803	1.23	–0.66362	–1.19	0.19524	0.27	1.55	1.2	–3.89	–1.75	–0.45	–0.16
sov	Driving age student	–1.56467	–4.06	–1.10778	–1.94	–0.61499	–0.79	0.86	0.63	1.19	0.8	2.47	1.21
bike	Constant	–3.5144	–5.81	4.01366	1.41	–3.17964	–1.99	–2.53	–4.5	12.45	2.65	0.55	0.21
bike	Male	0.16084	0.64	–0.65262	–0.5	1.27223	0.97	1.48	1.46	–3.24	–0.62	4.42	0.84
bike	University student	0.51494	1.12	2.80857	1.9	0.5149	cons	–1.55	cons	4.99	1.55	0	cons
walk	University student	–0.00738	–0.02	0	cons	–0.0074	cons	cons	cons	0.02	cons	0	cons
transit	LN(origin parcel buffer 1 transit stops)	0.41911	1.63	0	cons	0.4191	cons	cons	cons	–1.63	cons	0	cons
transit	destination parcel buffer 1 mixed-use density	2.58949	1.53	0	cons	2.5895	cons	cons	cons	–1.53	cons	0	cons
sov	escort stops per tour in the pattern	–1.78375	–2.33	–1	cons	–1.7837	cons	cons	cons	1.02	cons	0	cons
sov	other stops per tour in the pattern	0.21961	1.81	0.69368	1.3	–1.53659	–2.28	–4.18	–3.32	3.9	0.89	–14.45	–2.61
hov3,hov2	escort stops per tour in the pattern	1.28842	3.28	0.29592	0.47	1.2884	cons	1.58	cons	–2.53	–1.58	0	cons
hov3,hov2	other stops per tour in the pattern	0.22136	2.48	0.45737	1.5	–0.16187	–0.75	–2.03	–2.86	2.64	0.77	–4.29	–1.77

(continued on next page)

Table A.11. School-Tour-Mode Choice Model (continued)

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		1568 –2400.4 0.1218 –0.2427		211 –277.8 0.2177 –0.1999		166 –226.3 0.1633 –0.2714		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
bike	fraction of distance on class 1 bike paths	1.07764	3.36	1.0776	cons	1.0776	cons	cons	cons	0	cons	0	cons
bike	fraction of distance on class 2 bike lanes	0.8818	2.35	0.8818	cons	0.8818	cons	cons	cons	0	cons	0	cons
bike	fraction of distance on "gauntlet" links	–1.15327	–3.07	–1.1533	cons	–1.1533	cons	cons	cons	0	cons	0	cons
bike	origin parcel buffer 2 mixed-use density	0.93583	1.67	0.90448	0.3	1.53678	0.74	0.21	0.3	–0.06	–0.01	1.07	0.29
bike	destination parcel buffer 2 total employment	0.00018	2.78	0	cons	–0.00019	–0.1	cons	–0.1	–2.78	cons	–5.73	–0.19
bike	destination parcel buffer 2 mixed-use density	0.21171	0.34	–1.40269	–0.51	–2.06128	–0.7	–0.24	–0.22	–2.56	–0.59	–3.6	–0.77
walk	destination parcel buffer 1 mixed-use density	0.18728	0.87	4.02265	2.25	–0.4031	–0.48	–2.47	–5.32	17.89	2.14	–2.75	–0.71
all	mode nest log-sum	1	4.13										

Table A.12. Escort-Tour-Mode Choice Model

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		1432 –1248 0.4392 –0.1203		353 –305.5 0.438 –0.0353		229 –213.5 0.3887 –0.078		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Log-sum from the path type choice model	3.3416	14.96	0.9562	8.43	1.09069	4.23	1.19	0.52	–10.68	–21.02	–10.07	–8.73
hov3	Constant	–2.18009	–6.74	–4.23173	–8.51	–5.14627	–7.4	–1.84	–1.31	–6.35	–4.13	–9.17	–4.26
hov3	Number of HH children under age 5	1.1668	8.93	0.4204	1.42	1.7387	3.87	4.47	2.93	–5.71	–2.53	4.37	1.27
hov3	Number of HH children age 5–15	0.48228	8.9	0.41088	3.13	0.4372	3.44	0.2	0.21	–1.32	–0.54	–0.83	–0.35
hov3	Number of HH children age 16+	0.07773	0.57	–0.52813	–1.37	0.0631	0.15	1.54	1.39	–4.45	–1.57	–0.11	–0.03
hov2	Constant	–1.30159	–4.01	–3.59873	–7.26	–4.11953	–6.07	–1.05	–0.77	–7.08	–4.64	–8.68	–4.16
hov3,hov2	No cars in HH	–5.914	cons	–5.914	cons	–5.914	cons	cons	cons	cons	cons	cons	cons
hov3,hov2	Cars in HH, fewer cars than adults	–0.03257	–0.24	–0.39563	–1.53	0.11937	0.3	1.99	1.3	–2.67	–1.41	1.12	0.38
sov	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
bike	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
walk	Age over 50	–2.3805	–3.36	–6.56808	–5.34	–2.65183	–2.84	3.18	4.19	–5.91	–3.4	–0.38	–0.29
walk	Destination parcel buffer 1 net intersections	0.00151	0.15	–0.14041	–4.38	–0.15356	–3.12	–0.41	–0.27	–14.43	–4.42	–15.76	–3.15
walk	Number of HH children under age 5	0.915	3.22	0.64675	0.47	1.43404	1.84	0.57	1.01	–0.94	–0.19	1.83	0.66
walk	Number of HH children age 5–15	–0.02723	–0.19	–1.12771	–2.34	–1.1189	–2.81	0.02	0.02	–7.83	–2.29	–7.77	–2.74
walk	Number of HH children age 16+	–1.41548	–2.61	–0.15483	–0.11	–1.4155	cons	–0.93	cons	2.32	0.93	0	cons

Table A.13. Other Home-Based Tour-Mode Choice Model

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		4501 –5206 0.2961 –0.2656		2569 –3211.3 0.2142 –0.266		1373 –1738.6 0.1807 –0.254		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Parking cost utility	0.37911	2.6	0.3791	cons	1.05119	0.03	cons	0.02	0	cons	4.61	0.02
All	Path type model log-sum	2.01869	7.78	0.55722	13.18	0.58223	9.32	0.59	0.4	–5.63	–34.56	–5.54	–22.99
walk to transit	Constant	–4.42008	–1.91	–4.25336	–5.31	1.49021	0.98	7.16	3.76	0.07	0.21	2.55	3.87
walk to transit	No cars in HH	4.94579	4.96	2.77448	3.2	6.0858	cons	3.82	cons	–2.18	–2.5	1.14	cons
hov3	Constant	–0.8113	–2.45	–2.40766	–8.5	–2.36988	–6.85	0.13	0.11	–4.83	–5.64	–4.71	–4.5
hov3,hov2	#HH children under age 5	0.59819	3.7	0.5004	2.79	0.59385	3.3	0.52	0.52	–0.6	–0.54	–0.03	–0.02
hov3,hov2	#HH children age 5–15	0.12635	1.76	0.37209	4.12	0.04996	0.47	–3.57	–3.06	3.43	2.72	–1.06	–0.73
hov3,hov2	#HH non-working adults	0.18246	3.11	0.29481	4.19	–0.05443	–0.63	–4.96	–4.03	1.92	1.6	–4.04	–2.73
hov3,hov2	LN(hov path auto distance)	0.22511	3.93	0.20982	4.2	0.33797	5.6	2.56	2.12	–0.27	–0.31	1.97	1.87
hov3	One person HH	–3.64495	–8.88	–1.63004	–6.74	–2.07673	–5.7	–1.85	–1.23	4.91	8.33	3.82	4.31
hov3	Two person HH	–2.04564	–16.71	–1.57539	–10.1	–1.8144	–8.53	–1.53	–1.12	3.84	3.01	1.89	1.09
hov2	Constant	–0.72293	–2.21	–2.10667	–7.87	–2.32123	–6.96	–0.8	–0.64	–4.23	–5.17	–4.89	–4.79
hov3,hov2	No cars in HH	–0.92857	–1.86	–1.45624	–3.66	1.17193	1.97	6.61	4.42	–1.06	–1.33	4.2	3.53
hov3,hov2	Cars in HH, but fewer cars than workers	–0.11562	–0.4	0.10724	0.24	0	cons	–0.24	cons	0.77	0.51	0.4	cons
hov2	One person HH	–2.12368	–6.53	–1.21047	–6.85	–1.39139	–5.06	–1.02	–0.66	2.81	5.17	2.25	2.66
sov	Constant	1.21464	3.36	–0.4115	–1.87	–0.57261	–1.99	–0.73	–0.56	–4.49	–7.38	–4.94	–6.22
sov	Cars in HH, but fewer cars than adults	–0.87685	–5.29	–0.80327	–7.19	–0.96336	–5.13	–1.43	–0.85	0.44	0.66	–0.52	–0.46
sov	HH income less than 25K	0.11453	0.94	0.04135	0.35	0.24034	1.33	1.69	1.1	–0.6	–0.62	1.03	0.7
bike	Constant	–6.57748	–6.34	–3.97398	–6.04	–4.2289	–6.28	–0.39	–0.38	2.51	3.96	2.26	3.49
bike	Male	1.03601	3.11	1.01565	3.11	0.8404	2.26	–0.54	–0.47	–0.06	–0.06	–0.59	–0.53
bike	Age over 50	–0.76683	–2.22	–1.19302	–3.79	–0.01419	–0.04	3.74	3	–1.23	–1.35	2.18	1.92
walk	Age over 50	–0.36705	–1.6	–0.84513	–5.14	–0.25856	–1.12	3.57	2.55	–2.09	–2.91	0.47	0.47
transit	shopping tour	–1.37393	–1.73	–0.03041	–0.04	–2.77393	–1.35	–3.55	–1.34	1.7	1.74	–1.77	–0.68
transit	origin parcel buffer 1 mixed-use density	1.98545	0.8	0	cons	–4.23325	–1.98	cons	–1.98	–0.8	cons	–2.51	–2.91
transit	destination parcel buffer 1 total employment	0.00016	2.5	–0.03635	–1.01	–0.00048	–1.51	1	113.39	–583.57	–1.02	–10.16	–2.01
sov	escort stops per tour in the pattern	–0.48854	–0.86	0.11684	0.18	1.6076	0.98	2.31	0.91	1.06	0.94	3.69	1.28
sov	other stops per tour in the pattern	0.2318	1.81	0.3196	3.01	0.44975	3.06	1.23	0.89	0.69	0.83	1.7	1.48
hov3,hov2	escort stops per tour in the pattern	–0.44898	–0.8	–0.0429	–0.07	2.13482	1.29	3.46	1.32	0.72	0.64	4.61	1.56
hov3,hov2	other stops per tour in the pattern	0.33715	2.58	0.44811	4.14	0.48639	3.28	0.35	0.26	0.85	1.03	1.14	1.01
hov3,hov2	shopping tour	0.07281	0.64	0.13645	1.06	0.05768	0.33	–0.61	–0.45	0.56	0.49	–0.13	–0.09
hov3,hov2	meal tour	2.17392	7.09	1.75807	9.3	1.29675	5.69	–2.44	–2.02	–1.36	–2.2	–2.86	–3.85
hov3,hov2	social recreation tour	0.54895	4.03	0.19059	1.37	0.53055	2.77	2.44	1.77	–2.63	–2.58	–0.14	–0.1
bike	social recreation tour	0.97577	2.6	2.07246	5.59	1.79883	4.6	–0.74	–0.7	2.92	2.96	2.19	2.11
bike	fraction of distance on class 1 bike paths	0.73069	1.84	0.7307	cons	0.7307	cons	cons	cons	0	cons	0	cons
bike	fraction of distance on class 2 bike lanes	0.91913	2.39	0.9191	cons	0.9191	cons	cons	cons	0	cons	0	cons

(continued on next page)

Table A.13. Other Home-Based Tour-Mode Choice Model (continued)

		Region						Difference					
Variables		**Sacramento**		**Tampa**		**Jacksonville**		**Jacksonville vs. Tampa**		**Tampa vs. Sacramento**		**Jacksonville vs. Sacramento**	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		4501 –5206 0.2961 –0.2656		2569 –3211.3 0.2142 –0.266		1373 –1738.6 0.1807 –0.254		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
bike	fraction of distance on "gauntlet" links	–0.88337	–2.16	–0.8834	cons	–0.8834	cons	cons	cons	0	cons	0	cons
bike	origin parcel buffer 2 mixed-use density	2.86896	3.4	1.15129	1.89	0.69326	1.07	–0.75	–0.71	–2.04	–2.82	–2.58	–3.35
bike	origin parcel buffer 2 households	0.00081	2.57	–0.00051	–0.95	0.00114	1.5	3.1	2.16	–4.18	–2.47	1.06	0.44
bike	destination parcel buffer 2 total employment	0.00006	1.25	–0.00065	–0.42	–0.00008	–0.52	0.37	3.74	–15.56	–0.46	–3	–0.89
bike	destination parcel buffer 2 mixed-use density	1.04301	1.21	–0.67979	–1.23	–0.56845	–0.88	0.2	0.17	–2	–3.11	–1.87	–2.5
walk	meal tour	1.23828	3.23	–0.96356	–1.77	–0.0601	–0.12	1.66	1.87	–5.75	–4.04	–3.39	–2.69
walk	social recreation tour	1.35282	4.68	1.38501	9.47	1.41585	6.32	0.21	0.14	0.11	0.22	0.22	0.28
walk	origin parcel buffer 1 households	0.00083	2.61	–0.0001	–0.33	–0.00111	–1.62	–3.36	–1.47	–2.92	–3.11	–6.08	–2.84
walk	destination parcel buffer 1 total employment	0.00001	0.03	–0.00041	–1.35	–0.00069	–1.07	–0.91	–0.43	–1.3	–1.39	–2.15	–1.09
all	mode nest log-sum	0.7839	8.17										

Table A.14. Work-Based Sub-Tour Mode Choice Model

		Region						Difference					
Variables		**Sacramento**		**Tampa**		**Jacksonville**		**Jacksonville vs. Tampa**		**Tampa vs. Sacramento**		**Jacksonville vs. Sacramento**	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		595 –704.6 0.3009 –0.3653		107 –94.1 0.4655 –0.2836		81 –92.4 0.2918 –0.611		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
all	Parking cost utility	1.45144	3.26	1.4514	cons	292.13159	1.86	cons	1.85	0	cons	653.33	1.85
all	Path type model log-sum	1.30394	4.1	4.16509	2.84	3.57026	3.16	–0.41	–0.53	9	1.95	7.13	2.01
walk to transit	Constant	–3.49807	–2.96	–4.0361	cons	–5	cons	cons	cons	–0.45	cons	–1.27	cons
hov3	Constant	–2.63531	–5.22	–4.34539	–4.36	–5.10516	–2.37	–0.76	–0.35	–3.39	–1.72	–4.89	–1.15
hov2	Constant	–1.77451	–3.67	–4.14449	–4.33	–4.20755	–1.98	–0.07	–0.03	–4.9	–2.48	–5.03	–1.14
sov	Constant	–2.30718	–3.27	7.76793	0.03	–5.08833	–2.22	–0.05	–5.62	14.26	0.04	–3.94	–1.22
sov	Income under 25K	–0.13557	–0.34	0.66098	0.5	–0.1356	cons	–0.6	cons	2.01	0.6	0	cons
sov	Income 25–50K	–0.13244	–0.47	1.18144	1.52	3.87112	2.16	3.46	1.5	4.64	1.69	14.15	2.24
sov	sov is mode to work	2.76788	3.29	–9.70172	–0.04	3.75733	1.61	0.05	5.75	–14.81	–0.05	1.18	0.42
sov	hov is mode to work	2.03252	2.73	0	cons	0.13916	0.06	cons	0.06	–2.73	cons	–2.55	–0.75
bike	Constant	–4.85669	–4.87	–5.525	cons	–5	cons	cons	cons	–0.67	cons	–0.14	cons
bike	Male	–0.07611	–0.07	–0.0761	cons	0	cons	cons	cons	0	cons	0.07	cons
bike	bike is mode to work	4.25352	4.2	4.2535	cons	4.2535	cons	cons	cons	0	cons	0	cons
walk to transit	walk is mode to work	5	cons	5	cons	5	cons	cons	cons	cons	cons	cons	cons
hov2,hov3	sov is mode to work	–0.23853	–0.62	0	cons	1.18139	0.55	cons	0.55	0.62	cons	3.71	0.66
hov2,hov3	hov is mode to work	1.31878	2.33	11.00842	0.04	0.35342	0.15	–0.04	–4.66	17.14	0.04	–1.71	–0.42
all	log-sum coefficient	0.96667	4										

Table A.15. Work-Tour Arrival and Departure Time Choice Model—Part 1

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		3328 –17879.5 0.2323 –0.0223		846 –4382.2 0.2592 0.0174		511 –2566 0.2843 0.0501		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
Arrive 3–6 am	Constant	–2.33947	–14.05	–2.80203	–8.26	–2.05413	–5.78	2.2	2.11	–2.78	–1.36	1.71	0.8
Arrive 6–7 am	Constant	–0.67106	–6.84	–0.51768	–2.71	–0.607	–2.65	–0.47	–0.39	1.56	0.8	0.65	0.28
Arrive 7–8 am	Constant	–0.01819	–0.3	0.0353	0.29	–0.13868	–0.92	–1.43	–1.15	0.87	0.44	–1.96	–0.8
Arrive 9–10 am	Constant	–0.9365	–11.76	–0.47093	–3.16	–0.98884	–5.36	–3.48	–2.81	5.85	3.13	–0.66	–0.28
Arrive 10 am–1 pm	Constant	–1.77744	–13.48	–1.21123	–5.24	–2.0996	–7.96	–3.85	–3.37	4.29	2.45	–2.44	–1.22
Arrive 1–4 pm	Constant	–1.86737	–8.42	–1.53276	–4	–2.61612	–6.46	–2.83	–2.67	1.51	0.87	–3.38	–1.85
Arrive 4–7 pm	Constant	–2.26569	–6.85	–2.49411	–4.41	–3.18197	–5.53	–1.21	–1.19	–0.69	–0.4	–2.77	–1.59
Arrive 7–10 pm	Constant	–3.16131	–6.44	–2.6398	–3.37	–4.50467	–4.57	–2.38	–1.89	1.06	0.67	–2.74	–1.36
Arrive 10 pm–3 am	Constant	–4.12095	–5.04	–5	cons	–4.121	cons	cons	cons	–1.08	cons	0	cons
Depart 3–7 am	Constant	–1.18601	–2.34	–1.65053	–1.57	–1.186	cons	0.44	cons	–0.92	–0.44	0	cons
Depart 7–10 am	Constant	–1.7641	–5.4	–1.48173	–2.43	–0.83676	–1.31	1.06	1.01	0.86	0.46	2.84	1.45
Depart 10 am–1 pm	Constant	–0.67544	–3.41	–0.63834	–1.68	–0.0177	–0.05	1.63	1.59	0.19	0.1	3.32	1.69
Depart 1–3 pm	Constant	–0.56921	–4.92	–0.67563	–2.97	–0.45724	–1.8	0.96	0.86	–0.92	–0.47	0.97	0.44
Depart 5–6 pm	Constant	0.0364	0.55	0.20036	1.55	0.03169	0.19	–1.31	–1.04	2.47	1.27	–0.07	–0.03
Depart 6–7 pm	Constant	–0.72643	–6.99	–0.75573	–3.65	–0.92422	–3.7	–0.81	–0.67	–0.28	–0.14	–1.9	–0.79
Depart 7–9 pm	Constant	–1.83603	–11.42	–1.88039	–5.92	–1.65318	–4.74	0.71	0.65	–0.28	–0.14	1.14	0.52
Depart 9–12 pm	Constant	–1.98924	–8.04	–1.57247	–3.24	–2.29411	–4.05	–1.49	–1.27	1.68	0.86	–1.23	–0.54
Depart 12–3 am	Constant	–3.33788	–8.46	–3.10673	–3.87	–3.82442	–4.01	–0.89	–0.75	0.59	0.29	–1.23	–0.51
Duration 0–3 hrs	Constant	0.8476	2.83	0.86667	1.44	1.36541	1.71	0.83	0.63	0.06	0.03	1.73	0.65
Duration 3–5 hrs	Constant	1.04808	4.62	1.12161	2.38	1.51006	2.32	0.82	0.6	0.32	0.16	2.04	0.71
Duration 5–7 hrs	Constant	0.47836	2.74	0.52987	1.37	0.73615	1.3	0.54	0.36	0.29	0.13	1.47	0.46
Duration 7–9 hrs	Constant	0.61578	4.79	0.60311	1.9	0.78513	1.58	0.57	0.37	–0.1	–0.04	1.32	0.34
Duration 10–11 hrs	Constant	–1.01822	–13.79	–1.00429	–6.58	–1.12957	–6.28	–0.82	–0.7	0.19	0.09	–1.51	–0.62
Duration 11–12 hrs	Constant	–2.11405	–16.76	–1.61497	–6.92	–2.23448	–7.77	–2.66	–2.15	3.96	2.14	–0.95	–0.42
Duration 12–14 hrs	Constant	–3.34291	–18.05	–3.1971	–8.46	–3.55973	–8.78	–0.96	–0.89	0.79	0.39	–1.17	–0.53
Duration 14–18 hrs	Constant	–6.02927	–17.13	–5.76419	–8.38	–7.22372	–7.85	–2.12	–1.59	0.75	0.39	–3.39	–1.3
Duration 18–24 hrs	Constant	–9.49833	–8.49	–10	cons	–9.4983	cons	cons	cons	–0.45	cons	0	cons
All	Arrival shift—part-time worker	0.04004	4.02	0.05778	2.77	0.08364	3.11	1.24	0.96	1.78	0.85	4.37	1.62
All	Duration shift—part-time worker	–0.02903	–2.29	–0.0825	–3.21	–0.083	–2.28	–0.02	–0.01	–4.22	–2.08	–4.26	–1.49
All	Arrival shift—non-working adult under age 65	0.06008	2.37	0.07183	1.82	0.03982	0.63	–0.81	–0.51	0.46	0.3	–0.8	–0.32
All	Duration shift—non-working adult under age 65	–0.13634	–3.75	–0.14297	–2.84	–0.3149	–2.99	–3.41	–1.63	–0.18	–0.13	–4.91	–1.69
All	Arrival shift—university student	0.10374	6.24	0.18097	2.16	0.14631	1.43	–0.41	–0.34	4.65	0.92	2.56	0.41
All	Duration shift—university student	0.01357	0.59	0.11314	0.97	0.12379	0.75	0.09	0.06	4.35	0.85	4.82	0.67
All	Arrival shift—driving age student	0.19069	7.19	0.28431	4.5	0.1097	1.25	–2.76	–1.98	3.53	1.48	–3.05	–0.92
All	Duration shift—driving age student	–0.04766	–1.15	–0.00542	–0.06	–0.24988	–1.69	–2.67	–1.65	1.02	0.46	–4.88	–1.37

Table A.16. Work-Tour Arrival and Departure Times Choice Model—Part 2

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations		3328		846		511		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Final log-likelihood		–17879.5		–4382.2		–2566							
Rho-squared versus 0 coefficients		0.2323		0.2592		0.2843							
Rho-squared versus constants only		–0.0223		0.0174		0.0501							
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Arrival shift—income 0 to 25K	0.01744	1.53	0.06573	2.65	0.06159	1.53	–0.17	–0.1	4.24	1.94	3.87	1.1
All	Duration shift—income 0 to 25K	–0.01108	–0.86	0.02412	0.86	0.01969	0.4	–0.16	–0.09	2.74	1.26	2.39	0.63
All	Arrival shift—income over 100K	–0.00458	–0.26	0.00872	0.35	0.00373	0.12	–0.2	–0.16	0.74	0.54	0.47	0.27
All	Duration shift—income over 100K	0.00176	0.12	0.00572	0.28	0.02051	0.8	0.73	0.58	0.27	0.2	1.28	0.73
All	Arrival shift—Second or subsequent work tour simulated in the day	1.46221	0.17	1.98128	0.15	9.99568	0.03	0.61	0.03	0.06	0.04	0.99	0.03
All	Duration shift—Second or subsequent work tour simulated in the day	0.2443	0.03	0.01274	0	–0.08478	0	–0.01	0	–0.03	–0.02	–0.04	0
All	Arrival shift—stops in pattern, patterns with home-based tours only	0.00395	1.08	0.01959	1.86	–0.00643	–0.67	–2.47	–2.72	4.28	1.49	–2.84	–1.08
All	Duration shift—stops in pattern, patterns with home-based tours only	–0.04584	–11.86	–0.03698	–3.59	–0.07759	–7.4	–3.94	–3.88	2.29	0.86	–8.21	–3.03
All	Arrival shift—stops in pattern, patterns with work-based sub-tours	–0.00065	–0.19	0.02352	2.3	–0.00369	–0.37	–2.66	–2.75	7.09	2.36	–0.89	–0.31
All	Duration shift—stops in pattern, patterns with work-based sub-tours	–0.04282	–11.36	–0.0282	–2.71	–0.06425	–6.03	–3.46	–3.38	3.88	1.4	–5.68	–2.01
All	Arrival shift—escort stops in the day pattern	–0.0143	–2.22	–0.02926	–1.62	–0.01531	–0.69	0.77	0.63	–2.32	–0.83	–0.16	–0.05
All	Duration shift—escort stops in the day pattern	0.0451	7.12	0.03342	2.16	0.04946	2.4	1.04	0.78	–1.84	–0.75	0.69	0.21
All	Arrival shift—Number of work-based sub-tours in the tour	0.01356	1.2	0.07216	2.52	–0.00473	–0.14	–2.68	–2.28	5.17	2.04	–1.61	–0.54
All	Duration shift—Number of work-based sub-tours in the tour	0.16495	14.7	0.1979	6.93	0.15368	5.13	–1.55	–1.48	2.94	1.15	–1	–0.38
Duration less than 9 hrs	Full time worker	–1.28515	–9.6	–1.10967	–3.43	–1.17633	–2.33	–0.21	–0.13	1.31	0.54	0.81	0.22
Arrive before 7 am	Income over $100K	–0.47347	–2.58	–0.94627	–3.33	–0.40538	–1.36	1.91	1.82	–2.57	–1.67	0.37	0.23
Depart after 9 pm	Income over $100K	–0.81108	–2.27	–0.06742	–0.17	–0.2211	–0.38	–0.38	–0.26	2.08	1.82	1.65	1.02
Duration less than 8 hrs	First work tour simulated in day, other work tours remaining to simulate	2.09809	8.64	2.94772	4.76	3.02944	2.87	0.13	0.08	3.5	1.37	3.83	0.88
Duration less than 8 hrs	Second or subsequent work tour simulated in day	5	cons	5	cons	5	cons	cons	cons	cons	cons	cons	cons
Duration less than 8 hrs	First work tour simulated, other non-work tours only remaining to simulate	–0.64055	–5.78	–0.55537	–2.5	–0.35868	–1.25	0.88	0.69	0.77	0.38	2.54	0.99
All	Auto tours, auto path type log-sum during the outbound period	0.5	cons	0.5	cons	0.5	cons	cons	cons	cons	cons	cons	cons
All	Auto tours, auto path type log-sum during the return period	0.5	cons	0.5	cons	0.5	cons	cons	cons	cons	cons	cons	cons
All	Transit tours, transit path type log-sum during the outbound period	0.5	cons	0.5	cons	0.5	cons	cons	cons	cons	cons	cons	cons
All	Transit tours, transit path type log-sum during the return period	0.5	cons	0.5	cons	0.5	cons	cons	cons	cons	cons	cons	cons
All	Transit tours, no transit path in period	–2.97702	–3.19	–2.977	cons	–2.977	cons	cons	cons	0	cons	0	cons
All	Minutes still available to schedule in the arrival period	3.14619	1.37	1.28049	0.39	5	cons	1.14	cons	–0.81	–0.57	0.8	cons
All	Minutes still available to schedule in the departure period	5	cons	5	cons	5	cons	cons	cons	cons	cons	cons	cons

Table A.17. Work-Tour Arrival and Departure Times Choice Model—Part 3

		Region						Difference					
Variables		**Sacramento**		**Tampa**		**Jacksonville**		**Jacksonville vs. Tampa**		**Tampa vs. Sacramento**		**Jacksonville vs. Sacramento**	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		3328 –17879.5 0.2323 –0.0223		846 –4382.2 0.2592 0.0174		511 –2566 0.2843 0.0501		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Time window minutes available before the arrival period, first simulated home-based tour	–0.24016	–9.1	–0.2714	–5.53	–0.2787	–5.26	–0.15	–0.14	–1.18	–0.64	–1.46	–0.73
All	Time window minutes available after the departure period, first simulated home-based tour	–0.24977	–9.37	–0.23815	–4.69	–0.34386	–6.2	–2.08	–1.91	0.44	0.23	–3.53	–1.7
All	Time window minutes available before the arrival period, later simulated home-based tour	–1.72822	–2.01	–2.29177	–1.37	–10.64107	–0.08	–4.99	–0.06	–0.66	–0.34	–10.38	–0.07
All	Time window minutes available after the departure period, later simulated home-based tour	0.0195	0.00	–0.21668	–0.02	–0.39134	0	–0.01	0	–0.03	–0.02	–0.05	0
All	Remaining tours to simulate in the day divided by the total time window that would remain	–100.45727	–8.82	–86.70972	–3.89	–80.60962	–3.13	0.27	0.24	1.21	0.62	1.74	0.77
All	Remaining tours to simulate in the day divided by the largest coherent time window that would remain	–23.74796	–4.96	–33.33515	–3.42	–9.1058	–0.86	2.49	2.29	–2	–0.98	3.06	1.38
All	Remaining stop purposes to simulate divided by the window that would remain before the arrival period	–0.5874	–5.25	–0.28505	–1.53	–1.03602	–2.51	–4.03	–1.82	2.7	1.62	–4.01	–1.09
All	Remaining stop purposes to simulate divided by the window that would remain after the departure period	–0.99453	–1.85	–10.55279	–2.91	–1.00754	–0.62	2.63	5.9	–17.75	–2.63	–0.02	–0.01
Depart 3–4 pm	Constant	–0.12591	–1.71	–0.21827	–1.46	0.13308	0.78	2.35	2.06	–1.26	–0.62	3.53	1.52

Table A.18. School-Tour Arrival and Departure Times Choice Model—Part 1

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations		1422		155		113		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Final log-likelihood		–6449		–639.6		–436.6							
Rho-squared versus 0 coefficients		0.3479		0.4053		0.4488							
Rho-squared versus constants only		0.0386		0.1328		0.2058							
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
Arrive 3–6 am	Constant	–10	cons	–26.0071	cons	–10	cons	cons	cons	cons	cons	cons	cons
Arrive 6–7 am	Constant	–3.25373	–15.32	–1.03292	–2.01	–3.2783	–4.93	–4.37	–3.38	10.45	4.32	–0.12	–0.04
Arrive 7–8 am	Constant	–0.21598	–2.65	0.5874	2.06	–0.61644	–1.94	–4.23	–3.78	9.87	2.82	–4.92	–1.26
Arrive 9–10 am	Constant	–1.2615	–10.82	–0.89654	–2.44	–1.27458	–2.41	–1.03	–0.72	3.13	0.99	–0.11	–0.02
Arrive 10 am–1 pm	Constant	–2.25578	–12.25	–2.90739	–4.15	–0.88873	–1.3	2.88	2.95	–3.54	–0.93	7.42	2
Arrive 1–4 pm	Constant	–2.94294	–8.88	–4.2571	–3.3	–0.84214	–0.67	2.65	2.7	–3.96	–1.02	6.34	1.66
Arrive 4–7 pm	Constant	–2.04227	–4.49	–2.88131	–1.8	0.62403	0.35	2.19	1.94	–1.85	–0.52	5.86	1.48
Arrive 7–10 pm	Constant	–3.46744	–5.43	–3.27706	–1.56	–2.13101	–0.84	0.54	0.45	0.3	0.09	2.09	0.53
Arrive 10 pm–3 am	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
Depart 3–7 am	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
Depart 7–10 am	Constant	–0.7008	–1.77	–3.68527	–2.97	–4.14047	–2.64	–0.37	–0.29	–7.55	–2.41	–8.7	–2.19
Depart 10 am–1 pm	Constant	0.90244	3.76	–0.68983	–0.95	–3.1746	–2.99	–3.44	–2.34	–6.63	–2.2	–16.98	–3.84
Depart 1–3 pm	Constant	1.61171	10.31	0.17239	0.4	–0.68088	–1.14	–1.97	–1.43	–9.21	–3.32	–14.67	–3.84
Depart 5–6 pm	Constant	–0.01054	–0.07	–0.76908	–1.68	–0.08102	–0.14	1.5	1.16	–5.24	–1.65	–0.49	–0.12
Depart 6–7 pm	Constant	–0.91968	–4.49	–0.79113	–1.42	–1.01719	–0.89	–0.4	–0.2	0.63	0.23	–0.48	–0.09
Depart 7–9 pm	Constant	–1.48754	–6.07	–1.07332	–1.64	1.64312	2.04	4.15	3.38	1.69	0.63	12.77	3.89
Depart 9–12 pm	Constant	–2.23021	–6.67	–2.56942	–2.45	2.68146	2.23	5	4.37	–1.01	–0.32	14.68	4.09
Depart 12–3 am	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
Duration 0–3 hrs	Constant	–1.40478	–3.83	1.89984	1.65	–0.12777	–0.09	–1.76	–1.46	9.01	2.87	3.48	0.92
Duration 3–5 hrs	Constant	–0.89502	–3.2	1.45184	1.57	0.29707	0.27	–1.25	–1.06	8.39	2.54	4.26	1.09
Duration 5–7 hrs	Constant	–0.63805	–3.12	1.65189	2.39	0.81191	0.99	–1.22	–1.02	11.2	3.32	7.09	1.77
Duration 7–9 hrs	Constant	–0.16016	–1.08	1.76829	3.36	1.24762	1.99	–0.99	–0.83	13.04	3.67	9.52	2.25
Duration 10–11 hrs	Constant	–0.74882	–3.78	–0.05121	–0.07	0.16615	0.21	0.31	0.27	3.52	0.98	4.62	1.16
Duration 11–12 hrs	Constant	–1.76817	–4.86	0.13144	0.17	–3	cons	–4.05	cons	5.22	2.46	–3.38	cons
Duration 12–14 hrs	Constant	–3.0607	–5.9	–1.4408	–1.33	–4	cons	–2.37	cons	3.13	1.5	–1.81	cons
Duration 14–18 hrs	Constant	–4.2862	–5.22	–1.91115	–1.19	–5	cons	–1.92	cons	2.89	1.47	–0.87	cons
Duration 18–24 hrs	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons

Table A.19. School-Tour Arrival and Departure Times Choice Model—Part 2

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		1422 –6449 0.3479 0.0386		155 –639.6 0.4053 0.1328		113 –436.6 0.4488 0.2058		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Arrival shift—part-time worker	0.28932	3.54	–0.22125	–1.4	0.48436	2.87	4.48	4.19	–6.24	–3.24	2.38	1.16
All	Duration shift—part-time worker	–0.12602	–0.87	–0.37175	–2.84	–0.29494	–1.73	0.59	0.45	–1.7	–1.88	–1.17	–0.99
All	Arrival shift—non-working adult under age 65	0.21889	1.92	–0.04775	–0.67	0.08555	0.83	1.86	1.29	–2.34	–3.72	–1.17	–1.29
All	Duration shift—non-working adult under age 65	–0.13019	–0.72	–0.55566	–3.09	–0.38472	–2.31	0.95	1.03	–2.34	–2.37	–1.4	–1.53
All	Arrival shift—university student	0.16569	8.28	0.06203	0.93	0.19437	3.06	1.99	2.08	–5.18	–1.56	1.43	0.45
All	Duration shift—university student	–0.07565	–4.06	–0.09405	–1.12	–0.14929	–2.11	–0.66	–0.78	–0.99	–0.22	–3.96	–1.04
All	Arrival shift—driving age student	–0.06262	–1.8	–0.41185	–3.28	–0.29124	–1.88	0.96	0.78	–10.06	–2.78	–6.59	–1.48
All	Duration shift—driving age student	0.05894	2.82	0.00883	0.17	–0.03836	–0.56	–0.9	–0.69	–2.4	–0.96	–4.65	–1.42
All	Arrival shift—stops in pattern, patterns with home-based tours only	0.01389	1.67	–0.02898	–0.7	0.04986	1.1	1.9	1.74	–5.14	–1.03	4.31	0.79
All	Duration shift—stops in pattern, patterns with home-based tours only	–0.03351	–4	–0.06738	–1.98	–0.0068	–0.16	1.78	1.46	–4.04	–1	3.19	0.64
All	Arrival shift—remaining stop purposes in pattern, patterns with work-based sub-tours	–0.00549	–0.74	0.03179	0.97	0.03503	1.11	0.1	0.1	5.04	1.14	5.48	1.28
All	Duration shift—remaining stop purposes in pattern, patterns with work-based sub-tours	–0.03619	–4.61	0.00413	0.1	–0.0247	–0.73	–0.67	–0.86	5.13	0.94	1.46	0.34
All	Arrival shift—escort stops in the day pattern	–0.02127	–1.19	0.00296	0.03	–0.15819	–2.09	–1.89	–2.13	1.35	0.28	–7.64	–1.81
All	Duration shift—escort stops in the day pattern	0.03853	2.55	0.11687	1.88	0.0381	0.66	–1.27	–1.36	5.18	1.26	–0.03	–0.01
All	Auto tours, auto path type log-sum during the outbound period	0.25	cons	0.25	cons	0.25	cons	cons	cons	cons	cons	cons	cons
All	Auto tours, auto path type log-sum during the return period	0.25	cons	0.25	cons	0.25	cons	cons	cons	cons	cons	cons	cons
All	Transit tours, transit path type log-sum during the outbound period	0.25	cons	0.25	cons	0.25	cons	cons	cons	cons	cons	cons	cons
All	Transit tours, transit path type log-sum during the return period	0.25	cons	0.25	cons	0.25	cons	cons	cons	cons	cons	cons	cons
All	Minutes still available to schedule in the arrival period	4.39849	2.24	4.3985	cons	4.3985	cons	cons	cons	0	cons	0	cons
All	Minutes still available to schedule in the departure period	1.29765	1.11	1.2977	cons	1.2977	cons	cons	cons	0	cons	0	cons
All	Time window minutes available before the arrival period, first simulated home-based tour	–0.13713	–4.17	–0.09793	–0.82	–0.36598	–2.78	–2.24	–2.03	1.19	0.33	–6.96	–1.74
All	Time window minutes available after the departure period, first simulated home-based tour	–0.11773	–4.17	–0.17774	–1.97	0.1557	1.26	3.69	2.71	–2.13	–0.66	9.69	2.22
All	Time window minutes available before the arrival period, later simulated home-based tour	–0.0809	–2.1	–0.02826	–0.18	–0.08875	–0.52	–0.39	–0.36	1.36	0.34	–0.2	–0.05
All	Time window minutes available after the departure period, later simulated home-based tour	–0.02026	–0.67	–0.00946	–0.1	0.20929	1.14	2.3	1.19	0.36	0.11	7.62	1.25

(continued on next page)

Table A.19. School-Tour Arrival and Departure Times Choice Model—Part 2 (continued)

Variables		**Region**						**Difference**					
		Sacramento		**Tampa**		**Jacksonville**		**Jacksonville vs. Tampa**		**Tampa vs. Sacramento**		**Jacksonville vs. Sacramento**	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		1422 –6449 0.3479 0.0386		155 –639.6 0.4053 0.1328		113 –436.6 0.4488 0.2058		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Remaining tours to simulate in the day divided by the total time window that would remain	–88.14783	–6.22	–94.15871	–2.67	–79.37626	–1.43	0.42	0.27	–0.42	–0.17	0.62	0.16
All	Remaining stop purposes to simulate divided by the window that would remain before the arrival period	–0.51533	–1.96	–1.07745	–0.66	–0.7146	–0.33	0.22	0.17	–2.14	–0.34	–0.76	–0.09
All	Remaining stop purposes to simulate divided by the window that would remain after the departure period	–1.48342	–2.36	–7.54322	–1.12	–4.24913	–0.43	0.49	0.33	–9.64	–0.9	–4.4	–0.28
Depart 3–4 pm	Constant	1.68479	13.54	0.2481	0.77	0.68935	1.73	1.37	1.11	–11.54	–4.45	–8	–2.5
All	Arrival shift—full-time worker	0.28553	7.2	0.02581	0.2	0.20168	2.03	1.39	1.77	–6.55	–2.05	–2.11	–0.84
All	Duration shift—full-time worker	0.1154	2.49	0.23319	1.38	–0.21527	–1.62	–2.65	–3.38	2.55	0.7	–7.15	–2.49
All	Arrival shift—pre-school age (0–4)	0.10499	2.69	0.105	cons	0.105	cons	cons	cons	0	cons	0	cons
All	Duration shift—pre-school age (0–4)	0.15535	5.4	0.1553	cons	0.1553	cons	cons	cons	0	cons	0	cons

Table A.20. Other Home-Based-Tour Arrival and Departure Times Choice Model—Part 1

Variables		**Region**						**Difference**					
		Sacramento		**Tampa**		**Jacksonville**		**Jacksonville vs. Tampa**		**Tampa vs. Sacramento**		**Jacksonville vs. Sacramento**	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		5946 –29997.3 0.2166 –0.0729		3006 –15255.6 0.229 –0.0215		1609 –8028.2 0.2385 –0.0347		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
Arrive 3–6 am	Constant	–4.73828	–17.79	–5.24283	–12.32	–4.64224	–9.97	1.41	1.29	–1.89	–1.19	0.36	0.21
Arrive 6–7 am	Constant	–2.20312	–13.41	–2.50811	–7.51	–2.02352	–6.48	1.45	1.55	–1.86	–0.91	1.09	0.57
Arrive 7–8 am	Constant	–0.8424	–10.11	–0.6892	–4.75	–0.71762	–4.57	–0.2	–0.18	1.84	1.06	1.5	0.8
Arrive 9–10 am	Constant	–0.04143	–0.52	0.30655	2.64	0.01597	0.11	–2.51	–1.97	4.4	3	0.73	0.39
Arrive 10 am–1 pm	Constant	0.38184	3.94	0.41157	2.87	0.37599	2.1	–0.25	–0.2	0.31	0.21	–0.06	–0.03
Arrive 1–4 pm	Constant	0.43606	3.12	0.41958	2.14	0.18237	0.71	–1.21	–0.92	–0.12	–0.08	–1.82	–0.98
Arrive 4–7 pm	Constant	0.741	4.08	0.32472	1.29	0.19246	0.57	–0.52	–0.39	–2.29	–1.65	–3.02	–1.62
Arrive 7–10 pm	Constant	0.29207	1.33	–0.36393	–1.17	–0.82744	–1.97	–1.49	–1.1	–2.99	–2.12	–5.11	–2.67
Arrive 10 pm–3 am	Constant	–1.22734	–4.2	–1.86922	–4.23	–2.84574	–4.46	–2.21	–1.53	–2.19	–1.45	–5.53	–2.53
Depart 3–7 am	Constant	–0.83847	–2.79	0.14997	0.34	–0.63898	–1.18	–1.8	–1.45	3.29	2.25	0.66	0.37
Depart 7–10 am	Constant	–0.52239	–2.78	–0.94018	–3.9	–1.10086	–3.14	–0.67	–0.46	–2.22	–1.73	–3.08	–1.65
Depart 10 am–1 pm	Constant	–0.22383	–1.63	–0.42659	–2.43	–0.6591	–2.61	–1.32	–0.92	–1.47	–1.15	–3.16	–1.72
Depart 1–3 pm	Constant	0.0909	0.99	–0.09948	–0.86	–0.19688	–1.2	–0.84	–0.59	–2.08	–1.65	–3.14	–1.75

(continued on next page)

Table A.20. Other Home-Based-Tour Arrival and Departure Times Choice Model—Part 1 (continued)

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		5946 –29997.3 0.2166 –0.0729		3006 –15255.6 0.229 –0.0215		1609 –8028.2 0.2385 –0.0347		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
Depart 5–6 pm	Constant	–0.281	–3.65	–0.09348	–0.89	–0.51334	–3.39	–4.01	–2.78	2.44	1.79	–3.02	–1.54
Depart 6–7 pm	Constant	–0.4021	–4.53	–0.22574	–1.82	–0.24329	–1.48	–0.14	–0.11	1.99	1.42	1.79	0.96
Depart 7–9 pm	Constant	–0.26728	–2.52	–0.00069	0	–0.14558	–0.72	–0.99	–0.72	2.52	1.83	1.15	0.6
Depart 9–12 pm	Constant	–0.34157	–2.1	–0.1922	–0.84	–0.46849	–1.46	–1.21	–0.86	0.92	0.65	–0.78	–0.4
Depart 12–3 am	Constant	–1.7071	–6.5	–1.90026	–4.32	–1.73715	–3.02	0.37	0.28	–0.74	–0.44	–0.11	–0.05
Duration 0–1 hrs	Constant	–0.38357	–3.19	–0.38182	–2.52	–0.54801	–2.45	–1.1	–0.74	0.01	0.01	–1.37	–0.73
Duration 1–2 hrs	Constant	0.16773	2.24	0.03745	0.37	–0.10891	–0.75	–1.44	–1.01	–1.74	–1.28	–3.69	–1.91
Duration 3–5 hrs	Constant	–0.52962	–5.88	–0.17726	–1.43	–0.12783	–0.76	0.4	0.29	3.91	2.85	4.46	2.39
Duration 5–7 hrs	Constant	–1.00849	–5.04	–0.57419	–2.18	–0.76503	–2.09	–0.72	–0.52	2.17	1.65	1.22	0.66
Duration 7–9 hrs	Constant	–1.18987	–3.79	–0.5942	–1.38	–0.51565	–0.89	0.18	0.14	1.9	1.38	2.15	1.17
Duration 9–12 hrs	Constant	–1.38769	–3.06	–1.35226	–1.75	–0.51238	–0.6	1.09	0.99	0.08	0.05	1.93	1.03
Duration 12–14 hrs	Constant	–3.18227	–2.79	–5	cons	–0.48375	–0.34	cons	3.2	–1.6	cons	2.37	1.91
Duration 14–18 hrs	Constant	–1.57538	–1.75	–5	cons	–5	cons	cons	cons	–3.81	cons	–3.81	cons
Duration 18–24 hrs	Constant	–11.1077	cons	–11.1077	cons	–11.1077	cons	cons	cons	cons	cons	cons	cons
All	Arrival shift—part-time worker	0.00051	0.07	–0.00646	–0.61	–0.01369	–0.95	–0.68	–0.5	–1	–0.65	–2.04	–0.98
All	Duration shift—part-time worker	–0.01621	–0.72	–0.02162	–0.66	0.00002	0	0.66	0.49	–0.24	–0.16	0.72	0.37
All	Arrival shift—non-working adult under age 65	–0.00372	–0.59	0.0041	0.5	–0.02548	–2.21	–3.6	–2.56	1.25	0.95	–3.47	–1.89
All	Duration shift—non-working adult under age 65	–0.0142	–0.77	–0.0437	–1.69	–0.00903	–0.28	1.34	1.09	–1.6	–1.14	0.28	0.16
All	Arrival shift—university student	0.04342	4.37	0.00145	0.02	–0.00454	–0.12	–0.1	–0.16	–4.22	–0.68	–4.83	–1.31
All	Duration shift—university student	0.03845	1.42	0.12807	1.31	–0.00436	–0.04	–1.36	–1.23	3.3	0.92	–1.58	–0.4
All	Arrival shift—non-working adult age 65+	–0.02629	–4.34	–0.012	–1.58	–0.04785	–4.21	–4.71	–3.16	2.36	1.88	–3.56	–1.9
All	Duration shift—non-working adult age 65+	–0.01945	–1.18	–0.05401	–2.33	–0.02017	–0.68	1.46	1.13	–2.1	–1.49	–0.04	–0.02
All	Arrival shift—driving age student	0.05276	3.43	0.05071	2.15	0.11116	3.06	2.57	1.66	–0.13	–0.09	3.79	1.61
All	Duration shift—driving age student	0.04145	1.16	0.03523	0.67	0.09229	1.22	1.09	0.75	–0.17	–0.12	1.42	0.67
All	Arrival shift—First of multiple tours simulated for same purpose	–0.10652	–10.58	–0.09148	–7.39	–0.08155	–4.47	0.8	0.54	1.49	1.22	2.48	1.37
All	Duration shift—First of multiple tours simulated for same purpose	–0.03547	–0.67	–0.21901	–4.62	–0.08854	–1.04	2.75	1.53	–3.48	–3.87	–1.01	–0.62

Table A.21. Other Home-Based-Tour Arrival and Departure Times Choice Model—Part 2

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		5946 –29997.3 0.2166 –0.0729		3006 –15255.6 0.229 –0.0215		1609 –8028.2 0.2385 –0.0347		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Arrival shift—Second or subsequent tour for same purpose simulated in the day	0.00957	0.6	0.01414	0.66	0.07213	2.32	2.71	1.87	0.29	0.21	3.95	2.01
All	Duration shift—Second or subsequent tour for same purpose simulated in the day	–0.15892	–4.23	–0.37883	–7.86	–0.42637	–5.74	–0.99	–0.64	–5.85	–4.56	–7.12	–3.6
All	Arrival shift—patterns with home-based tours only	0.01327	0.94	0.03398	1.92	0.04404	1.68	0.57	0.38	1.47	1.17	2.19	1.17
All	Duration shift—patterns with home-based tours only	–0.01047	–0.19	–0.26526	–6.51	0.04087	0.44	7.51	3.31	–4.59	–6.25	0.92	0.55
All	Arrival shift—stops in pattern, patterns with home-based tours only	–0.00023	–0.09	–0.00638	–2.04	–0.00204	–0.4	1.39	0.86	–2.39	–1.96	–0.7	–0.36
All	Duration shift—stops in pattern, patterns with home-based tours only	0.00012	0.02	0.01365	1.8	0.01021	1.1	–0.45	–0.37	2.41	1.79	1.8	1.09
All	Arrival shift—stops in pattern, patterns with work-based sub-tours	0.0021	1.61	0.00378	1.74	0.00207	0.69	–0.79	–0.58	1.29	0.77	–0.03	–0.01
All	Duration shift—stops in pattern, patterns with work-based sub-tours	–0.01041	–2.19	0.01339	1.81	0.00166	0.17	–1.58	–1.18	5.01	3.21	2.54	1.22
All	Arrival shift—escort stops in the day pattern	–0.00503	–1.48	–0.01644	–2.59	0.00471	0.42	3.33	1.9	–3.35	–1.8	2.86	0.88
All	Duration shift—escort stops in the day pattern	0.04512	3.41	0.01099	0.45	0.01704	0.45	0.25	0.16	–2.58	–1.38	–2.12	–0.75
Duration less than 4 hrs	Second or subsequent tour simulated in the day	1.07433	6.63	–0.02228	–0.1	–0.27523	–0.98	–1.19	–0.91	–6.76	–5.16	–8.33	–4.83
All	Auto tours, auto path type log-sum during the outbound period	0.5	cons	0.5	cons	0.5	cons	cons	cons	cons	cons	cons	cons
All	Auto tours, auto path type log-sum during the return period	0.5	cons	0.5	cons	0.5	cons	cons	cons	cons	cons	cons	cons
All	Transit tours, transit path type log-sum during the outbound period	0.5	cons	0.5	cons	0.5	cons	cons	cons	cons	cons	cons	cons
All	Transit tours, transit path type log-sum during the return period	0.5	cons	0.5	cons	0.5	cons	cons	cons	cons	cons	cons	cons
All	Transit tours, no transit path in period	–5	cons	–5	cons	–5	cons	cons	cons	cons	cons	cons	cons
All	Minutes still available to schedule in the arrival period	2.36286	10.57	1.43437	7.25	3.53459	4.86	10.62	2.89	–4.15	–4.69	5.24	1.61
All	Minutes still available to schedule in the departure period	0.75577	3.73	0.08283	0.43	1.65586	2.49	8.14	2.36	–3.32	–3.48	4.44	1.35
All	Time window minutes available before the arrival period, first simulated home-based tour	0.05779	0.92	–0.11183	–4.28	0.25302	2.31	13.95	3.32	–2.69	–6.49	3.09	1.78
All	Time window minutes available after the departure period, first simulated home-based tour	0.15927	2.57	0.01792	2.34	0.34536	3.24	42.67	3.07	–2.28	–18.42	3	1.74
All	Time window minutes available before the arrival period, later simulated home-based tour	–0.01883	–2.47	–0.05073	–5.48	–0.01719	–1.17	3.62	2.28	–4.18	–3.45	0.21	0.11
All	Time window minutes available after the departure period, later simulated home-based tour	0.0258	4.24	0.00135	0.19	0.03219	2.75	4.24	2.64	–4.02	–3.36	1.05	0.55
All	Remaining tours to simulate in the day divided by the total time window that would remain	–183.0939	–6.09	–190.2117	–7.13	–96.23658	–1.78	3.52	1.74	–0.24	–0.27	2.89	1.61
All	Remaining tours to simulate in the day divided by the largest coherent time window that would remain	–19.73042	–6.77	–11.73476	–3.16	–24.73102	–4.11	–3.5	–2.16	2.74	2.15	–1.72	–0.83
All	Remaining stop purposes to simulate divided by the window that would remain before the arrival period	–0.08639	–3.22	–0.26236	–4.77	–0.19526	–2.68	1.22	0.92	–6.56	–3.2	–4.06	–1.49
All	Remaining stop purposes to simulate divided by the window that would remain after the departure period	–0.1358	–3.26	–0.32397	–4.05	–0.142	–1.45	2.27	1.86	–4.51	–2.35	–0.15	–0.06
Depart 3–4 pm	Constant	0.42817	5.54	–0.15663	–1.48	0.04529	0.33	1.91	1.46	–7.56	–5.52	–4.95	–2.76

Table A.22. Other Home-Based-Tour Arrival and Departure Times Choice Model—Part 3

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		5946 –29997.3 0.2166 –0.0729		3006 –15255.6 0.229 –0.0215		1609 –8028.2 0.2385 –0.0347		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Arrival shift—Child age 5–15	0.02319	2.41	0.04027	2.6	0.01305	0.7	–1.76	–1.46	1.78	1.1	–1.05	–0.55
All	Duration shift—Child age 5–15	0.03224	1.48	–0.00862	–0.23	0.08498	2.36	2.49	2.6	–1.88	–1.09	2.43	1.46
All	Arrival shift—Child age 0–4	–0.00635	–0.6	–0.0063	cons	–0.0063	cons	cons	cons	0	cons	0	cons
All	Duration shift—Child age 0–4	0.04991	2.13	0.0499	cons	0.0499	cons	cons	cons	0	cons	0	cons
All	Arrival shift—escort tour	–0.01152	–1.77	0.01328	1.3	–0.03632	–2.44	–4.85	–3.34	3.8	2.42	–3.81	–1.67
All	Duration shift—escort tour	–0.56634	–10	–0.12331	–2.03	–0.2182	–2.21	–1.56	–0.96	7.82	7.28	6.15	3.52
All	Arrival shift—shopping tour	0.02458	3.75	0.01779	2.12	0.00119	0.1	–1.98	–1.35	–1.04	–0.81	–3.57	–1.91
All	Duration shift—shopping tour	0.08471	2.5	0.08207	2.17	0.10007	1.75	0.48	0.32	–0.08	–0.07	0.45	0.27
All	Arrival shift—meal tour	0.07416	7.84	0.08361	7.01	0.05569	3.44	–2.34	–1.72	1	0.79	–1.95	–1.14
All	Duration shift—meal tour	0.03202	0.83	–0.0151	–0.26	0.05945	0.75	1.28	0.94	–1.23	–0.81	0.71	0.35
All	Arrival shift—Social/recr. Tour	0.0277	4.34	0.0206	2.65	–0.00065	–0.05	–2.74	–1.75	–1.11	–0.91	–4.44	–2.34
All	Duration shift—Social/recr. Tour	0.13123	9.08	0.1432	5.97	0.14963	4.92	0.27	0.21	0.83	0.5	1.27	0.61
All	Arrival shift—First simulated tour, other tours in pattern for different purposes	0.02396	1.72	0.0247	1.39	0.05101	1.96	1.48	1.01	0.05	0.04	1.95	1.04
All	Duration shift—First simulated tour, other tours in pattern for different purposes	0.06339	1.02	–0.21626	–4.52	0.06109	0.6	5.8	2.72	–4.51	–5.85	–0.04	–0.02
All	Arrival shift—2nd or subsequent simulated tour, other tours in pattern for different purposes	–0.07494	–5.05	–0.0858	–4.26	–0.04577	–1.59	1.99	1.39	–0.73	–0.54	1.97	1.01
All	Duration shift—2nd or subsequent simulated tour, other tours in pattern for different purposes	–0.1023	–2.93	–0.31471	–7.58	–0.34329	–5.02	–0.69	–0.42	–6.09	–5.11	–6.91	–3.52
Duration less than 1 hr	Escort tour	1.65695	9.45	1.41275	6.62	1.37227	3.95	–0.19	–0.12	–1.39	–1.14	–1.62	–0.82
Duration less than 1 hr	Shopping tour	2.86342	12	1.90372	8.67	2.32849	6.19	1.93	1.13	–4.02	–4.37	–2.24	–1.42
Duration less than 1 hr	Meal tour	0.09184	0.38	–0.07033	–0.21	0.51851	1.05	1.77	1.2	–0.67	–0.49	1.76	0.87
Duration 1–2 hours	Shopping tour	1.8868	9.9	1.30497	7.3	1.58207	5.25	1.55	0.92	–3.05	–3.25	–1.6	–1.01
Duration 1–2 hours	Meal tour	0.76901	4.45	0.76698	3.17	1.23472	3.4	1.94	1.29	–0.01	–0.01	2.7	1.28
Arrive before 8 am	Shopping tour	–1.32565	–3.07	–1.67388	–3.77	–1.23011	–2.45	1	0.88	–0.81	–0.78	0.22	0.19
Arrive before 8 am	Meal tour	1.07362	2.98	0.64441	1.25	0	cons	–1.25	cons	–1.19	–0.83	–2.98	cons
Depart after 9 pm	Escort tour	0.10531	0.66	–0.17043	–0.53	0.00086	0	0.53	0.35	–1.72	–0.85	–0.65	–0.21
Depart after 9 pm	Shopping tour	–1.0572	–5.99	–0.94048	–3.43	–0.5401	–1.55	1.46	1.15	0.66	0.43	2.93	1.48
Depart after 9 pm	Meal tour	–0.66777	–3.86	–0.60847	–2.15	–0.6049	–1.44	0.01	0.01	0.34	0.21	0.36	0.15

Table A.23. Work-Based Sub-Tour Arrival and Departure Times Choice Model—Part 1

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		587 –2207.1 0.2395 2208.0801		106 –339.1 0.3628 0.1849		83 –275.2 0.3484 0.162		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
Arrive 3–6 am	Constant	–0.4519	cons	–0.4519	cons	–2.7619	cons	cons	cons	cons	cons	cons	cons
Arrive 6–7 am	Constant	–5	cons	–5	cons	–5	cons	cons	cons	cons	cons	cons	cons
Arrive 7–8 am	Constant	–0.2749	cons	–1.8841	cons	–2.2949	cons	cons	cons	cons	cons	cons	cons
Arrive 9–10 am	Constant	–0.4405	cons	–0.49237	–0.54	–1.51362	–1.5	–1.12	–1.01	cons	–0.06	cons	–1.06
Arrive 10 am–1 pm	Constant	–0.1867	cons	0.73738	1.82	–0.5972	–0.56	–3.29	–1.25	cons	2.28	cons	–0.38
Arrive 1–4 pm	Constant	–1.6032	cons	0	cons	–2.28882	–1.91	cons	–1.91	cons	cons	cons	–0.57
Arrive 4–7 pm	Constant	–2.6232	cons	–0.44976	–0.45	–2.38496	–1.12	–1.94	–0.91	cons	2.18	cons	0.11
Arrive 7–10 pm	Constant	–4.4149	cons	–16.71	cons	–7.4149	cons	cons	cons	cons	cons	cons	cons
Arrive 10 pm–3 am	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
Depart 3–7 am	Constant	2.515	cons	2.515	cons	2.515	cons	cons	cons	cons	cons	cons	cons
Depart 7–10 am	Constant	0.047	cons	3.47696	2.52	1.0576	0.58	–1.75	–1.32	cons	2.49	cons	0.55
Depart 10 am–1 pm	Constant	0.5978	cons	2.65547	2.91	1.59016	1.02	–1.17	–0.69	cons	2.25	cons	0.64
Depart 1–3 pm	Constant	0.622	cons	2.24208	3.02	2.45037	1.64	0.28	0.14	cons	2.18	cons	1.23
Depart 5–6 pm	Constant	0.0969	cons	0.0969	cons	0	cons	cons	cons	cons	cons	cons	cons
Depart 6–7 pm	Constant	0.1199	cons	0.1199	cons	0.1199	cons	cons	cons	cons	cons	cons	cons
Depart 7–9 pm	Constant	1.0428	cons	1.0428	cons	1.0428	cons	cons	cons	cons	cons	cons	cons
Depart 9–12 pm	Constant	2.1327	cons	2.1327	cons	2.1327	cons	cons	cons	cons	cons	cons	cons
Depart 12–3 am	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
Duration 0–1 hrs	Constant	0.3405	cons	3.28051	3.42	3.84464	2.21	0.59	0.32	cons	3.06	cons	2.02
Duration 1–2 hrs	Constant	0.7208	cons	1.92269	2.63	3.07652	1.99	1.58	0.75	cons	1.64	cons	1.52
Duration 3–5 hrs	Constant	–0.2508	cons	–1	cons	–1	cons	cons	cons	cons	cons	cons	cons
Duration 5–7 hrs	Constant	–5	cons	–5	cons	–5	cons	cons	cons	cons	cons	cons	cons
Duration 7–9 hrs	Constant	–5	cons	–5	cons	–5	cons	cons	cons	cons	cons	cons	cons
Duration 9–12 hrs	Constant	0.052	cons	0.052	cons	0.052	cons	cons	cons	cons	cons	cons	cons
Duration 12–14 hrs	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
Duration 14–18 hrs	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons

Table A.24. Work-Based Sub-Tour Arrival and Departure Times Choice Model—Part 2

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		587 –2207.1 0.2395 2208.0801		106 –339.1 0.3628 0.1849		83 –275.2 0.3484 0.162		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Arrival shift—part-time worker	0.0026	cons	–0.01737	–0.26	–0.1128	–0.67	–1.41	–0.57	cons	–0.29	cons	–0.69
All	Duration shift—part-time worker	0.1281	cons	–0.71597	–1.12	–0.41217	–0.4	0.48	0.29	cons	–1.32	cons	–0.52
All	Auto tours, auto path type log-sum during the outbound period	0.25	cons	0.25	cons	0.25	cons	cons	cons	cons	cons	cons	cons
All	Auto tours, auto path type log-sum during the return period	0.25	cons	0.25	cons	0.25	cons	cons	cons	cons	cons	cons	cons
All	Transit tours, transit path type log-sum during the outbound period	0.25	cons	0.25	cons	0.25	cons	cons	cons	cons	cons	cons	cons
All	Transit tours, transit path type log-sum during the return period	0.25	cons	0.25	cons	0.25	cons	cons	cons	cons	cons	cons	cons
All	Minutes still available to schedule in the arrival period	2	cons	–0.09746	–0.16	–0.68225	–0.75	–0.95	–0.64	cons	–3.41	cons	–2.93
All	Minutes still available to schedule in the departure period	2.0366	cons	–0.98541	–1.69	0.31175	0.33	2.23	1.37	cons	–5.18	cons	–1.82
All	Time window minutes available before the arrival period, first simulated home-based tour	0.1606	cons	0.10101	1.29	–0.20101	–1.79	–3.85	–2.69	cons	–0.76	cons	–3.22
All	Time window minutes available after the departure period, first simulated home-based tour	0.0665	cons	–0.03932	–0.56	–0.10453	–1.13	–0.93	–0.7	cons	–1.51	cons	–1.84
Depart 3–4 pm	Constant	0.622	cons	0.13975	0.17	2.18651	1.47	2.47	1.37	cons	–0.58	cons	1.05
All	Arrival shift—escort tour	0.1819	cons	0.20995	1.26	0.361	1.91	0.91	0.8	cons	0.17	cons	0.95
All	Duration shift—escort tour	–1.9103	cons	–0.90251	–0.88	–0.90552	–0.87	0	0	cons	0.99	cons	0.96
All	Arrival shift—shopping tour	0.0581	cons	0.02667	0.45	0.26796	3.19	4.08	2.87	cons	–0.53	cons	2.5
All	Duration shift—shopping tour	–0.8893	cons	0.16525	0.77	–1.06807	–2.05	–5.76	–2.37	cons	4.93	cons	–0.34
All	Arrival shift—meal tour	0.0473	cons	0.08715	1.43	0.15338	3.03	1.09	1.31	cons	0.65	cons	2.1
All	Duration shift—meal tour	–0.3517	cons	0.28328	1.58	–0.03033	–0.12	–1.75	–1.19	cons	3.54	cons	1.22
All	Arrival shift—social/recr. tour	0.15	cons	–0.04598	–0.64	0.38082	2.44	5.98	2.74	cons	–2.74	cons	1.48
All	Duration shift—social/recr. tour	–0.0377	cons	0.10413	0.31	–0.59679	–1	–2.07	–1.17	cons	0.42	cons	–0.93
All	Arrival shift—personal business tour	0.0162	cons	0.23573	1.75	0.13426	2.13	–0.75	–1.61	cons	1.63	cons	1.88
All	Duration shift—personal business tour	–0.2996	cons	0.31202	1.01	–0.37546	–0.9	–2.22	–1.65	cons	1.98	cons	–0.18

Table A.25. Intermediate-Stop Generation and Purpose Choice Model—Part 1

		Region						Difference					
Variables		**Sacramento**		**Tampa**		**Jacksonville**		**Jacksonville vs. Tampa**		**Tampa vs. Sacramento**		**Jacksonville vs. Sacramento**	
Number of observations		22879		7625		4370		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Final log-likelihood		–20444.2		–4988.3		–3231.8							
Rho-squared versus 0 coefficients		0.1115		0.2834		0.2238							
Rho-squared versus constants only		–0.137		–0.1457		–0.1221							
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
no more stops	two simulated trips in half tour * 1st half tour	0.42649	7.19	0.12878	1.31	0.41268	3.18	2.89	2.18	–5.02	–3.03	–0.23	–0.11
no more stops	three simulated trips in half tour * 1st half tour	0.5297	6.15	0.16885	1.22	0.39572	2.09	1.64	1.2	–4.19	–2.6	–1.56	–0.71
no more stops	four simulated trips in half tour * 1st half tour	0.75025	5.78	0.48504	2.4	0.84436	3.11	1.77	1.32	–2.04	–1.31	0.73	0.35
no more stops	five simulated trips in half tour * 1st half tour	0.75194	3.69	0.4984	1.68	0.97441	2.22	1.6	1.08	–1.24	–0.85	1.09	0.51
no more stops	two simulated trips in half tour * 2nd half tour	0.75835	15.2	0.55446	4.77	0.57713	4.43	0.2	0.17	–4.09	–1.76	–3.63	–1.39
no more stops	three simulated trips in half tour * 2nd half tour	0.99548	14.42	0.83042	4.83	0.79623	4.32	–0.2	–0.19	–2.39	–0.96	–2.89	–1.08
no more stops	four simulated trips in half tour * 2nd half tour	0.95329	9.52	1.05947	3.86	1.3538	4.72	1.07	1.03	1.06	0.39	4	1.4
no more stops	five simulated trips in half tour * 2nd half tour	1.04284	7.22	1.33401	2.96	2.12827	3.43	1.76	1.28	2.02	0.65	7.52	1.75
no more stops	# home-based tours in pattern	0.32698	7.29	0.38971	3.79	0.10611	0.96	–2.76	–2.56	1.4	0.61	–4.93	–1.99
no more stops	# tours already simulated	–0.04974	–0.71	0.14261	0.93	0.63226	3.56	3.2	2.76	2.73	1.26	9.68	3.84
no more stops	not a home-based tour	0.97584	8.92	0.77327	2.3	0.86729	2.5	0.28	0.27	–1.85	–0.6	–0.99	–0.31
no more stops	stop is before mandatory destination	0.17428	2.47	0.08664	0.55	0.11918	0.66	0.21	0.18	–1.24	–0.55	–0.78	–0.3
no more stops	non-auto tour * IntersectionDensityRatio * LN(Buffer 1 retail, service empl.)	0.10621	4.89	0.38761	5.33	0.11717	1.62	–3.72	–3.74	12.94	3.87	0.5	0.15
no more stops	transit tour	–0.86773	–5.29	–1.24316	–2.12	–0.23608	–0.3	1.71	1.26	–2.29	–0.64	3.85	0.79
work stop	work or school tour	–3.35946	–12.22	–1.80163	–3.25	–3.02729	–4.32	–2.21	–1.75	5.67	2.81	1.21	0.47
school stop	work or school tour	–0.91028	–1.52	–8.40972	–2.07	–2.55124	–1.06	1.44	2.44	–12.53	–1.85	–2.74	–0.68
escort stop	work or school tour	–1.36681	–6.95	–2.24977	–4.2	–1.8778	–3.16	0.69	0.63	–4.49	–1.65	–2.6	–0.86
personal business stop	work or school tour	–0.91193	–7.54	–2.36603	–6.13	–2.19351	–4.31	0.45	0.34	–12.03	–3.77	–10.6	–2.52
shopping stop	work or school tour	–0.51006	–4.56	–1.78191	–8.02	–1.40118	–5.43	1.71	1.48	–11.38	–5.73	–7.97	–3.46
meal stop	work tour	–2.08553	–12.05	–2.63979	–7.68	–2.49209	–5.79	0.43	0.34	–3.2	–1.61	–2.35	–0.94
social/rec stop	work or school tour	–0.96266	–6.43	–2.08764	–6.25	–1.44943	–3.67	1.91	1.61	–7.51	–3.37	–3.25	–1.23
no more stops	school tour	0.14939	2.56	0.48828	2.11	0.17757	0.96	–1.34	–1.69	5.81	1.46	0.48	0.15
meal stop	school tour	–1.67372	–7.38	–1.93159	–3.23	–2.55747	–3.78	–1.05	–0.93	–1.14	–0.43	–3.9	–1.31
escort stop	escort tour	–1.88266	–8.59	–2.65019	–4.51	–2.19915	–3.22	0.77	0.66	–3.5	–1.31	–1.44	–0.46
personal business stop	escort tour	–1.12018	–7.28	–2.11304	–4.73	–2.1484	–3.57	–0.08	–0.06	–6.46	–2.22	–6.68	–1.71
shopping stop	escort tour	–0.64615	–4.4	–1.75604	–6.51	–1.3976	–4.34	1.33	1.11	–7.55	–4.12	–5.11	–2.33
meal stop	escort tour	–2.0029	–8.68	–2.56293	–5.54	–2.54118	–4.33	0.05	0.04	–2.43	–1.21	–2.33	–0.92
social/rec stop	escort tour	–1.02595	–5.38	–1.58528	–4	–1.59203	–3.1	–0.02	–0.01	–2.94	–1.41	–2.97	–1.1
personal business stop	pers. bus. tour	–1.15631	–8.4	–2.33676	–5.82	–2.40488	–4.45	–0.17	–0.13	–8.58	–2.94	–9.07	–2.31
shopping stop	pers. bus. tour	–0.64916	–5.08	–2.29905	–9.55	–1.56665	–5.7	3.04	2.66	–12.91	–6.86	–7.18	–3.34
meal stop	pers. bus. tour	–2.18128	–10.26	–3.16272	–6.6	–2.90039	–4.97	0.55	0.45	–4.61	–2.05	–3.38	–1.23
social/rec stop	pers. bus. tour	–1.66243	–7.99	–1.77695	–3.99	–2.59461	–4.62	–1.83	–1.45	–0.55	–0.26	–4.48	–1.66
personal business stop	shopping tour	–1.23584	–8.77	–2.43835	–6.02	–2.27766	–4.15	0.4	0.29	–8.54	–2.97	–7.39	–1.9

(continued on next page)

Table A.25. Intermediate-Stop Generation and Purpose Choice Model—Part 1 (continued)

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		22879 –20444.2 0.1115 –0.137		7625 –4988.3 0.2834 –0.1457		4370 –3231.8 0.2238 –0.1221		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
shopping stop	shopping tour	–0.32343	–2.57	–1.52359	–6.9	–1.19811	–4.59	1.47	1.25	–9.52	–5.43	–6.94	–3.35
meal stop	shopping tour	–2.32428	–10.04	–3.08128	–7.09	–2.91841	–5.28	0.37	0.29	–3.27	–1.74	–2.57	–1.08
social/rec stop	shopping tour	–1.65789	–7.62	–1.82438	–4.83	–1.67374	–3.6	0.4	0.32	–0.77	–0.44	–0.07	–0.03
personal business stop	meal tour	–1.30462	–8.12	–2.17553	–5.18	–2.25232	–4.03	–0.18	–0.14	–5.42	–2.07	–5.9	–1.69
shopping stop	meal tour	–0.50322	–3.45	–1.98538	–7.61	–1.52359	–5	1.77	1.51	–10.16	–5.68	–6.99	–3.35
meal stop	meal tour	–4.83327	–7.71	–3.76037	–5.71	–3.1249	–4.15	0.97	0.84	1.71	1.63	2.73	2.27
social/rec stop	meal tour	–1.52893	–6.91	–1.84646	–3.68	–1.88704	–3.65	–0.08	–0.08	–1.44	–0.63	–1.62	–0.69

Table A.26. Intermediate-Stop Generation and Purpose Choice Model—Part 2

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations		22879		7625		4370		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Final log-likelihood		–20444.2		–4988.3		–3231.8							
Rho-squared versus 0 coefficients		0.1115		0.2834		0.2238							
Rho-squared versus constants only		–0.137		–0.1457		–0.1221							
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
personal business stop	social/recr. tour	–1.34867	–8.98	–2.34313	–5.71	–2.71375	–4.96	–0.9	–0.68	–6.62	–2.42	–9.09	–2.5
shopping stop	social/recr. tour	–0.55978	–4.17	–1.90826	–8.21	–1.55765	–5.58	1.51	1.26	–10.05	–5.8	–7.44	–3.57
meal stop	social/recr. tour	–2.12047	–9.64	–2.54245	–6.11	–2.77974	–4.96	–0.57	–0.42	–1.92	–1.01	–3	–1.18
social/rec stop	social/recr. tour	–1.10856	–6.4	–1.49491	–4.58	–1.39793	–3.32	0.3	0.23	–2.23	–1.18	–1.67	–0.69
work stop	1st half tour	1.0361	6.3	0.41863	1.2	1.00677	2.52	1.69	1.47	–3.75	–1.78	–0.18	–0.07
school stop	1st half tour	0.49618	1.41	4.60198	2.22	1.26771	1.52	–1.61	–4	11.67	1.98	2.19	0.93
escort stop	1st half tour	–0.2394	–2.43	1.4819	5.68	1.02893	3.3	–1.74	–1.45	17.46	6.6	12.87	4.06
personal business stop	1st half tour	0.14182	2.19	1.4204	7.98	0.91268	4.24	–2.85	–2.36	19.7	7.18	11.88	3.58
shopping stop	1st half tour	–0.66114	–10.25	1.34221	12.27	0.70734	5.47	–5.8	–4.91	31.07	18.31	21.22	10.59
meal stop	1st half tour	–0.18745	–1.89	1.07769	5.53	0.65067	2.81	–2.19	–1.84	12.77	6.49	8.46	3.62
social/rec stop	1st half tour	–0.29525	–3.07	0.75151	4.01	0.84067	3.56	0.48	0.38	10.89	5.58	11.82	4.8
work stop	# of simulated work stops	0.93398	1.84	1.65023	1.27	1.71892	3.23	0.05	0.13	1.41	0.55	1.55	1.48
school stop	# of simulated school stops	–5	cons	–5	cons	–5	cons	cons	cons	cons	cons	cons	cons
escort stop	# of simulated escort stops	–0.46211	–1.38	0	cons	–0.4621	cons	cons	cons	1.38	cons	0	cons
personal business stop	# of simulated pers bus stops	–0.86144	–3.92	–1.15732	–1.08	–0.8614	cons	0.28	cons	–1.35	–0.28	0	cons
shopping stop	# of simulated shopping stops	–1.81255	–4.92	–1.3777	–2.13	–1.89214	–1.77	–0.8	–0.48	1.18	0.67	–0.22	–0.07
meal stop	# of simulated meal stops	–2.15229	–4.57	–1.92196	–1.81	–2.1523	cons	–0.22	cons	0.49	0.22	0	cons
social/rec stop	# of simulated social/recr. stops	–1.64865	–2.78	–0.57004	–0.54	–1.6486	cons	–1.02	cons	1.82	1.02	0	cons
work stop	1 or more simulated work stops	–1.38945	–2.1	–0.1471	–0.1	0	cons	0.1	cons	1.88	0.86	2.1	cons
work stop	# of remaining tours to be simulated	0.1198	1.41	0.11559	0.68	–0.25228	–1.05	–2.17	–1.53	–0.05	–0.02	–4.39	–1.55
school stop	# of remaining tours to be simulated	–0.06087	–0.27	0.72708	2.02	0.43016	0.78	–0.83	–0.54	3.46	2.19	2.16	0.89
escort stop	# of remaining tours to be simulated	0.06188	1.06	0.33802	2.4	–0.18078	–0.93	–3.68	–2.68	4.72	1.96	–4.15	–1.25
personal business stop	# of remaining tours to be simulated	–0.10669	–1.88	0.15755	1.12	–0.54478	–2.89	–5	–3.72	4.65	1.88	–7.71	–2.32
shopping stop	# of remaining tours to be simulated	–0.14998	–2.57	0.04367	0.37	–0.38854	–2.9	–3.69	–3.23	3.31	1.65	–4.08	–1.78
meal stop	# of remaining tours to be simulated	–0.17909	–2.28	0.03805	0.25	–0.5356	–2.52	–3.77	–2.7	2.77	1.43	–4.54	–1.68
social/rec stop	# of remaining tours to be simulated	–0.19213	–2.65	–0.19588	–1.17	–0.47651	–2.42	–1.67	–1.42	–0.05	–0.02	–3.92	–1.44
work stop	duration of tour time window	0.21578	10.54	0.03962	0.96	0.15684	3.11	2.84	2.32	–8.6	–4.26	–2.88	–1.17
school stop	duration of tour time window	0.17361	3.46	0.45209	1.63	0.14851	0.69	–1.1	–1.42	5.55	1.01	–0.5	–0.12
escort stop	duration of tour time window	0.01538	1.58	–0.02112	–0.86	0.05327	1.7	3.01	2.37	–3.75	–1.48	3.9	1.21
personal business stop	duration of tour time window	0.07501	10.85	0.03405	1.89	0.02613	1.14	–0.44	–0.35	–5.92	–2.28	–7.07	–2.13
shopping stop	duration of tour time window	0.07335	10.32	0.04912	4.23	0.03528	2.57	–1.19	–1.01	–3.41	–2.08	–5.36	–2.77
meal stop	duration of tour time window	0.09398	8.32	0.05775	2.79	0.04953	1.87	–0.4	–0.31	–3.21	–1.75	–3.94	–1.68
social/rec stop	duration of tour time window	0.10968	10.32	0.06537	3.23	0.03023	1.18	–1.74	–1.37	–4.17	–2.19	–7.48	–3.1

Table A.27. Intermediate-Stop Generation and Purpose Choice Model—Part 3

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		22879 –20444.2 0.1115 –0.137		7625 –4988.3 0.2834 –0.1457		4370 –3231.8 0.2238 –0.1221		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
work stop	from9AMto11AM + from11AMto1PM + from1PMto3PM + from3PMto5PM	1.15435	7.93	1.26115	3.81	0.98811	2.83	–0.82	–0.78	0.73	0.32	–1.14	–0.48
school stop	from7AMto9AM + from7PMto9PM + from9PMto11PM + from11PMto7AM	–0.89256	–1.73	0.60927	0.46	–0.23834	–0.17	–0.63	–0.62	2.91	1.12	1.27	0.48
escort stop	from7AMto9AM	0.53133	4.91	0.17482	0.61	0.20999	0.61	0.12	0.1	–3.29	–1.24	–2.97	–0.93
escort stop	from9AMto11AM + from11AMto1PM + from1PMto3PM + from3PMto5PM	0.44954	5.03	0.21316	0.82	0.06213	0.21	–0.58	–0.5	–2.65	–0.91	–4.34	–1.29
personal business stop	from7AMto9AM + from7PMto9PM + from9PMto11PM + from11PMto7AM	–0.40669	–4.25	–0.12282	–0.41	0.55979	1.35	2.25	1.65	2.97	0.94	10.11	2.33
personal business stop	from9AMto11AM + from11AMto1PM + from1PMto3PM + from3PMto5PM	0.62764	8.28	0.57209	2.35	1.21628	3.29	2.65	1.74	–0.73	–0.23	7.77	1.59
shopping stop	from7AMto9AM + from9PMto11PM + from11PMto7AM	–0.61176	–6.37	–0.83874	–4.42	–0.60608	–2.81	1.23	1.08	–2.36	–1.2	0.06	0.03
shopping stop	from11AMto1PM + from1PMto3PM + from3PMto5PM	0.29503	5.41	0.28913	3.33	0.61042	5.35	3.7	2.82	–0.11	–0.07	5.78	2.76
meal stop	from7AMto9AM + from11PMto7AM	–1.1368	–5.49	–0.21706	–0.81	–1.49495	–2.98	–4.78	–2.54	4.44	3.44	–1.73	–0.71
meal stop	from11AMto1PM + from1PMto3PM	0.80188	8.59	0.37534	1.99	0.62865	2.73	1.34	1.1	–4.57	–2.26	–1.86	–0.75
meal stop	from7PMto9PM	0.53036	3.3	0.1569	0.44	0.25569	0.67	0.28	0.26	–2.32	–1.04	–1.71	–0.72
social/rec stop	from7AMto9AM + from11PMto7AM	–0.48534	–3.41	–1.29562	–3.08	–1.02842	–2.5	0.63	0.65	–5.69	–1.92	–3.81	–1.32
social/rec stop	from11AMto1PM + from1PMto3PM + from3PMto5PM	0.21933	2.56	0.06384	0.36	0.34923	1.6	1.6	1.3	–1.81	–0.87	1.52	0.59
work stop	adult Male	0.47838	4.16	0.20701	0.86	0.2685	1	0.26	0.23	–2.36	–1.13	–1.82	–0.78
escort stop	adult Female w/children in HH	0.14237	2.08	–0.36203	–1.68	–0.11844	–0.49	1.13	1.01	–7.35	–2.34	–3.8	–1.08
escort stop	hov2 Tour	1.16615	7.61	0.74918	1.92	–0.00348	–0.01	–1.93	–1.61	–2.72	–1.07	–7.63	–2.5
escort stop	hov3 Tour	1.59405	10.44	0.87496	2.18	0.47023	1.06	–1.01	–0.91	–4.71	–1.79	–7.36	–2.53
personal business stop	one Person Household	0.04542	0.63	–0.1286	–0.67	–0.22158	–0.73	–0.48	–0.31	–2.4	–0.9	–3.68	–0.88
personal business stop	hov2 Tour	0.14396	2.37	0.23441	1.41	0.10996	0.52	–0.75	–0.59	1.49	0.54	–0.56	–0.16
personal business stop	hov3 Tour	0.21876	2.87	0.13865	0.58	0.27629	1.07	0.58	0.53	–1.05	–0.34	0.75	0.22
shopping stop	adult Female w/children in HH	0.11427	1.69	–0.02394	–0.16	0.20478	1.38	1.54	1.54	–2.04	–0.93	1.34	0.61
shopping stop	hov2 Tour	0.24912	4.2	0.07959	0.86	0.03337	0.29	–0.5	–0.4	–2.86	–1.84	–3.63	–1.85
shopping stop	hov3 Tour	0.25694	3.38	–0.24612	–1.61	–0.0193	–0.12	1.49	1.36	–6.61	–3.3	–3.63	–1.66
meal stop	one Person Household	0.1253	0.96	0.07126	0.29	0.09306	0.28	0.09	0.07	–0.41	–0.22	–0.25	–0.1
meal stop	hov2 Tour	0.51645	4.77	0.414	2.03	0.14633	0.59	–1.31	–1.09	–0.95	–0.5	–3.42	–1.5
meal stop	hov3 Tour	0.61578	4.93	0.43594	1.81	0.35185	1.23	–0.35	–0.29	–1.44	–0.75	–2.11	–0.92
meal stop	partTimeWorker or retiredAdult or drivingAgeStudent	0.0227	0.21	–0.1297	–0.54	0.18273	0.62	1.3	1.06	–1.44	–0.64	1.51	0.54
meal stop	nonworkingAdult or childAge5Through15 or childUnder5	–0.12468	–1.01	–0.28781	–1.03	0.20519	0.66	1.77	1.58	–1.32	–0.59	2.67	1.06
social/rec stop	hov2 Tour	0.29394	2.99	0.22403	1.03	–0.27656	–1.05	–2.29	–1.9	–0.71	–0.32	–5.8	–2.17
social/rec stop	hov3 Tour	0.35279	3.41	0.57004	2.54	0.55997	2.16	–0.04	–0.04	2.1	0.97	2	0.8
school stop	one Simulated Trip in half tour	–1.3902	–4.76	0.6383	0.76	0.49352	0.69	–0.17	–0.2	6.94	2.42	6.45	2.64
escort stop	one Simulated Trip in half tour	0.31366	4.38	0.65935	3.32	0.5841	2.45	–0.38	–0.32	4.83	1.74	3.78	1.13
meal stop	one Simulated Trip in half tour	0.61851	6.63	0.59523	3.17	0.81975	3.5	1.2	0.96	–0.25	–0.12	2.16	0.86

Table A.28. Intermediate-Stop Destination Choice Model—Part 1

Variables	Region						Difference					
	Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only	8018 –12287.9 0.603 0.3932		1487 –2428.5 0.5727 0.4854		1062 –2342.3 0.4165 0.2395		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
sampling adjustment factor	1	cons	1	cons	1	cons	cons	cons	cons	cons	cons	cons
ln(traveltime/availableWindow)	1.82314	4.23	0.22757	0.77	4.25642	2.81	13.62	2.66	–3.7	–5.4	5.64	1.61
gtim: generalized time	–14.04705	–27.24	–10.27226	–11.92	–11.11201	–7.33	–0.97	–0.55	7.32	4.38	5.69	1.94
gtis: gtim squared	13.70363	10.59	7.01676	5.68	4.80623	1.46	–1.79	–0.67	–5.17	–5.41	–6.88	–2.7
gtic: gtim cubed	–5.19458	–6.97	–1.96231	–3.45	–0.94867	–0.61	1.78	0.66	4.34	5.69	5.7	2.75
disc: distance cubed (100s of miles up to .5 cubed)	–9.26105	–2.83	–10	cons	0.09923	0.01	cons	1.17	–0.23	cons	2.86	1.09
prxs = travel minutes from stop origin	0.09198	7.89	0.0816	2.47	0.0724	2.19	–0.28	–0.28	–0.89	–0.31	–1.68	–0.59
prxo = travel minutes from tour origin	0.17812	12.37	0.05085	1.25	0.13996	3.24	2.19	2.06	–8.84	–3.12	–2.65	–0.88
HH has LowIncome	0.43208	1.96	0.6091	1.53	1.18916	1.65	1.46	0.81	0.8	0.45	3.44	1.05
HH has 100KPlusIncome	–1.08711	–2.79	–0.14573	–0.27	0.54205	0.66	1.3	0.84	2.41	1.77	4.18	1.98
HH has MissingIncome	0.67149	1.15	0.72623	1.27	–0.30497	–0.23	–1.8	–0.79	0.09	0.1	–1.67	–0.75
fkid * gtim	–1.07199	–3.28	–0.33615	–0.61	1.1432	1.39	2.69	1.8	2.25	1.34	6.79	2.7
nonwprk tour * gtim	–0.43799	–1.79	–0.32356	–0.7	–0.21152	–0.24	0.24	0.13	0.47	0.25	0.92	0.25
notFirst * prxs	0.08036	6.8	0.04658	1.34	0.08844	2.69	1.21	1.27	–2.86	–0.97	0.68	0.25
tour is not HomeBasedTour * prxo	–0.17187	–3.16	0.23481	1.33	–0.18421	–0.55	–2.37	–1.26	7.48	2.3	–0.23	–0.04
tour is SchoolPurpose * prxo	0.03778	1.7	0.07949	0.52	0.06456	0.51	–0.1	–0.12	1.88	0.27	1.21	0.21
bman * prxo	0.07647	3.82	0.25243	3.61	0.13805	2.04	–1.64	–1.69	8.79	2.52	3.08	0.91
tour is AnHovMode * prxs	0.03926	3.15	0.03582	0.99	–0.06818	–2.08	–2.86	–3.17	–0.28	–0.09	–8.63	–3.28
tour is AnHovMode * prxo	–0.06937	–3.87	0.14325	2.43	–0.1715	–2.8	–5.34	–5.14	11.87	3.61	–5.7	–1.67
tour is AnAutoMode * n134Q	–0.00737	–10.39	0.00029	0.22	–0.00236	–1.41	–1.97	–1.59	10.81	5.69	7.07	3
tour is SovMode * ParkingHourlyEmploymentCommercialMixBuffer1()	–0.34433	–2.76	–47.81963	–2.9	–1.65915	–3.08	2.8	85.7	–380.7	–2.88	–10.54	–2.44
tour is AnAutoMode * ParkingHourlyEmploymentCommercialMixInParcel()	1.1504	4.35	–0.39799	–0.17	0	cons	0.17	cons	–5.86	–0.67	–4.35	cons
tour is not AnAutoMode * gtim	2.99087	2.1	0.10269	0.02	2.60094	0.51	0.6	0.49	–2.03	–0.7	–0.27	–0.08
tour is not AnAutoMode * gtis	–4.04482	–1.5	1.46637	0.23	–3.15155	–0.31	–0.72	–0.46	2.04	0.86	0.33	0.09
tour is not AnAutoMode * gtic	1.80088	1.39	–0.60551	–0.24	2.42885	0.56	1.22	0.7	–1.86	–0.97	0.49	0.15
tour IsWalkMode * prxs	–0.11135	–1.22	–0.21917	–0.58	0	cons	0.58	cons	–1.19	–0.28	1.22	cons
not tour IsAnAutoMode * prxo	0.00918	0.17	0.16428	1.12	0.51549	3.04	2.39	2.07	2.89	1.05	9.44	2.98
tour IsBikeMode * prxo	–0.15561	–1.79	–0.1556	cons	–0.18725	–0.76	cons	–0.13	0	cons	–0.36	–0.13
tour IsWalkMode * prxo	–0.13429	–1.13	–0.14264	–0.63	0	cons	0.63	cons	–0.07	–0.04	1.13	cons
tour IsTransitMode * walk and transit unavailable on one leg	–0.81273	–1.45	1.79006	1.34	–2.0661	–0.42	–2.89	–0.78	4.65	1.95	–2.24	–0.25
tour IsTransitMode * walk and transit unavailable on both legs	–3.23707	–3.97	0	cons	0	cons	cons	cons	3.97	cons	3.97	cons
workOrSchool Stop * gtim	2.07294	6.39	0.71213	0.96	2.70621	2.41	2.7	1.78	–4.2	–1.84	1.95	0.56
personal Stop * UniversityStudent * LN (StudentsUniversityBuffer1 + 1)	0.06795	1.64	0.09584	0.45	–1.77911	–0.6	–8.75	–0.63	0.68	0.13	–44.71	–0.62
work Stop * LN (EmploymentTotalBuffer1 + 1)	0.18052	4.71	0.21422	1.89	0.34592	3.36	1.16	1.28	0.88	0.3	4.32	1.6

(continued on next page)

Table A.28. Intermediate-Stop Destination Choice Model—Part 1 (continued)

	Region						Difference					
Variables	**Sacramento**		**Tampa**		**Jacksonville**		**Jacksonville vs. Tampa**		**Tampa vs. Sacramento**		**Jacksonville vs. Sacramento**	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only	8018 –12287.9 0.603 0.3932		1487 –2428.5 0.5727 0.4854		1062 –2342.3 0.4165 0.2395		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
work Stop * LN (StudentsK12Buffer1 + 1)	–0.04003	–1.61	–0.12808	–1.78	0.0378	0.63	2.31	2.76	–3.54	–1.23	3.13	1.3
escort stop HH with kids * gtim	–1.83826	–3.51	–2.69657	–1.84	–8.63773	–3.17	–4.06	–2.18	–1.64	–0.59	–12.97	–2.5
escort stop HH with kids * prxs	–0.18325	–6.59	–0.06992	–0.44	–0.1315	–1.09	–0.39	–0.51	4.07	0.72	1.86	0.43
escort stop HH no kids * prxo	0.05356	1.43	–0.08341	–0.44	0.13831	1.47	1.17	2.36	–3.65	–0.72	2.26	0.9
escort stop HH with kids * prxo	0.11486	4.79	0.13428	0.92	–0.21021	–1.51	–2.36	–2.47	0.81	0.13	–13.56	–2.33
escort stop HH with kids * LN (EmploymentIndustrial&Construction Buffer1 + 1)	–0.23735	–8.51	0.05373	0.48	–0.18018	–1.97	–2.09	–2.55	10.43	2.61	2.05	0.62
escort stop HH with kids * LN (StudentsK12Buffer1 + 1)	0.22077	9.38	0.17059	2.64	0.28258	4.05	1.73	1.61	–2.13	–0.78	2.63	0.89
escort stop HH no kids * LN (EmploymentTotalBuffer1 + 1)	–0.1056	–2.43	–0.13132	–0.87	0.04538	0.31	1.18	1.21	–0.59	–0.17	3.48	1.04
escort stop HH no kids * LN (StudentsK12Buffer1 + 1)	0.07777	2.5	0.02977	0.4	0.02168	0.2	–0.11	–0.07	–1.55	–0.65	–1.81	–0.51

Table A.29. Intermediate-Stop Destination Choice Model—Part 2

Variables	Region						Difference					
	Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only	8018 –12287.9 0.603 0.3932		1487 –2428.5 0.5727 0.4854		1062 –2342.3 0.4165 0.2395		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
pers.business Stop * LN (EmploymentMedicalBuffer1 + 1)	0.12123	6.16	0.22517	2.22	0.41531	6.08	1.87	2.78	5.28	1.02	14.95	4.3
pers.business Stop * LN (EmploymentFoodBuffer1 + 1)	0.1498	5.48	0.17723	2.43	0.13573	1.47	–0.57	–0.45	1	0.38	–0.51	–0.15
pers.business Stop * LN (EmploymentRetailBuffer1 + 1)	–0.11689	–3.69	–0.1603	–1.35	–0.22362	–1.99	–0.53	–0.56	–1.37	–0.37	–3.37	–0.95
shopping Stop * gtim	–2.14897	–6.79	–1.20482	–3.22	–2.05458	–2.58	–2.27	–1.07	2.98	2.52	0.3	0.12
shoppingStopOnShopTour * prxs	–0.07173	–3.33	–0.02624	–0.67	0.03637	0.9	1.59	1.55	2.11	1.16	5.01	2.68
shopping Stop * LN (EmploymentRetailBuffer1 + 1)	0.38017	15.99	0.44985	10.25	0.48393	10.17	0.78	0.72	2.93	1.59	4.37	2.18
meal Stop * gtim	–1.5267	–3.35	–0.15607	–0.28	–3.19346	–2.28	–5.49	–2.17	3.01	2.48	–3.66	–1.19
meal Stop * LN (EmploymentFoodBuffer1 + 1)	0.17035	4.41	0.54212	5.91	0.24377	2.58	–3.25	–3.16	9.63	4.05	1.9	0.78
social/recr Stop * gtim	0.8289	2.8	–0.10225	–0.21	–0.46931	–0.57	–0.74	–0.44	–3.15	–1.87	–4.39	–1.57
social/recr Stop * LN (EmploymentFoodBuffer1 + 1)	0.06856	1.67	0.11613	1.32	0.29311	2.77	2.01	1.67	1.16	0.54	5.48	2.12
social/recr Stop * LN (EmploymentIndustrial&ConstructionBuffer1 + 1)	–0.21158	–4.35	0.49469	4.1	–0.09091	–0.77	–4.85	–4.99	14.53	5.86	2.48	1.03
social/recr Stop * LN (EmploymentServiceBuffer1 + 1)	0.17753	2.67	–0.12675	–1.17	0.22754	1.48	3.27	2.31	–4.57	–2.81	0.75	0.33
social/recr Stop * LN (EmploymentTotalBuffer1 + 1)	0.57042	7.55	0.21634	3.14	0.26182	1.57	0.66	0.27	–4.69	–5.14	–4.08	–1.85
social/recr Stop * LN (HouseholdsBuffer1 + 1)	–0.67778	–12	–0.8094	–6.59	–0.59222	–5.01	1.77	1.84	–2.33	–1.07	1.52	0.72
log size function coefficient (subsequent coefficients are for size variables)	0.18791	17.99	0.13469	23.68	0.16241	18.41	4.87	3.14	–5.1	–9.36	–2.44	–2.89
work Stop * (EmploymentGovernment + Office + Education)	0	cons	0	cons	0	cons						
work Stop * EmploymentTotal	–1.72562	–2.75	0	cons	1.37425	0.13	cons	0.13	2.75	cons	4.93	0.3
child under 15 on school stop * (EmploymentGovernment + Office + Education)	–9.33362	–2.51	–30	cons	–9.3336	cons	cons	cons	–5.57	cons	0	cons
child under 15 on school stop * (StudentsK8 + StudentsHighSchool)	0	cons	0	cons	0	cons						
driving age child on school stop * (EmploymentGovernment + Office + Education)	–5.75428	–1.54	–30	cons	–5.7543	cons	cons	cons	–6.51	cons	0	cons
driving age child on school stop * (StudentsK8 + StudentsHighSchool)	0	cons	0	cons	0	cons						
not child driving age or younger, on school stop * (Employment Government + Office + Educ)	–17.01747	–5.67	0	cons	–20.66102	–2.36	cons	–2.36	5.67	cons	–1.21	–0.42
not child driving age or younger, on school stop * StudentsUniversity	0	cons	0	cons	0	cons						

Table A.30. Intermediate-Stop Destination Choice Model—Part 3

Variables	Region						Difference					
	Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only	8018 –12287.9 0.603 0.3932		1487 –2428.5 0.5727 0.4854		1062 –2342.3 0.4165 0.2395		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
escort stop HH with kids * (StudentsK8 + StudentsHighSchool)	0	cons	0	cons	0	cons						
escort stop HH with kids * EmploymentTotal	–3.21687	–4.2	–20.16234	–9.52	–2.75109	–1.18	8.22	7.48	–22.1	–8	0.61	0.2
escort stop HH with kids * Households	–30.39025	–13.74	–30	cons	–30.3903	cons	cons	cons	0.18	cons	0	cons
escort stop HH no kids * EmploymentTotal	0	cons	0	cons	0	cons						
escort stop HH no kids * (StudentsK8 + StudentsHighSchool)	–7.12515	–1.87	12.78011	3.3	–7.1252	cons	–5.14	cons	5.21	5.14	0	cons
escort stop HH no kids * Households	–30.14553	–13.1	–30	cons	–28.95289	–6.65	cons	0.24	0.06	cons	0.52	0.27
pers.business Stop * EmploymentFood	–17.6099	–7.9	–30	cons	–17.6099	cons	cons	cons	–5.56	cons	0	cons
pers.business Stop * (EmploymentIndustrial &Construction)	–19.06402	–11.05	–30	cons	–15.13727	–4.03	cons	3.95	–6.34	cons	2.28	1.04
pers.business Stop * EmploymentMedical	–3.62285	–3.91	4.01899	1.65	–0.65541	–0.36	–1.92	–2.6	8.24	3.15	3.2	1.65
pers.business Stop * (EmploymentGovernment + Office + Education)	–13.30079	–13.39	5.12519	1.37	–17.88648	–3.43	–6.16	–4.42	18.55	4.94	–4.62	–0.88
pers.business Stop * EmploymentRetail	–0.50241	–1.4	11.94429	5.06	5.02555	2.56	–2.93	–3.52	34.56	5.27	15.35	2.82
pers.business Stop * EmploymentService	0	cons	0	cons	0	cons						
pers.business Stop * Households	–27.87342	–16.12	–30	cons	–27.8734	cons	cons	cons	–1.23	cons	0	cons
shopping Stop * EmploymentRetail	0	cons	0	cons	0	cons						
shopping Stop * EmploymentService	–18.02249	–12.08	–30	cons	–9.29847	–6.8	cons	15.15	–8.03	cons	5.85	6.38
shopping Stop * EmploymentTotal	–18.72634	–16.54	–23.76755	–15.59	–15.76702	–11.51	5.25	5.84	–4.45	–3.31	2.61	2.16
shopping Stop * Households	–38.21024	–6.67	–30	cons	–38.2102	cons	cons	cons	1.43	cons	0	cons
meal Stop * EmploymentFood	0	cons	0	cons	0	cons						
meal Stop * EmploymentTotal	–22.11866	–15.48	–30	cons	–21.50977	–8.79	cons	3.47	–5.52	cons	0.43	0.25
meal Stop * Households	–38.58772	–6.7	–30	cons	–38.5877	cons	cons	cons	1.49	cons	0	cons
social/recr Stop * EmploymentFood	–2.97865	–1.43	–30	cons	8.13816	0.93	cons	4.34	–12.95	cons	5.33	1.27
social/recr Stop * EmploymentMedical	–30	cons	–30	cons	–30	cons	cons	cons	cons	cons	cons	cons
social/recr Stop * EmploymentService	0	cons	0	cons	0	cons						
social/recr Stop * EmploymentTotal	–12.33962	–6.03	–13.53027	–1.87	–0.18135	–0.02	1.85	1.5	–0.58	–0.16	5.94	1.37
social/recr Stop * OpenSpaceType2Buffer1 > 0	–80	cons	–30	cons	–30	cons	cons	cons	cons	cons	cons	cons
social/recr Stop * Households	–1.01534	–0.83	8.18641	1.51	5.14053	0.61	–0.56	–0.36	7.56	1.7	5.06	0.73

Table A.31. Trip-Level Mode Choice Model—Part 1

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		29627 –19653.9 0.4563 –0.8714		9876 –5718.3 0.5162 –1.4856		5741 –3492.5 0.4714 –1.3457		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Parking cost utility	0.95365	2.74	0.9537	cons	210.1176	1.58	cons	1.57	0	cons	600.45	1.57
All	Path type model log-sum (for 1-way trip)	2.45567	13.18	1.34078	4.75	1.04904	3.92	–1.03	–1.09	–5.98	–3.95	–7.55	–5.25
walk to transit	Constant	–0.79145	–1.92	–1.5239	–1.22	2.9202	2.67	3.54	4.06	–1.78	–0.58	9.01	3.39
walk to transit	Cars in HH, but fewer cars than adults	–0.35055	–0.77	0.49038	0.22	0	cons	–0.22	cons	1.85	0.38	0.77	cons
hov3	Constant	3.65806	8.2	4.38267	3.7	4.85415	3.97	0.4	0.39	1.62	0.61	2.68	0.98
hov3, hov2	#HH children age 5–15	–0.22423	–7.7	–0.21	–2.16	–0.38994	–4.25	–1.85	–1.96	0.49	0.15	–5.69	–1.8
hov3, hov2	#HH non-working adults	–0.00939	–0.21	–0.29497	–2.71	–0.00885	–0.07	2.63	2.31	–6.32	–2.63	0.01	0
hov3	One person HH	–1.31282	–6.03	–0.96163	–2.05	–1.0769	–2.28	–0.25	–0.24	1.61	0.75	1.08	0.5
hov3	Two person HH	–0.4185	–4.74	–0.37475	–2.18	–0.82355	–3.73	–2.61	–2.03	0.5	0.25	–4.59	–1.83
hov2	One person HH	–0.95024	–5.5	–1.18829	–2.88	–0.75631	–2	1.05	1.14	–1.38	–0.58	1.12	0.51
hov2	Constant	2.66399	6.37	3.58325	3.07	3.57214	3.37	–0.01	–0.01	2.2	0.79	2.17	0.86
hov3, hov2	No cars in HH	–2.7633	–5.95	–3.89301	–2.64	–2.89278	–1.68	0.68	0.58	–2.43	–0.77	–0.28	–0.08
sov	Constant	1.89925	5.44	1.29588	1.55	0.19956	0.33	–1.31	–1.83	–1.73	–0.72	–4.87	–2.83
sov	Cars in HH, but fewer cars than adults	–0.74065	–6.64	–0.47859	–1.83	–0.62338	–2.21	–0.55	–0.51	2.35	1	1.05	0.42
sov	HH income less than 25K	–0.38698	–3.05	–1.0204	–2.87	–0.17127	–0.64	2.39	3.15	–4.99	–1.78	1.7	0.8
sov	HH income 25K–45K	–0.13091	–1.21	–0.49486	–1.81	0.07693	0.34	2.1	2.54	–3.37	–1.33	1.93	0.92
sov	Child age 16–17	–0.98552	–4.24	–0.21774	–0.29	–0.67145	–1.02	–0.61	–0.69	3.3	1.03	1.35	0.48
bike	Constant	–3.34984	–6.9	–4.11532	–3.45	–2.601	–2	1.27	1.16	–1.58	–0.64	1.54	0.58
bike	Male	0.72116	3.01	1.74314	2.14	1.21594	1.59	–0.65	–0.69	4.26	1.25	2.06	0.65
bike	Age under 35	1.58697	4.85	–0.15166	–0.14	0.64056	0.6	0.73	0.75	–5.32	–1.61	–2.89	–0.89
bike	Origin parcel buffer 2 net intersections	0.02375	4	–0.03246	–1.64	–0.01735	–0.72	0.76	0.63	–9.47	–2.84	–6.92	–1.71
walk	Age under 35	0.79006	3.47	1.02053	1.35	0.41575	0.57	–0.8	–0.83	1.01	0.3	–1.64	–0.52
walk	Origin parcel buffer 1 net intersections	0.02516	6.38	–0.01147	–0.99	–0.00552	–0.51	0.52	0.55	–9.28	–3.18	–7.77	–2.84
walk	Origin parcel buffer 1 mixed-use density	0.30945	0.95	0.78005	0.96	0.7412	1.05	–0.05	–0.05	1.45	0.58	1.33	0.61
main tour mode	Constant	4.71524	14.09	6.70469	5.62	4.39101	4.67	–1.94	–2.46	5.95	1.67	–0.97	–0.34
main tour mode	If only trip on 1st half tour	0.72271	8.31	0.73605	3.89	0.84999	4.25	0.6	0.57	0.15	0.07	1.46	0.64
main tour mode	If only trip on 2nd half tour	0.58309	6.35	–0.27317	–1.04	0.40568	1.86	2.59	3.11	–9.32	–3.27	–1.93	–0.81
main tour mode	If first of multiple trips on 1st half tour	–0.16575	–1.59	–0.25875	–1.1	0.11104	0.47	1.58	1.56	–0.89	–0.4	2.66	1.17
main tour mode	If first of multiple trips on 2nd half tour	0.13384	1.44	0.79974	4.33	1.01846	5.03	1.18	1.08	7.15	3.6	9.5	4.36
main tour mode	If last of multiple trips on 1st half tour	–0.03693	–0.36	–0.26355	–1.15	–0.19498	–0.87	0.3	0.31	–2.19	–0.99	–1.53	–0.71
main tour mode	If last of multiple trips on 2nd half tour	–0.32011	–3.48	–0.2063	–0.68	0.43133	1.64	2.09	2.43	1.24	0.37	8.16	2.87

Table A.32. Trip-Level Mode Choice Model—Part 2

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		29627 –19653.9 0.4563 –0.8714		9876 –5718.3 0.5162 –1.4856		5741 –3492.5 0.4714 –1.3457		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
hov3	tour mode is walk to transit	–3.1281	–5.53	–3.1281	cons	–3.1281	cons	cons	cons	0	cons	0	cons
hov3	tour mode is school bus	2.37732	4.92	2.53236	1.84	0.30362	0.32	–1.62	–2.32	0.32	0.11	–4.29	–2.16
hov2	tour mode is walk to transit	–0.99931	–1.99	–2.64617	–1.99	–0.9993	cons	1.24	cons	–3.28	–1.24	0	cons
hov2	tour mode is school bus	3.31036	6.89	4.1285	3	1.67996	1.81	–1.78	–2.64	1.7	0.59	–3.4	–1.76
hov2	tour mode is hov 3	4.57042	11.47	5.99236	4.58	4.25026	3.39	–1.33	–1.39	3.57	1.09	–0.8	–0.26
sov	tour mode is drive to transit	–1.6664	cons	–1.6664	cons	–1.6664	cons	cons	cons	cons	cons	cons	cons
sov	tour mode is walk to transit	–4.47217	–6.09	–0.95958	–0.39	–4.4722	cons	–1.43	cons	4.79	1.43	0	cons
sov	tour mode is hov 3	2.05041	6.58	2.93434	3.44	5.05095	4.23	2.48	1.77	2.84	1.04	9.63	2.51
sov	tour mode is hov 2	2.50011	7.6	3.58384	3.97	4.55814	4.08	1.08	0.87	3.3	1.2	6.26	1.84
bike	tour mode is walk to transit	–0.59113	–1.21	4.44985	3.23	0	cons	–3.23	cons	10.28	3.66	1.21	cons
bike	tour mode is hov 2	–0.01052	–0.03	–0.28819	–0.21	0	cons	0.21	cons	–0.77	–0.2	0.03	cons
bike	tour mode is sov	–1.1576	–2.11	–1.1576	cons	–1.71483	–1.25	cons	–0.41	0	cons	–1.01	–0.41
walk	work tour	1.59837	7.18	1.01133	1.62	1.71604	2.78	1.13	1.14	–2.64	–0.94	0.53	0.19
walk	school tour	1.31318	5.44	0.0741	0.08	3.77612	4.45	3.89	4.36	–5.13	–1.3	10.2	2.9
bike	work-based tour	–0.39171	–0.48	–0.3917	cons	0	cons	cons	cons	0	cons	0.48	cons
hov2, hov3	work tour	–3.39096	–11.53	–5.24259	–5.05	–3.03657	–3.95	2.12	2.87	–6.3	–1.78	1.21	0.46
hov2, hov3	school tour	–2.68022	–8.8	–3.27068	–3.09	–1.61751	–2.51	1.56	2.57	–1.94	–0.56	3.49	1.65
hov2, hov3	escort tour	–2.82765	–10.71	–4.76541	–4.93	–2.78008	–3.82	2.06	2.73	–7.34	–2.01	0.18	0.07
hov2, hov3	shopping tour	2.24083	6.53	1.69991	2.7	0.34924	0.72	–2.15	–2.78	–1.58	–0.86	–5.51	–3.89
hov2, hov3	meal tour	1.10426	3.71	5.28218	3.03	0.61461	1.05	–2.68	–7.95	14.03	2.4	–1.64	–0.83
hov2, hov3	social/recr tour	–0.01941	–0.09	–0.16513	–0.31	–0.91973	–1.91	–1.43	–1.57	–0.68	–0.28	–4.19	–1.87
hov2, hov3	trip from escort stop to work, am peak	–3.28437	–8.48	–5.78687	–3.55	–2.68558	–3.14	1.9	3.62	–6.46	–1.54	1.55	0.7
hov2, hov3	trip from work to escort stop, pm peak	–2.81411	–7.17	–2.56057	–2.46	–2.85218	–3.23	–0.28	–0.33	0.65	0.24	–0.1	–0.04
hov2, hov3	trip from home to escort stop, am peak	3.23956	10.11	3.72254	4.25	1.93886	3.34	–2.04	–3.07	1.51	0.55	–4.06	–2.24
hov2, hov3	trip from home to escort stop, midday	–2.00566	–8.17	–1.83681	–3.3	–1.21929	–2.7	1.11	1.37	0.69	0.3	3.2	1.74
hov2, hov3	trip from home to escort stop, pm peak	–1.80811	–7.49	–1.23396	–2.12	–1.09632	–2.26	0.24	0.28	2.38	0.99	2.95	1.47
hov2, hov3	trip from home to escort stop, evening	–1.91208	–4.94	–2.76076	–2.31	–2.13014	–2.32	0.53	0.69	–2.19	–0.71	–0.56	–0.24
hov2, hov3	trip from escort stop to home, am peak	–3.94979	–10.67	–4.6985	–4.76	–4.56277	–4.24	0.14	0.13	–2.02	–0.76	–1.66	–0.57
hov2, hov3	trip from escort stop to home, midday	–0.71345	–2.41	–0.09981	–0.18	–0.44228	–0.85	–0.63	–0.66	2.07	1.14	0.91	0.52
hov2, hov3	trip from escort stop to home, pm peak	0.23362	1.04	0.26207	0.58	0.58699	1.34	0.72	0.74	0.13	0.06	1.57	0.81
hov2, hov3	trip from escort stop to home, evening	–1.73842	–5.18	0.33866	0.39	2.13889	1.51	2.07	1.27	6.19	2.39	11.56	2.74
all	mode nest log-sum	0.60321	14.53	0.50001	5.74	0.7846	5.04	3.27	1.83	–2.49	–1.19	4.37	1.16

Table A.33. Intermediate-Stop Departure Time Choice Model—Part 1

Variables		Region						Difference					
		Sacramento		Tampa		Jacksonville		Jacksonville vs. Tampa		Tampa vs. Sacramento		Jacksonville vs. Sacramento	
Number of observations		8977		3894		2009		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Final log-likelihood		–21446.3		–9252		–4833.7							
Rho-squared versus 0 coefficients		0.1524		0.1601		0.1468							
Rho-squared versus constants only		–0.6425		–3.4713		–2.6153							
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
Arrive 3–6 am	Constant—Arrival constants applied for outbound half tour	–5.22743	–16.17	–5	cons	–6.96268	–4.24	cons	–1.2	0.7	cons	–5.37	–1.06
Arrive 6–7 am	Constant	–3.05164	–15.78	–2.63431	–7.25	–1.77551	–3.15	2.36	1.52	2.16	1.15	6.6	2.27
Arrive 7–8 am	Constant	–1.08938	–9.19	–0.41118	–1.7	–0.80009	–2	–1.61	–0.97	5.72	2.81	2.44	0.72
Arrive 9–10 am	Constant	0.64148	5.34	1.55375	5.36	0.84406	2.5	–2.45	–2.1	7.6	3.14	1.69	0.6
Arrive 10 am–1 pm	Constant	1.376	9.31	3.65141	10.13	1.84599	4.36	–5.01	–4.26	15.39	6.31	3.18	1.11
Arrive 1–4 pm	Constant	2.26673	10.5	5.93945	11.47	2.38396	4.16	–6.87	–6.2	17.02	7.09	0.54	0.2
Arrive 4–7 pm	Constant	3.52962	11.93	10.00297	12.39	2.57882	3.1	–9.19	–8.92	21.87	8.02	–3.21	–1.14
Arrive 7–10 pm	Constant	3.38518	8.94	9.95463	10.3	1.37568	1.04	–8.88	–6.5	17.35	6.8	–5.31	–1.52
Arrive 10 pm–3 am	Constant	3.09654	4.4	3.0965	cons	3.0965	cons	cons	cons	0	cons	0	cons
Depart 3–7 am	Constant—Departure constants applied for return half tour	–1.43504	–1.34	–1.435	cons	0	cons	cons	cons	0	cons	1.34	cons
Depart 7–10 am	Constant	–1.17012	–4.12	4.25953	8.67	–1.53564	–1.81	–11.8	–6.84	19.1	11.05	–1.29	–0.43
Depart 10 am–1 pm	Constant	–0.77006	–4	4.30295	9.33	–0.45761	–0.68	–10.33	–7.05	26.37	11	1.62	0.46
Depart 1–3 pm	Constant	–0.7246	–5.3	3.27424	7.79	–0.51482	–0.97	–9.01	–7.16	29.26	9.51	1.53	0.4
Depart 4–5 pm	Constant	–0.08196	–1.13	1.32203	4.99	0.08793	0.31	–4.66	–4.33	19.36	5.3	2.34	0.6
Depart 6–7 pm	Constant	–0.48726	–6.24	–1.80816	–5.45	–0.42268	–1.24	4.18	4.07	–16.93	–3.98	0.83	0.19
Depart 7–9 pm	Constant	–0.74717	–6.54	–3.33085	–8.39	–1.00053	–2.13	5.87	4.95	–22.6	–6.51	–2.22	–0.54
Depart 9–12 pm	Constant	–1.13209	–6.08	–4.15977	–10.88	–0.82229	–1.3	8.73	5.27	–16.27	–7.92	1.66	0.49
Depart 12–3 am	Constant	–2.62865	–6.85	–2.6286	cons	–2.6286	cons	cons	cons	0	cons	0	cons
Duration 1–2 hrs	Constant	–0.94801	–22.18	–2.17881	–22.94	0.9306	6.68	32.73	22.32	–28.79	–12.96	43.95	13.48
Duration 2–3 hrs	Constant	–1.37748	–16.89	–3.79314	–19.13	2.79685	9.18	33.23	21.63	–29.62	–12.18	51.19	13.7
Duration 3–5 hrs	Constant	–1.35665	–10.7	–5.36393	–18.45	4.71101	9.59	34.65	20.5	–31.61	–13.78	47.86	12.35
Duration 5–7 hrs	Constant	–2.14559	–9.27	–8.82194	–8.12	8.14408	7.9	15.61	16.46	–28.85	–6.14	44.47	9.98
Duration 7–9 hrs	Constant	–2.95704	–6.83	–8.22783	–7.79	14.15852	11.05	21.19	17.47	–12.17	–4.99	39.53	13.36
Duration 9–12 hrs	Constant	–2.04292	–4.03	–5	cons	18.4878	9.62	cons	12.22	–5.83	cons	40.47	10.68
Duration 12–14 hrs	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
Duration 14–18 hrs	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons
Duration 18–24 hrs	Constant	–10	cons	–10	cons	–10	cons	cons	cons	cons	cons	cons	cons

Table A.34. Intermediate-Stop Departure Time Choice Model—Part 2

		Region						Difference					
Variables		**Sacramento**		**Tampa**		**Jacksonville**		**Jacksonville vs. Tampa**		**Tampa vs. Sacramento**		**Jacksonville vs. Sacramento**	
Number of observations Final log-likelihood Rho-squared versus 0 coefficients Rho-squared versus constants only		8977 –21446.3 0.1524 –0.6425		3894 –9252 0.1601 –3.4713		2009 –4833.7 0.1468 –2.6153		Standard errors from Tampa model	Standard errors from Jacksonville model	Standard errors from Sacramento model	Standard errors from Tampa model	Standard errors from Sacramento model	Standard errors from Jacksonville model
Description		**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	**Coeff**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**	***t*-stat**
All	Duration shift—non-working adult under age 65	0.10104	4.64	–0.00671	–0.17	0.02637	0.34	0.84	0.42	–4.95	–2.74	–3.43	–0.95
All	Duration shift—university student	0.13234	4.85	0.06348	0.51	0.16425	0.91	0.81	0.56	–2.52	–0.55	1.17	0.18
All	Duration shift—non-working adult age 65+	0.10578	5.09	0.00671	0.19	0.10094	1.22	2.63	1.14	–4.77	–2.76	–0.23	–0.06
All	Duration shift—driving age student	0.14992	4.09	–0.51292	–3.83	–0.25947	–0.83	1.89	0.81	–18.07	–4.96	–11.16	–1.3
All	Duration shift—Child age 5–15	0.19472	7.65	–0.11238	–1.27	0.23197	1.43	3.9	2.13	–12.07	–3.48	1.46	0.23
All	Duration shift—Child age 0–4	0.13707	3.89	0.1371	cons	0.1371	cons	cons	cons	0	cons	0	cons
All	Auto tours, auto path type log-sum during the period	0.5	cons	0.5	cons	0.5	cons	cons	cons	cons	cons	cons	cons
All	Transit tours, transit path type log-sum during the period	0.5	cons	0.5	cons	0.5	cons	cons	cons	cons	cons	cons	cons
All	Minutes still available to schedule in the period	0.32487	11.33	–2.3492	–16.68	0.68924	4.84	21.58	21.35	–93.3	–18.99	12.71	2.56
All	Remaining tours to simulate in the day divided by the total time window that would remain	–93.62074	–8.56	–653.0773	–9.67	–131.18414	–2.94	7.73	11.68	–51.14	–8.29	–3.43	–0.84
All	Remaining stop purposes to simulate divided by the window that would remain in the simulation direction	–2.72866	–5.76	–10.68298	–3.93	–9.69806	–2.28	0.36	0.23	–16.78	–2.93	–14.7	–1.64
Depart 3–4 pm	Constant	–0.33158	–3.35	2.50068	6.96	–0.19695	–0.5	–7.51	–6.79	28.64	7.88	1.36	0.34
All	Duration shift—Outbound half of a work tour	0.17439	5.27	–0.06536	–1.15	0.6787	6.63	13.08	7.27	–7.25	–4.22	15.24	4.93
All	Duration shift—Return half of a work tour	–0.16106	–5.25	0	cons	–2.60696	–16.98	cons	–16.98	5.25	cons	–79.77	–15.93
All	Duration shift—Return half of a non-work tour	–0.43896	–11.82	0	cons	–3.71888	–23.82	cons	–23.82	11.82	cons	–88.3	–21.01
All	Duration shift—Work-based sub-tour	0.03082	0.62	–0.45317	–2.4	–0.67984	–1.98	–1.2	–0.66	–9.73	–2.56	–14.29	–2.07
All	Duration shift—Escort tour	–0.15799	–6.37	–0.85198	–9.78	1.10502	8.71	22.45	15.43	–28	–7.96	50.96	9.96
All	Duration shift—Shopping tour	–0.07286	–3.76	–0.63403	–15.39	1.38323	14.81	48.97	21.59	–28.96	–13.62	75.13	15.59
All	Duration shift—Meal tour	0.01736	0.72	–0.77345	–14.66	1.31757	11.79	39.64	18.72	–32.66	–14.99	53.69	11.64
All	Duration shift—Social/recr. tour	0.20112	9.75	–0.73518	–18.11	1.22246	10.71	48.21	17.15	–45.4	–23.06	49.52	8.95
All	Duration shift—Personal business tour	0.00829	0.45	–0.69093	–15.75	1.23196	10.52	43.83	16.42	–37.78	–15.94	66.11	10.45
All	Duration shift—School tour	0.23128	5.94	–1.23418	–6.98	0.56937	2.87	10.2	9.1	–37.63	–8.29	8.68	1.71

APPENDIX B

Summary of Model Calibration Differences

Table B.1. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Usual-Work-Location Model

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	Full-time worker has one-way drive distance in 0–3.5 miles band	–4.153	–3.642			✓
NA	Full-time worker has one-way drive distance in 3.5–10 miles band	–0.644	–0.491	✓		
NA	Full-time worker has one-way drive distance in >10 miles band	–0.732	–1.008		✓	
NA	Part-time worker * LN (1 + one-way drive distance)	–2.626	–3.103		✓	
NA	Not full- or part-time worker * LN (1 + one-way drive distance)	–3.465	–3.745		✓	
Overall mean APLD across variables				33.9%		

Note: Number of variables in the model = 73; number of variables that were calibrated = 5.

Table B.2. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Auto Ownership Model

				Absolute Percentage Logit Difference (APLD)		
Alternative	**Variable/Interaction Term**	**SACOG**	**Tampa**	**Low (APLD ≤ 20%)**	**Medium (20% < APLD ≤ 50%)**	**High (APLD > 50%)**
0 autos	household has 1 Driver	–3.690	–2.371			✓
2 autos	household has 1 Driver	–1.892	–2.188		✓	
3 autos	household has 1 Driver	–3.018	–4.319			✓
4+ autos	household has 1 Driver	–4.485	–4.485	✓		
0 autos	household has 2 Drivers	–4.429	–4.392	✓		
1 auto	household has 2 Drivers	–1.639	–0.837			✓
3 autos	household has 2 Drivers	–1.398	–2.359			✓
4+ autos	household has 2 Drivers	–2.229	–3.569			✓
0 autos	household has 3 Drivers	–3.825	–3.224			✓
1 auto	household has 3 Drivers	–1.370	–0.769			✓
2 autos	household has 3 Drivers	–0.364	0.237			✓
4+ autos	household has 3 Drivers	–0.516	–0.933		✓	
0 autos	household has 4 or more Drivers	–5.133	–4.652			✓
1 auto	household has 4 or more Drivers	–1.818	–1.337			✓
2 autos	household has 4 or more Drivers	–1.109	–0.628			✓
3 autos	household has 4 or more Drivers	–1.093	–0.611			✓
0 autos	household has 0–15K Income	2.072	0.549			✓
1 auto	household has 0–15K Income	0.607	0.179		✓	
3 autos	household has 0–15K Income	–0.715	0.434			✓
4+ autos	household has 0–15K Income	–1.436	0.080			✓
0 autos	household has 50–75K Income	–1.453	–4.289			✓
1 auto	household has 50–75K Income	–1.093	–0.677			✓
3 autos	household has 50–75K Income	0.141	0.206	✓		
4+ autos	household has 50–75K Income	0.189	0.273	✓		
0 autos	household has 75K and plus Income	–0.585	–3.608			✓
1 auto	household has 75K and plus Income	–1.006	–1.511		✓	
3 autos	household has 75K and plus Income	0.226	0.977			✓
4+ autos	household has 75K and plus Income	0.343	0.946			✓
Overall mean APLD across variables					83.5%	

Note: Number of variables in the model = 60; number of variables that were calibrated = 28.

Table B.3. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Individual Person-Day Pattern Model—Part 1

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	work tour constant	0.594	0.729	✓		
NA	work stop constant	2.261	2.272	✓		
NA	work purpose * person is part-time worker	–0.677	–1.420			✓
NA	work purpose * person is university student	–1.229	–2.399			✓
NA	work purpose * person is student age 16+	–1.887	–2.002	✓		
NA	work purpose * person is full-time worker	0.000	0.000	✓		
NA	school tour constant	–0.861	–0.858	✓		
NA	school stop constant	–0.786	–0.288			✓
NA	school purpose * person is university student	1.008	–0.115			✓
NA	school purpose * person is student age 16+	2.089	1.104			✓
NA	school purpose * person is student age 5–15	2.176	1.193			✓
NA	school purpose * person is full-time worker	0.000	0.000	✓		
NA	escort tour constant	–3.407	–3.633		✓	
NA	escort stop constant	–1.468	–0.213			✓
NA	escort purpose * person is part-time worker	0.000	–0.577		✓	
NA	escort purpose * person is retired adult	–0.747	–1.277		✓	
NA	escort purpose * person is non-working adult	0.000	–0.116	✓		
NA	escort purpose * person is university student	0.000	–1.889			✓
NA	escort purpose * person is student age 16+	0.000	–1.136			✓
NA	escort purpose * person is student age 5–15	0.000	–0.582		✓	
NA	escort purpose * person is full-time worker	0.000	–0.192	✓		
NA	personal business tour constant	–2.398	–1.166			✓
NA	personal business stop constant	1.762	0.482			✓
NA	personal business purpose * person is part-time worker	0.193	0.009	✓		
NA	personal business purpose * person is retired adult	0.525	–0.229			✓
NA	personal business purpose * person is non-working adult	0.413	–0.161		✓	
NA	personal business purpose * person is university student	0.000	–2.094			✓
NA	personal business purpose * person is student age 16+	–0.280	–0.938		✓	
NA	personal business purpose * person is student age 5–15	–0.445	–0.413	✓		
NA	personal business purpose * person is full-time worker	0.000	0.000	✓		
NA	shopping tour constant	–2.889	–1.356			✓
NA	shopping stop constant	1.200	2.555			✓
NA	shopping purpose * person is part-time worker	0.058	–0.818			✓
NA	shopping purpose * person is retired adult	0.204	–0.459		✓	
NA	shopping purpose * person is non-working adult	0.461	–0.570			✓

Note: Number of variables in the model = 350; number of variables that were calibrated = 57.

Table B.4. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Individual Person-Day Pattern Model—Part 2

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	shopping purpose * person is university student	0.222	–1.600			✓
NA	shopping purpose * person is student age 16+	–0.474	–1.629			✓
NA	shopping purpose * person is student age 5–15	–0.559	–2.647			✓
NA	shopping purpose * person is full-time worker	0.000	–0.861			✓
NA	meal tour constant	–3.143	–1.830			✓
NA	meal stop constant	0.468	0.966			✓
NA	meal purpose * person is part-time worker	–0.259	–1.028			✓
NA	meal purpose * person is retired adult	0.000	–0.689		✓	
NA	meal purpose * person is non-working adult	0.000	–0.685		✓	
NA	meal purpose * person is university student	0.000	–0.576		✓	
NA	meal purpose * person is student age 16+	–0.432	–1.340			✓
NA	meal purpose * person is student age 5–15	–0.762	–0.815	✓		
NA	meal purpose * person is full-time worker	0.000	–0.739			✓
NA	social or recreational tour constant	–2.296	–0.242			✓
NA	social or recreational stop constant	1.044	1.118	✓		
NA	social or recreational purpose * person is part-time worker	0.000	–0.177	✓		
NA	social or recreational purpose * person is retired adult	0.000	–0.807			✓
NA	social or recreational purpose * person is non-working adult	0.000	–0.676		✓	
NA	social or recreational purpose * person is university student	0.000	–0.674		✓	
NA	social or recreational purpose * person is student age 16+	0.000	–0.214	✓		
NA	social or recreational purpose * person is student age 5–15	0.328	–0.577			✓
NA	social or recreational purpose * person is full-time worker	–0.221	–0.484		✓	
Overall mean APLD across variables				75.1%		

Note: Number of variables in the model = 350; number of variables that were calibrated = 57.

Table B.5. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Work–Based Sub–Tour Generation Model

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	work stop	–0.226	–1.134			✓
NA	school stop	–2.189	–2.702		✓	
NA	escort stop	–3.136	–3.633		✓	
NA	personal business stop	–1.400	–2.223			✓
NA	shopping stop	–1.796	–1.772	✓		
NA	meal stop	–0.271	–0.491	✓		
NA	social or recreational stop	–1.730	–1.581	✓		
Overall mean APLD across variables				33.3%		

Note: Number of variables in the model = 15; number of variables that were calibrated = 7.

Table B.6. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Exact Number of Person Tours—Part 1

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	2+ work tours ∗ person is full-time worker	–0.074	0.421			✓
NA	2+ work tours ∗ person is part-time worker	0.000	0.707			✓
NA	2+ work tours ∗ person is retired adult	0.000	0.000	✓		
NA	2+ work tours ∗ person is non-working adult	0.000	0.000	✓		
NA	2+ work tours ∗ person is university student	0.000	–3.908			✓
NA	2+ work tours ∗ person is student age 16+	0.000	–4.454			✓
NA	2+ school tours ∗ person is full-time worker	0.000	0.000	✓		
NA	2+ school tours ∗ person is part-time worker	–10.000	–10.000	✓		
NA	2+ school tours ∗ person is non-working adult	0.000	0.000	✓		
NA	2+ school tours ∗ person is university student	1.297	–0.358			✓
NA	2+ school tours ∗ person is student age 16+	0.730	0.561	✓		
NA	2+ school tours ∗ person is student age 5–15	0.000	0.000	✓		
NA	2+ escort tours ∗ person is full-time worker	0.000	–1.266			✓
NA	2+ escort tours ∗ person is part-time worker	0.000	0.691			✓
NA	2+ escort tours ∗ person is retired adult	0.000	0.000	✓		
NA	2+ escort tours ∗ person is non-working adult	0.392	0.367	✓		
NA	2+ escort tours ∗ person is university student	0.000	–5.643			✓
NA	2+ escort tours ∗ person is student age 16+	0.000	–5.291			✓
NA	2+ escort tours ∗ person is student age 5–15	0.000	–2.452			✓
NA	2+ personal business tours ∗ person is full-time worker	0.000	–0.444		✓	
NA	2+ personal business tours ∗ person is part-time worker	0.000	–0.211	✓		

Note: Number of variables in the model = 295; number of variables that were calibrated = 47.

Table B.6. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Exact Number of Person Tours—Part 1 (continued)

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	2+ personal business tours * person is retired adult	0.000	–1.148			✓
NA	2+ personal business tours * person is non-working adult	0.000	0.288		✓	
NA	2+ personal business tours * person is university student	0.000	–4.981			✓
NA	2+ personal business tours * person is student age 16+	0.418	–4.660			✓
NA	2+ personal business tours * person is student age 5–15	–0.731	–0.731	✓		
NA	2+ shopping tours * person is full-time worker	0.339	0.339	✓		
NA	2+ shopping tours * person is part-time worker	0.000	–0.983			✓
NA	2+ shopping tours * person is retired adult	0.000	0.082	✓		
NA	2+ shopping tours * person is non-working adult	0.000	0.268		✓	
NA	2+ shopping tours * person is university student	0.000	0.000	✓		
NA	2+ shopping tours * person is student age 16+	0.000	0.116	✓		
NA	2+ shopping tours * person is student age 5–15	–1.112	–0.211			✓

Table B.7. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Exact Number of Person Tours—Part 2

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	2+ meal tours * person is full-time worker	–10.000	–10.000	✓		
NA	2+ meal tours * person is part-time worker	–10.000	–10.000	✓		
NA	2+ meal tours * person is retired adult	0.000	–0.941			✓
NA	2+ meal tours * person is non-working adult	0.000	–3.750			✓
NA	2+ meal tours * person is university student	–10.000	–10.000	✓		
NA	2+ meal tours * person is student age 16+	–10.000	–10.000	✓		
NA	2+ meal tours * person is student age 5–15	–10.000	–10.000	✓		
NA	2+ social or recreational tours * person is full-time worker	0.000	1.362			✓
NA	2+ social or recreational tours * person is part-time worker	0.000	0.550			✓
NA	2+ social or recreational tours * person is retired adult	0.000	0.623			✓
NA	2+ social or recreational tours * person is non-working adult	0.000	0.000	✓		
NA	2+ social or recreational tours * person is university student	0.000	–4.463			✓
NA	2+ social or recreational tours * person is student age 16+	0.000	–0.244		✓	
NA	2+ social or recreational tours * person is student age 5–15	0.000	0.657			✓
Overall mean APLD across variables				50.3%		

Note: Number of variables in the model = 295; number of variables that were calibrated = 47.

Table B.8. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Intermediate-Stop Generation Model

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	work stop * work/school tour	–3.359	–3.304	✓		
NA	school stop * work/school tour	–0.910	–0.855	✓		
NA	escort stop * work/school tour	–1.367	–1.215	✓		
NA	personal business stop * work/school tour	–0.912	–0.949	✓		
NA	shopping stop * work/school tour	–0.510	–0.096			✓
NA	meal stop * work tour	–2.086	–1.772		✓	
NA	social or recreational stop * work/school tour	–0.963	–0.766		✓	
NA	no more stops * school tour	0.149	0.080	✓		
NA	meal stop * school tour	–1.674	–1.331		✓	
NA	escort stop * escort tour	–1.883	–1.545		✓	
NA	personal business stop * escort tour	–1.120	–0.972	✓		
NA	shopping stop * escort tour	–0.646	–0.047			✓
NA	meal stop * escort tour	–2.003	–1.490			✓
NA	social or recreational stop * escort tour	–1.026	–0.644		✓	
NA	personal business stop * personal business tour	–1.156	–1.248	✓		
NA	shopping stop * personal business tour	–0.649	–0.290		✓	
NA	meal stop * personal business tour	–2.181	–1.908		✓	
NA	social or recreational stop * personal business tour	–1.662	–1.521	✓		
NA	personal business stop * shopping tour	–1.236	–0.903		✓	
NA	shopping stop * shopping tour	–0.323	0.460			✓
NA	meal stop * shopping tour	–2.324	–1.627			✓
NA	social or recreational stop * shopping tour	–1.658	–1.092			✓
NA	personal business stop * meal tour	–1.305	–0.657			✓
NA	shopping stop * meal tour	–0.503	0.596			✓
NA	meal stop * meal tour	–4.833	–3.820			✓
NA	social or recreational stop * meal tour	–1.529	–0.648			✓
NA	personal business stop * social or recreational tour	–1.349	–0.876			✓
NA	shopping stop * social or recreational tour	–0.560	0.364			✓
NA	meal stop * social or recreational tour	–2.120	–1.283			✓
NA	social or recreational stop * social or recreational tour	–1.109	–0.403			✓
Overall mean APLD across variables				64.3%		

Note: Number of variables in the model = 106; number of variables that were calibrated = 30.

Table B.9. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Nonmandatory-Tour Destination Model

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	escort tour ∗ distance from origin in 0–1 mile band	–10.572	–8.678			✓
NA	escort tour ∗ distance from origin in 1–3.5 miles band	–3.553	–2.987			✓
NA	escort tour ∗ distance from origin in 3.5–10 miles band	–2.287	–2.961		✓	
NA	personal business tour ∗ distance from origin in 0–1 mile band	–11.879	–7.510			✓
NA	personal business tour ∗ distance from origin in 1–3.5 miles band	–3.261	–1.832			✓
NA	personal business tour ∗ distance from origin in 3.5–10 miles band	–1.814	–3.520			✓
NA	personal business tour ∗ distance from origin in >10 miles band	–0.440	–2.633			✓
NA	shopping tour ∗ distance from origin in 0–1 mile band	–9.372	–9.172		✓	
NA	shopping tour ∗ distance from origin in 1–3.5 miles band	–7.002	–6.853	✓		
NA	shopping tour ∗ distance from origin in 3.5–10 miles band	–2.097	–1.918	✓		
NA	shopping tour ∗ distance from origin in >10 miles band	–0.268	–1.291			✓
NA	meal tour ∗ distance from origin in 0–1 mile band	–15.744	–15.437		✓	
NA	meal tour ∗ distance from origin in 1–3.5 miles band	–5.065	–4.741		✓	
NA	meal tour ∗ distance from origin in 3.5–10 miles band	–2.192	–1.993		✓	
NA	meal tour ∗ distance from origin in >10 miles band	–0.381	–1.464			✓
NA	social or recreational tour ∗ distance from origin in 0–1 mile band	–14.078	–12.591			✓
NA	social or recreational tour ∗ distance from origin in 1–3.5 miles band	–3.771	–3.209			✓
NA	social or recreational tour ∗ distance from origin in 3.5–10 miles band	–1.768	–2.613			✓
NA	social or recreational tour ∗ distance from origin in >10 miles band	–0.233	–1.309			✓
Overall mean APLD across variables				515.6%		

Note: Number of variables in the model = 101; number of variables that were calibrated = 19.

Table B.10. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Tour-Mode Choice Model and Work–Based Sub–Tour Mode Choice Model

Alternative	Variable/ Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
Tour-mode choice model (tour purpose: work)[a]						
Drive–Transit	Drive–Transit	–1.604	–1.604	✓		
Walk–Transit	Walk–Transit	–1.918	–1.918	✓		
Shared Ride 3+	Shared Ride 3+	–0.970	–0.970	✓		
Shared Ride 2	Shared Ride 2	–0.437	–0.296	✓		
Drive Alone	Drive Alone	2.200	2.185	✓		
Bike	Bike	–9.572	–9.572	✓		
Overall mean APLD across variables				2.8%		
Tour-mode choice model (tour purpose: school)[b]						
School Bus	School Bus	–1.194	–0.046			✓
Walk–Transit	Walk–Transit	–3.891	–2.885			✓
Shared Ride 3+	Shared Ride 3+	–0.436	–0.016			✓
Shared Ride 2	Shared Ride 2	–1.076	–0.801		✓	
Drive Alone	Drive Alone	1.215	2.558			✓
Bike	Bike	–3.514	–2.509			✓
Overall mean APLD across variables				154.8%		
Tour-mode choice model (tour purpose: escort)[c]						
Shared Ride 3+	Shared Ride 3+	–2.180	–4.136			✓
Shared Ride 2	Shared Ride 2	–1.302	–3.506			✓
Bike	Bike	–10.000	–11.927			✓
Overall mean APLD across variables				86.8%		
Tour-mode choice model (tour purpose: other home-based tours)[d]						
Walk–Transit	Walk–Transit	–4.420	–6.351			✓
Shared Ride 3+	Shared Ride 3+	–0.811	–2.857			✓
Shared Ride 2	Shared Ride 2	–0.723	–3.234			✓
Drive Alone	Drive Alone	1.215	–1.522			✓
Bike	Bike	–6.577	–6.952		✓	
Overall mean APLD across variables				77.8%		
Work–based sub–tour mode choice model[e]						
Walk–Transit	Walk–Transit	–3.498	–4.036		✓	
Shared Ride 3+	Shared Ride 3+	–2.635	–4.015			✓
Shared Ride 2	Shared Ride 2	–1.775	–4.122			✓
Drive Alone	Drive Alone	–2.307	–2.703		✓	
Bike	Bike	–4.857	–5.525		✓	
Overall mean APLD across variables				57.7%		

[a] Number of variables in the model = 36; number of variables that were calibrated = 6.
[b] Number of variables in the model = 42; number of variables that were calibrated = 6.
[c] Number of variables in the model = 15; number of variables that were calibrated = 3.
[d] Number of variables in the model = 45; number of variables that were calibrated = 5.
[e] Number of variables in the model = 17; number of variables that were calibrated = 5.

Table B.11. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Tour-Time-of-Day Choice Model for Home-Based Work and School Tours

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
Tour-time-of-day choice model (tour purpose: work)[a]						
tour arrival time 03:00–05:59	tour arrival time 03:00–05:59	–2.339	–3.245			✓
tour arrival time 06:00–06:59	tour arrival time 06:00–06:59	–0.671	–0.892	✓		
tour arrival time 07:00–07:59	tour arrival time 07:00–07:59	–0.018	–0.018	✓		
tour arrival time 08:00–08:59	tour arrival time 08:00–08:59	0.000	–0.111	✓		
tour arrival time 09:00–09:59	tour arrival time 09:00–09:59	–0.936	–0.745		✓	
tour arrival time 10:00–12:59	tour arrival time 10:00–12:59	–1.777	–1.346			✓
tour arrival time 13:00–15:59	tour arrival time 13:00–15:59	–1.867	–1.180			✓
tour arrival time 16:00–18:59	tour arrival time 16:00–18:59	–2.266	–3.226			✓
tour arrival time 19:00–21:59	tour arrival time 19:00–21:59	–3.161	–4.098			✓
tour arrival time 22:00–23:59	tour arrival time 22:00–23:59	–4.121	–4.121	✓		
Overall mean APLD across variables				38.6%		
Tour-time-of-day choice model (tour purpose: school)[b]						
tour arrival time 03:00–05:59	tour arrival time 03:00–05:59	–10.000	–16.007			✓
tour arrival time 06:00–06:59	tour arrival time 06:00–06:59	–3.254	–4.843			✓
tour arrival time 07:00–07:59	tour arrival time 07:00–07:59	–0.216	0.396			✓
tour arrival time 08:00–08:59	tour arrival time 08:00–08:59	0.000	0.042	✓		
tour arrival time 09:00–09:59	tour arrival time 09:00–09:59	–1.261	–0.232			✓
tour arrival time 10:00–12:59	tour arrival time 10:00–12:59	–2.256	–2.207	✓		
tour arrival time 13:00–15:59	tour arrival time 13:00–15:59	–2.943	–2.649		✓	
tour arrival time 16:00–18:59	tour arrival time 16:00–18:59	–2.042	–0.361			✓
tour arrival time 19:00–21:59	tour arrival time 19:00–21:59	–3.467	–3.467	✓		
tour arrival time 22:00–23:59	tour arrival time 22:00–23:59	–10.000	–10.000	✓		
Overall mean APLD across variables				92.4%		

[a] Number of variables in the model = 74; number of variables that were calibrated = 10.
[b] Number of variables in the model = 68; number of variables that were calibrated = 10.

Table B.12. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Time-of-Day Choice Model for Other Home-Based Tours and Work-Based Sub-Tours

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
Tour-time-of-day choice model (tour purpose: other home-based tour)[a]						
tour arrival time 03:00–05:59	tour arrival time 03:00–05:59	–4.738	–4.738	✓		
tour arrival time 06:00–06:59	tour arrival time 06:00–06:59	–2.203	–2.203	✓		
tour arrival time 07:00–07:59	tour arrival time 07:00–07:59	–0.842	–0.842	✓		
tour arrival time 08:00–08:59	tour arrival time 08:00–08:59	0.000	0.000	✓		
tour arrival time 09:00–09:59	tour arrival time 09:00–09:59	–0.041	0.238		✓	
tour arrival time 10:00–12:59	tour arrival time 10:00–12:59	0.382	0.241	✓		
tour arrival time 13:00–15:59	tour arrival time 13:00–15:59	0.436	0.330	✓		
tour arrival time 16:00–18:59	tour arrival time 16:00–18:59	0.741	1.055		✓	
tour arrival time 19:00–21:59	tour arrival time 19:00–21:59	0.292	0.134	✓		
tour arrival time 22:00–23:59	tour arrival time 22:00–23:59	–1.227	–1.227	✓		
Overall mean APLD across variables				10.7%		
Work–based sub–tour time-of-day choice model[b]						
tour arrival time 03:00–05:59	tour arrival time 03:00–05:59	–0.452	–0.452	✓		
tour arrival time 06:00–06:59	tour arrival time 06:00–06:59	–5.000	–5.000	✓		
tour arrival time 07:00–07:59	tour arrival time 07:00–07:59	–0.275	–1.884			✓
tour arrival time 08:00–08:59	tour arrival time 08:00–08:59	0.000	–8.236			✓
tour arrival time 09:00–09:59	tour arrival time 09:00–09:59	–0.441	–4.745			✓
tour arrival time 10:00–12:59	tour arrival time 10:00–12:59	–0.187	0.502			✓
tour arrival time 13:00–15:59	tour arrival time 13:00–15:59	–1.603	–0.959			✓
tour arrival time 16:00–18:59	tour arrival time 16:00–18:59	–2.623	–2.595	✓		
tour arrival time 19:00–21:59	tour arrival time 19:00–21:59	–4.415	–16.710			✓
tour arrival time 22:00–23:59	tour arrival time 22:00–23:59	–10.000	–10.000	✓		
Overall mean APLD across variables				57.1%		

[a] Number of variables in the model = 95; number of variables that were calibrated = 10.
[b] Number of variables in the model = 50; number of variables that were calibrated = 10.

Table B.13. Comparison Between Sacramento and Calibrated Tampa Model Coefficients: Trip-Time-of-Day Choice Model

Alternative	Variable/Interaction Term	SACOG	Tampa	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
arrival time 03:00–05:59	arrival time 03:00–05:59	–5.227	–5.506		✓	
arrival time 06:00–06:59	arrival time 06:00–06:59	–3.052	–3.052	✓		
arrival time 07:00–07:59	arrival time 07:00–07:59	–1.089	–1.089	✓		
arrival time 08:00–08:59	arrival time 08:00–08:59	0.000	0.000	✓		
arrival time 09:00–09:59	arrival time 09:00–09:59	0.641	0.641	✓		
arrival time 10:00–12:59	arrival time 10:00–12:59	1.376	1.549	✓		
arrival time 13:00–15:59	arrival time 13:00–15:59	2.267	2.346	✓		
arrival time 16:00–18:59	arrival time 16:00–18:59	3.530	3.530	✓		
arrival time 19:00–21:59	arrival time 19:00–21:59	3.385	3.385	✓		
arrival time 22:00–25:59	arrival time 22:00–25:59	3.097	3.097	✓		
Overall mean APLD across variables				5.1%		

Note: Number of variables in the model = 55; number of variables that were calibrated = 10.

Table B.14. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Usual-Work-Location Model

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	LN(1 + one-way drive distance)	0.000	0.100	✓		
NA	Full-time worker has one-way drive distance in 0–3.5 miles band	–4.153	–4.313	✓		
NA	Full-time worker has one-way drive distance in 3.5–10 miles band	–0.644	–0.194			✓
NA	Full-time worker has one-way drive distance in >10 miles band	–0.732	–0.672	✓		
NA	Part-time worker * LN(1 + one-way drive distance)	–2.626	–2.306		✓	
NA	Not full- or part-time worker * LN(1 + one-way drive distance)	–3.465	–3.475	✓		
NA	LN(1 + accessibility to service sector employment)	–0.165	–0.445		✓	
NA	Work in same county as home	0.000	1.000			✓
Overall mean APLD across variables				36.7%		

Note: Number of variables in the model = 73; number of variables that were calibrated = 9.

Table B.15. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Auto-Ownership Model

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
0 autos	household has 1 Driver	–3.690	–2.670			✓
2 autos	household has 1 Driver	–1.892	–1.892	✓		
3 autos	household has 1 Driver	–3.018	–4.148			✓
4+ autos	household has 1 Driver	–4.485	–5.182			✓
0 autos	household has 2 Drivers	–4.429	–2.749			✓
1 auto	household has 2 Drivers	–1.639	–0.979			✓
3 autos	household has 2 Drivers	–1.398	–1.858		✓	
4+ autos	household has 2 Drivers	–2.229	–3.269			✓
0 autos	household has 3 Drivers	–3.825	–2.074			✓
1 auto	household has 3 Drivers	–1.370	–0.590			✓
2 autos	household has 3 Drivers	–0.364	0.228			✓
4+ autos	household has 3 Drivers	–0.516	–0.906		✓	
0 autos	household has 4 or more Drivers	–5.133	–1.773			✓
1 auto	household has 4 or more Drivers	–1.818	–1.298			✓
2 autos	household has 4 or more Drivers	–1.109	–0.319			✓
3 autos	household has 4 or more Drivers	–1.093	–0.363			✓
0 autos	household has 0–15K Income	2.072	2.062	✓		
1 auto	household has 0–15K Income	0.607	0.597	✓		
3 autos	household has 0–15K Income	–0.715	–1.005		✓	
4+ autos	household has 0–15K Income	–1.436	–1.046		✓	
0 autos	household has 50–75K Income	–1.453	–0.693			✓
1 auto	household has 50–75K Income	–1.093	–0.553			✓
3 autos	household has 50–75K Income	0.141	0.111	✓		
4+ autos	household has 50–75K Income	0.189	–0.059		✓	
0 autos	household has 75K and plus Income	–0.585	–1.154		✓	
1 auto	household has 75K and plus Income	–1.006	–1.266		✓	
3 autos	household has 75K and plus Income	0.226	0.516		✓	
4+ autos	household has 75K and plus Income	0.343	0.453	✓		
Overall mean APLD across variables				182.3%		

Note: Number of variables in the model = 60; number of variables that were calibrated = 28.

Table B.16. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Individual Person-Day Pattern Model—Part 1

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	work tour constant	0.594	0.398	✓		
NA	work stop constant	2.261	2.361	✓		
NA	work purpose * person is part-time worker	–0.677	–1.059		✓	
NA	work purpose * person is university student	–1.229	–1.839		✓	
NA	school tour constant	–0.861	–1.004	✓		
NA	school stop constant	–0.786	–1.006	✓		
NA	school purpose * person is university student	1.008	1.480			✓
NA	school purpose * person is student age 16+	2.089	1.196			✓
NA	school purpose * person is student age 5–15	2.176	1.503		✓	
NA	escort tour constant	–3.407	–3.651		✓	
NA	escort stop constant	–1.468	–0.868			✓
NA	escort purpose * person is part-time worker	0.000	0.687			✓
NA	escort purpose * person is retired adult	–0.747	–0.996		✓	
NA	escort purpose * person is non-working adult	0.000	–0.044	✓		
NA	escort purpose * person is university student	0.000	1.163			✓
NA	escort purpose * person is student age 16+	0.000	–2.130			✓
NA	escort purpose * person is student age 5–15	0.000	–0.407		✓	
NA	personal business tour constant	–2.398	–1.267			✓
NA	personal business stop constant	1.762	0.192			✓
NA	personal business purpose * person is part-time worker	0.193	0.279	✓		
NA	personal business purpose * person is retired adult	0.525	0.205		✓	
NA	personal business purpose * person is non-working adult	0.413	0.161		✓	
NA	personal business purpose * person is university student	0.000	–0.245		✓	
NA	personal business purpose * person is student age 16+	–0.280	–0.226	✓		
NA	personal business purpose * person is student age 5–15	–0.445	0.153			✓

Note: Number of variables in the model = 350; number of variables that were calibrated = 48.

Table B.17. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Individual Person-Day Pattern Model—Part 2

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	shopping tour constant	–2.889	–1.099			✓
NA	shopping stop constant	1.200	2.580			✓
NA	shopping purpose * person is part-time worker	0.058	0.016	✓		
NA	shopping purpose * person is retired adult	0.204	–0.399		✓	
NA	shopping purpose * person is non-working adult	0.461	–0.493			✓
NA	shopping purpose * person is university student	0.222	0.511		✓	
NA	shopping purpose * person is student age 16+	–0.474	–2.335			✓
NA	shopping purpose * person is student age 5–15	–0.559	–2.286			✓
NA	meal tour constant	–3.143	–2.014			✓
NA	meal stop constant	0.468	0.628	✓		
NA	meal purpose * person is part-time worker	–0.259	0.966			✓
NA	meal purpose * person is retired adult	0.000	0.013	✓		
NA	meal purpose * person is non-working adult	0.000	–0.172	✓		
NA	meal purpose * person is university student	0.000	–2.336			✓
NA	meal purpose * person is student age 16+	–0.432	–2.285			✓
NA	social or recreational tour constant	–2.296	–0.086			✓
NA	social or recreational stop constant	1.044	0.804		✓	
NA	social or recreational purpose * person is part-time worker	0.000	–1.050			✓
NA	social or recreational purpose * person is retired adult	0.000	–0.477		✓	
NA	social or recreational purpose * person is non-working adult	0.000	0.030	✓		
NA	social or recreational purpose * person is university student	0.000	–0.740			✓
NA	social or recreational purpose * person is student age 16+	0.000	–0.024	✓		
NA	social or recreational purpose * person is student age 5–15	0.328	0.278	✓		
Overall mean APLD across variables				85.4%		

Note: Number of variables in the model = 350; number of variables that were calibrated = 48.

Table B.18. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Work-Based Sub-Tour Generation Model

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	work stop	–0.226	–1.886			✓
NA	school stop	–2.189	–2.569		✓	
NA	escort stop	–3.136	–3.809		✓	
NA	personal business stop	–1.400	–1.751		✓	
NA	shopping stop	–1.796	–2.155		✓	
NA	meal stop	–0.271	–0.425	✓		
NA	social or recreational stop	–1.730	–2.130		✓	
NA	no more stops	1.575	2.975			✓
Overall mean APLD across variables				71.7%		

Note: Number of variables in the model = 15; number of variables that were calibrated = 8.

Table B.19. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Exact Number of Person Tours

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	2+ work tours * person is university student	0.000	1.660			✓
NA	2+ work tours * person is student age 16+	0.000	1.560			✓
NA	2+ escort tours * person is retired adult	0.000	–0.420		✓	
NA	2+ escort tours * person is non-working adult	0.392	–0.392			✓
NA	2+ escort tours * person is university student	0.000	2.120			✓
NA	2+ personal business tours * person is part-time worker	0.000	–1.340			✓
NA	2+ shopping tours * person is student age 5–15	–1.112	1.042			✓
NA	2+ social or recreational tours * person is part-time worker	0.000	0.860			✓
Overall mean APLD across variables				324.5%		

Note: Number of variables in the model = 295; number of variables that were calibrated = 8.

Table B.20. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Intermediate-Stop Generation Model

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	Origin to destination half tour has one intermediate stop	0.426	–0.576			✓
NA	Origin to destination half tour has two intermediate stops	0.530	–0.480			✓
NA	Origin to destination half tour has three intermediate stops	0.750	–0.250			✓
NA	Origin to destination half tour has four intermediate stops	0.752	–0.252			✓
NA	Destination to origin half tour has one intermediate stop	0.758	–0.248			✓
NA	Destination to origin half tour has two intermediate stops	0.995	0.005			✓
NA	Destination to origin half tour has three intermediate stops	0.953	0.053			✓
NA	Destination to origin half tour has four intermediate stops	1.043	0.043			✓
Overall mean APLD across variables				62.8%		

Note: Number of variables in the model = 106; number of variables that were calibrated = 8.

Table B.21. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Nonmandatory-Tour Destination Model

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
NA	escort tour * distance from origin in 0–1 mile band	–10.572	–9.007			✓
NA	escort tour * distance from origin in 1–3.5 miles band	–3.553	–3.053			✓
NA	escort tour * distance from origin in 3.5–10 miles band	–2.287	–5.237			✓
NA	personal business tour * distance from origin in 0–1 mile band	–11.879	–10.879			✓
NA	personal business tour * distance from origin in 1–3.5 miles band	–3.261	–2.261			✓
NA	personal business tour * distance from origin in 3.5–10 miles band	–1.814	–2.314		✓	
NA	personal business tour * distance from origin in >10 miles band	–0.440	–0.150		✓	
NA	shopping tour * distance from origin in 0–1 mile band	–9.372	–8.372			✓
NA	shopping tour * distance from origin in 1–3.5 miles band	–7.002	–7.502		✓	
NA	shopping tour * distance from origin in 3.5–10 miles band	–2.097	–2.697		✓	
NA	shopping tour * distance from origin in >10 miles band	–0.268	–2.278			✓
NA	meal tour * distance from origin in 0–1 mile band	–15.744	–14.244			✓
NA	meal tour * distance from origin in 3.5–10 miles band	–2.192	–2.692		✓	
NA	meal tour * distance from origin in >10 miles band	–0.381	–2.881			✓
NA	social or recreational tour * distance from origin in 0–1 mile band	–14.078	–13.078			✓
NA	social or recreational tour * distance from origin in 1–3.5 miles band	–3.771	–2.771			✓
NA	social or recreational tour * distance from origin in 3.5–10 miles band	–1.768	–1.928	✓		
NA	social or recreational tour * distance from origin in >10 miles band	–0.233	–1.613			✓
NA	escort tour * require crossing a river	0.000	–0.800			✓
NA	personal business tour * require crossing a river	0.000	–0.800			✓
NA	shopping tour * require crossing a river	0.000	–0.800			✓
NA	meal tour * require crossing a river	0.000	–0.800			✓
NA	social or recreational tour * require crossing a river	0.000	–0.800			✓
NA	destination is located in the home county	0.000	1.000			✓
Overall mean APLD across variables				110.7%		

Note: Number of variables in the model = 101; number of variables that were calibrated = 24.

Table B.22. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Home-Based Work, School, and Escort Tour-Mode Choice Model

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
Tour-mode choice model (tour purpose: work)[a]						
Walk-Transit	Walk-Transit	–1.918	–2.118	✓		
Shared Ride 3+	Shared Ride 3+	–0.970	–0.440			✓
Shared Ride 2	Shared Ride 2	–0.437	0.127			✓
Drive Alone	Drive Alone	2.200	2.698			✓
Transit	Transit mode * intersection density at the destination	0.110	0.011	✓		
Transit	Transit mode * accessibility to total employment	0.981	0.000			✓
Drive Alone	Presence of other stops in the tour	–0.318	–0.032		✓	
Bike	Bike mode * accessibility to total employment	0.153	0.000	✓		
Overall mean APLD across variables					43.4%	
Tour-mode choice model (tour purpose: school)[b]						
School bus	School bus	–1.194	–0.014			✓
Walk-Transit	Walk-Transit	–3.891	–4.891			✓
Shared Ride 3+	Shared Ride 3+	–0.436	–0.140		✓	
Shared Ride 2	Shared Ride 2	–1.076	–1.086	✓		
Drive Alone	Drive Alone	1.215	1.785			✓
Walk	Walk mode * university student	–0.738	–0.007			✓
Bike	Bike mode * accessibility to total employment	0.177	0.000	✓		
Overall mean APLD across variables					75.0%	
Tour-mode choice model (tour purpose: escort)[c]						
Shared Ride 3+	Shared Ride 3+	–2.180	–1.400			✓
Shared Ride 2	Shared Ride 2	–1.302	–0.582			✓
Drive Alone	Drive Alone	–10.000	–9.330			✓
Overall mean APLD across variables					106.3%	

[a]Number of variables in the model = 36; number of variables that were calibrated = 8.
[b]Number of variables in the model = 42; number of variables that were calibrated = 7.
[c]Number of variables in the model = 15; number of variables that were calibrated = 3.

Table B.23. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Other-Tour-Mode Choice Model and Work-Based Sub-Tour-Mode Choice Model

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
Tour-mode choice model (tour purpose: other home-based tours)[a]						
Walk-Transit	Walk-Transit	–4.420	0.140			✓
Walk-Transit	Walk-Transit mode * no cars in household	4.946	2.901			✓
Shared Ride 3+	Shared Ride 3+	–0.811	–1.481		✓	
Shared Ride 2	Shared Ride 2	–0.723	–1.583			✓
Shared Ride	Shared Ride * no cars in household	–0.929	–0.669		✓	
Drive-Transit	Drive-Transit	1.215	0.425			✓
Bike	Bike	–6.577	–5.477			✓
Bike	Bike mode * male	1.036	2.026			✓
Transit	Transit mode * origin is located in a mixed land use parcel	1.985	1.345		✓	
Transit	Transit mode * accessibility to total employment	0.156	0.000	✓		
Shared Ride	Shopping tour * Shared Ride	0.728	0.073		✓	
Shared Ride	Meal tour * Shared Ride	2.174	1.174			✓
Bike	Bike mode * accessibility to other residence	0.810	0.001			✓
Bike	Bike mode * accessibility to total employment	0.564	0.000		✓	
Walk	Meal tour * walk	1.238	3.288			✓
Walk	Social recreation tour * walk	1.353	3.343			✓
Walk	Walk mode * accessibility to other residence	0.834	0.002			✓
Walk	Walk mode * accessibility to total employment	0.109	0.000	✓		
Overall mean APLD across variables				653.0%		
Work-based sub-tour-mode choice model[b]						
Shared Ride 3+	Shared Ride 3+	–2.635	–2.575	✓		
Shared Ride 2	Shared Ride 2	–1.775	–1.825	✓		
Drive Alone	Drive Alone	–2.307	–2.802		✓	
Drive Alone	Traveled to work by drive alone	2.768	2.778	✓		
Drive Alone	Traveled to work by shared ride	2.033	1.843	✓		
Bike	Bike mode * male	–0.761	–0.076			✓
Overall mean APLD across variables				27.8%		

[a] Number of variables in the model = 45; number of variables that were calibrated = 18.

[b] Number of variables in the model = 17; number of variables that were calibrated = 6.

Table B.24. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Tour-Time-of-Day Choice Model for Home-Based Work Tours

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
tour arrival time 03:00–05:59	tour arrival time 03:00–05:59	–2.339	–3.219			✓
tour arrival time 06:00–06:59	tour arrival time 06:00–06:59	–0.671	–0.441		✓	
tour arrival time 07:00–07:59	tour arrival time 07:00–07:59	–0.182	–0.202	✓		
tour arrival time 08:00–08:59	tour arrival time 08:00–08:59	0.000	–0.690		✓	
tour arrival time 09:00–09:59	tour arrival time 09:00–09:59	–0.936	–0.546		✓	
tour arrival time 10:00–12:59	tour arrival time 10:00–12:59	–1.777	–2.097		✓	
tour arrival time 13:00–15:59	tour arrival time 13:00–15:59	–1.867	–1.297			✓
tour arrival time 16:00–18:59	tour arrival time 16:00–18:59	–2.266	–1.956		✓	
tour departure time 03:00–06:59	tour departure time 03:00–06:59	–1.186	–3.826			✓
tour departure time 10:00–12:59	tour departure time 10:00–12:59	–0.675	–0.585	✓		
tour departure time 13:00–14:59	tour departure time 13:00–14:59	–0.569	–0.339		✓	
tour departure time 17:00–17:59	tour departure time 17:00–17:59	0.364	–0.214		✓	
tour departure time 18:00–18:59	tour departure time 18:00–18:59	–0.726	–1.276		✓	
tour departure time 19:00–20:59	tour departure time 19:00–20:59	–1.836	–1.286			✓
duration 7 to 8 hours	duration 7 to 8 hours	0.616	0.866		✓	
duration 9 hours	duration 9 hours	0.000	0.290		✓	
Overall mean APLD across variables				42.1%		

Note: Number of variables in the model = 74; number of variables that were calibrated = 16.

Table B.25. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Tour-Time-of-Day Choice Model for Home-Based School Tours

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
tour arrival time 06:00–06:59	tour arrival time 06:00–06:59	–3.254	–2.064			✓
tour arrival time 07:00–07:59	tour arrival time 07:00–07:59	–0.216	–0.436	✓		
tour arrival time 09:00–09:59	tour arrival time 09:00–09:59	–1.261	–1.341	✓		
tour departure time 13:00–15:59	tour departure time 13:00–15:59	–2.943	–2.673		✓	
tour arrival time 16:00–18:59	tour arrival time 16:00–18:59	–2.042	–1.792		✓	
tour departure time 07:00–09:59	tour departure time 07:00–09:59	–0.701	–1.408			✓
tour departure time 10:00–12:59	tour departure time 10:00–12:59	0.902	–0.152			✓
tour departure time 13:00–14:59	tour departure time 13:00–14:59	1.612	2.308			✓
tour departure time 17:00–17:59	tour departure time 17:00–17:59	–0.105	–0.665		✓	
tour departure time 18:00–18:59	tour departure time 18:00–18:59	–0.920	–2.270			✓
tour departure time 21:00–23:59	tour departure time 21:00–23:59	–2.230	–1.420			✓
Overall mean APLD across variables				70.3%		

Note: Number of variables in the model = 68; number of variables that were calibrated = 11.

Table B.26. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Tour-Time-of-Day Choice Model for Home-Based Other and Work-Based Sub-Tours

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
Tour-time-of-day choice model (tour purpose: other home-based tour)[a]						
tour arrival time 19:00–21:59	tour arrival time 19:00–21:59	0.292	–0.032		✓	
tour departure time 17:00–17:59	tour departure time 17:00–17:59	–0.281	–0.251	✓		
tour departure time 18:00–18:59	tour departure time 18:00–18:59	–0.402	–0.232	✓		
tour departure time 19:00–20:59	tour departure time 19:00–20:59	–0.267	–0.057		✓	
tour departure time 21:00–23:59	tour departure time 21:00–23:59	–0.342	–0.302	✓		
Overall mean APLD across variables				15.3%		
Work-based sub-tour time-of-day choice model[b]						
tour arrival time 03:00–05:59	tour arrival time 03:00–05:59	–0.452	–2.762			✓
tour arrival time 07:00–07:59	tour arrival time 07:00–07:59	–0.275	–2.295			✓
tour arrival time 08:00–08:59	tour arrival time 08:00–08:59	0.000	–1.650			✓
tour arrival time 10:00–12:59	tour arrival time 10:00–12:59	–0.187	0.897			✓
tour arrival time 13:00–15:59	tour arrival time 13:00–15:59	–1.603	–0.803			✓
tour arrival time 16:00–18:59	tour arrival time 16:00–18:59	–2.623	–4.973			✓
tour arrival time 19:00–21:59	tour arrival time 19:00–21:59	–4.415	–7.415			✓
tour departure time 07:00–09:59	tour departure time 07:00–09:59	0.470	0.047		✓	
tour departure time 10:00–12:59	tour departure time 10:00–12:59	0.598	1.058			✓
tour departure time 13:00–14:59	tour departure time 13:00–14:59	0.622	1.322			✓
Overall mean APLD across variables				95.5%		

[a]Number of variables in the model = 95; number of variables that were calibrated = 5.
[b]Number of variables in the model = 50; number of variables that were calibrated = 10.

Table B.27. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Trip-Mode Choice Model

Alternative	Variable/ Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD)		
				Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
Walk-transit	Walk-transit	–0.791	1.201			✓
Overall mean APLD across variables				633.7%		

Note: Number of variables in the model = 65; number of variables that were calibrated = 1.

Table B.28. Comparison Between Sacramento and Calibrated Jacksonville Model Coefficients: Trip-Time-of-Day Choice Model

Alternative	Variable/Interaction Term	SACOG	Jacksonville	Absolute Percentage Logit Difference (APLD) Low (APLD ≤ 20%)	Medium (20% < APLD ≤ 50%)	High (APLD > 50%)
arrival time 03:00–05:59	arrival time 03:00–05:59	–5.227	–5.587		✓	
arrival time 06:00–06:59	arrival time 06:00–06:59	–3.052	–4.042			✓
arrival time 07:00–07:59	arrival time 07:00–07:59	–1.089	–2.349			✓
arrival time 08:00–08:59	arrival time 08:00–08:59	0.000	0.000	✓		
arrival time 09:00–09:59	arrival time 09:00–09:59	0.641	0.751	✓		
arrival time 10:00–12:59	arrival time 10:00–12:59	1.376	2.196			✓
arrival time 13:00–15:59	arrival time 13:00–15:59	2.267	2.897			✓
arrival time 16:00–18:59	arrival time 16:00–18:59	3.530	3.390	✓		
departure time 03:00–06:59	departure time 03:00–06:59	–1.435	–1.665		✓	
departure time 07:00–09:59	departure time 07:00–09:59	–1.170	0.360			✓
departure time 10:00–12:59	departure time 10:00–12:59	–0.770	0.350			✓
departure time 13:00–14:59	departure time 13:00–14:59	–0.725	0.045			✓
departure time 16:00–16:59	departure time 16:00–16:59	–0.820	–0.440		✓	
departure time 17:00–17:59	departure time 17:00–17:59	0.000	0.000	✓		
departure time 18:00–18:59	departure time 18:00–18:59	–0.487	–0.927		✓	
departure time 19:00–20:59	departure time 19:00–20:59	–0.747	–1.287		✓	
departure time 21:00–23:59	departure time 21:00–23:59	–1.132	–2.572			✓
Overall mean APLD across variables				77.0%		

Note: Number of variables in the model = 55; number of variables that were calibrated = 17.

APPENDIX C

Transferability Tests for Six Regions

Concurrent to this project, members of the study team were involved in other, similar transferability tests as part of the FHWA STEP project, Making Advanced Travel Forecasting Methods Affordable Through Model Transferability (Bowman et al. 2014). The overall approach used for estimation-based transferability tests in that project was similar to what was used for this project and reported in this document and in Appendix A. There were, however, some important differences:

- The FHWA STEP project used 2009 NHTS data from six different regions, including the Tampa and Jacksonville regions in Florida, as well as the Sacramento, San Diego, San Joaquin, and Fresno regions in California. This provided a more consistent comparison across regions, because the survey data were collected at the same time with the same survey instrument.
- For the Tampa and Jacksonville regions (as well as Sacramento and Fresno), the parcel data for land use was aggregated to Census block-sized "microzones," so that all six regions in the study would be using data defined at the same level of aggregation. (The San Diego and San Joaquin regions did not have parcel data available.)
- For Jacksonville, the 2005 land-use data and skims were used rather than the new 2010 base year data. (That same 2005 data was used as the basis for the main C10A study.)
- For Tampa, the 2010 land-use data and skims were used for the FHWA study, but at an earlier stage of development, so some refinement of the Tampa data has been done for this study since the time of the FHWA analysis.
- The specifications of the original Sacramento models were simplified in some cases to make them more "estimable" on the data across the regions.

Given those caveats regarding the differences between the FHWA STEP analysis and the analysis done for this project, it is useful to look at the summary of results from that study with regard to the transferability of the Tampa and Jacksonville NHTS data versus the corresponding travel data from the other regions.

Figure C.1 plots the differences between the Tampa and Jacksonville model estimates by model type in terms of the percentage of coefficients that are significantly different, insignificantly different, or not estimable in one region and/or the other. Note that the list of 14 models is slightly different from the list of 17 models tested for this project; and it includes two models (usual work location, person-day tour generation) that were not included in this project. As was found here and described in this report, the mode choice models have the most inestimable parameters, particularly the parameters for the bike and transit modes for work and school tours, which are generally not observed in the NHTS data. The largest numbers of significant differences are in the destination choice models (usual work location, other tour destination, and intermediate-stop location). That result suggests that in transferring and calibrating a model from another region, a good deal of attention should be paid to the destination choice models and how well they can predict observed origin–destination patterns and replicate screen line data.

The work-based sub-tour generation model has no significant differences because there are so few work-based subtours observed in the NHTS data, and no significant statistical relationships can be estimated (as already mentioned). For that reason, any other models related to work-based subtours were excluded from the FHWA analysis.

In general, the tour generation models and tour time-of-day models transfer relatively well between the regions, with few inestimable parameters or significant differences. These types of models, which are generally focused on household and individual social organization more than on land use and accessibility, seem to transfer more readily across regions.

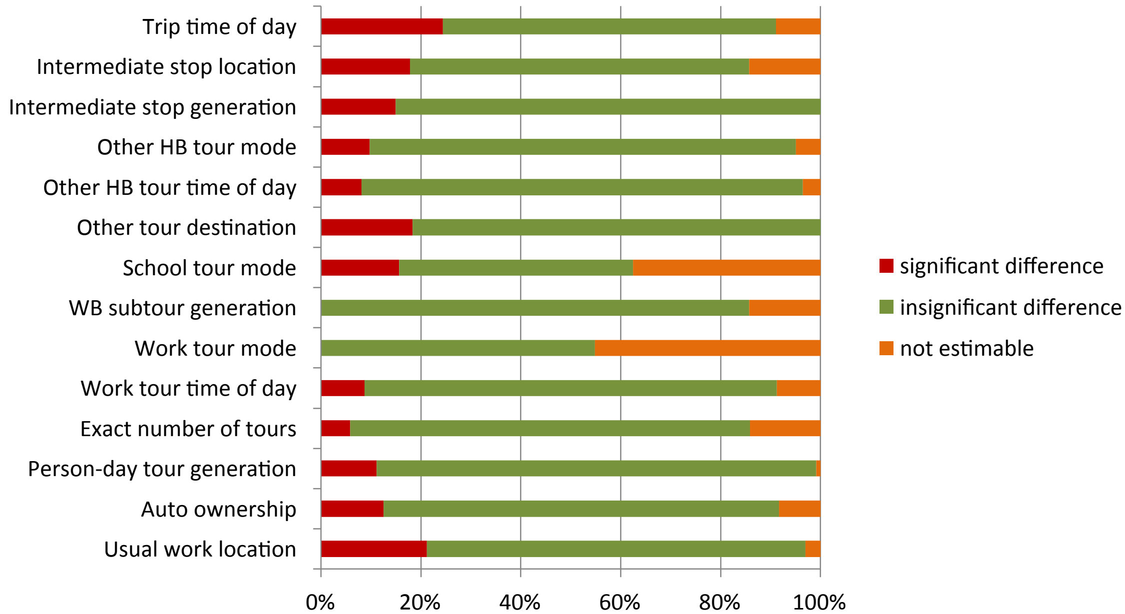

Figure C.1. Estimated differences between Tampa and Jacksonville coefficient estimates, by type of choice model.

Figure C.2 is the same type of graph as Figure C.1, but the coefficients are classified in terms of the type of variable rather than the type of model. The land-use and impedance measures have the greatest number of inestimable parameters, and these are mainly associated with the transit and bike modes in the mode choice models. The log-sum coefficients and land-use measures tend to show the highest percentage of significant differences—many of these are the mode choice log-sum effects and size variables in the location choice models. There are relatively few significant differences for person and household characteristics, or for those impedance variables (time and cost) that could be estimated.

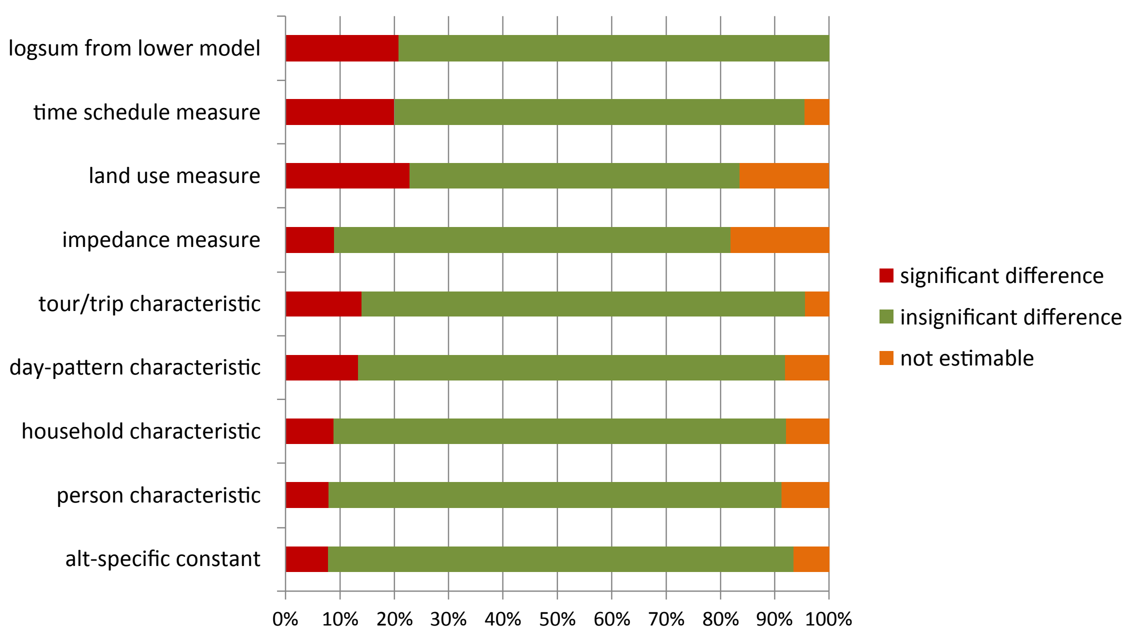

Figure C.2. Estimated differences between Tampa and Jacksonville coefficient estimates, by type of variable.

Conclusions from the Initial FHWA STEP Model Transferability Research

The paragraphs and charts that follow are from the Conclusions section of Bowman et al. (2014).

In the FHWA study, although small sample sizes limited the ability to draw strong conclusions about comparability among the four California regions and two Florida regions included in this study, there is some substantial evidence of comparability among them. This is shown in Figure C.3, where it can be seen that, for all regions, the differences from the two-state model (where the data were pooled across all six regions in both states) are insignificant for over 80 percent of the coefficients; however, Tampa stands out as less comparable than the others. This study did not identify the exact reason, although the socioeconomic data show a much higher presence of all-senior households in Tampa. The California regions are more comparable within state than across states, perhaps because of the presence of Tampa in the two-state comparison. The issue with Tampa draws attention to the likelihood that there may be factors that would cause two regions, even two regions within the same state, to be bad candidates for a model transfer. (Bowman et al. 2013).

The FHWA study did not explore comparability for regions in states other than California and Florida; estimability and comparability for a full spectrum of sample sizes, especially samples with more than 2,500 households; or comparability in categories other than state boundaries, such as urban density, size, or socioeconomic make-up. For example, university towns or cities with a large seasonal retirement population may be distinctly different in ways that make transferring from other regions inadvisable, and this study lacks evidence to draw conclusions one way or the other. These remain important avenues for further research.

In some cases, there may be good reasons for transferring a model from a region that is *not* currently comparable if there is reason to believe that it will be comparable in the future. For example, a region may be growing rapidly and/or adding new travel options but lacks the data to develop a model that would serve it well even if it could conduct a very large household interview survey. The diversity of conditions needed to estimate the coefficients of the model simply may not exist within the region. In a case such as that, perhaps a model transfer should be considered.

The FHWA study is also limited in its ability to determine what sample size is large enough for local estimation, because the largest sample in this study includes only 6,000 households and the rest are 2,500 or less. However, as shown in Figure C.4, where estimation results for each region are compared to the two-state combined models, the results show that a sample of 6,000 households provides much better information for estimating activity-based model coefficients than samples of size 2,500 or less. It is also likely that sample sizes considerably larger than 6,000 would substantially improve estimation results, enabling significant coefficient estimates for important small population segments.

Although it is not possible to make a definitive statement about the transferability of activity-based models based in the FHWA study, the study provides some new and unique evidence. Overall, although the strictest statistical tests (chi-squared test of model equality) usually rejected the hypothesis that models based on data from different regions are statistically indistinguishable, it is also true that most of the individual coefficients are not significantly different from one region to the next. In addition, this study shows the substantial improvement of estimability that occurs with large survey samples. Based on these findings, the most important conclusion of this study is that, although estimation of models using a large local sample is best, it is better to transfer models that are based on a large sample from a comparable region than it is to estimate new models using a much smaller local sample.

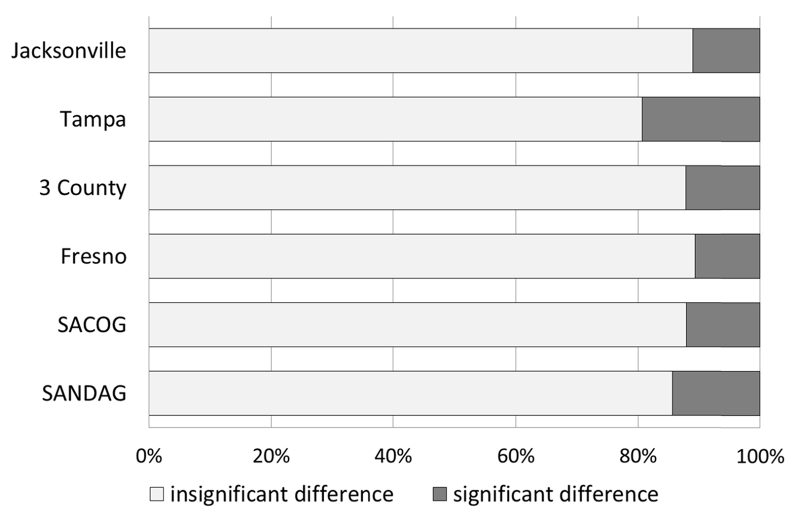

Figure C.3. Significance of parameter estimate differences between regional model and two-state model, by region (excluding inestimable parameters).

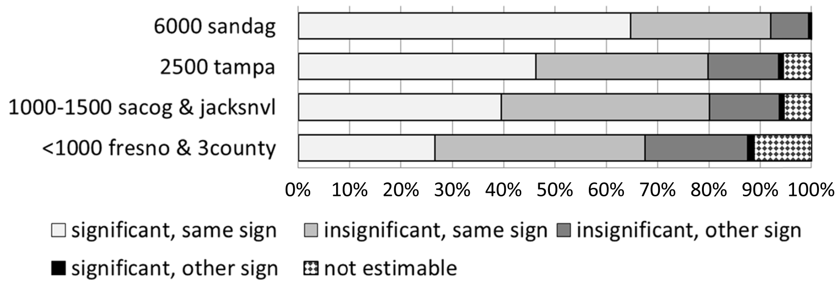

Figure C.4. Significance and sign of parameter estimates, by number of survey households.

This conclusion does not mean, however, that metropolitan regions can relegate survey data collection and model development to the past and simply borrow a model from others who have gone before. Even if a comparable region and its model can be found, survey data should be collected for purposes of calibrating components of the model, such as activity and tour generation, which cannot be calibrated using traffic count data.

References

Bowman, J. L., M. Bradley, and J. Castiglione. 2013. Making Advanced Travel Forecasting Models Affordable Through Model Transferability. Final Report. Prepared for Federal Highway Administration, U.S. Department of Transportation, Washington, D.C.

Bowman, J. L., M. Bradley, J. Castiglione, and S. L. Yoder. 2014. Making Advanced Travel Forecasting Models Affordable Through Model Transferability. Presented at the 93rd Annual Meeting of the Transportation Research Board, Washington, D.C., January.

Related SHRP 2 Research

Improving Our Understanding of How Highway Congestion and Pricing Affect Travel Demand (C04)

Dynamic, Integrated Model System: Jacksonville-Area Application (C10A)

Dynamic, Integrated Model System: Sacramento-Area Application (C10B)

Activity-Based Travel Demand Models: A Primer (C46)