



# AVs and TNCs in DaySim

SACOG presentation

January 17, 2019

# DaySim Enhancements

- Vehicle type (AV versus non-AV) model run as part of the auto ownership model
  - “All or nothing” decision – if household owns AVs, all vehicles owned by household are autonomous (e.g. no mixing)
- Paid rideshare (TNC) mode added to mode choice
  - One TNC mode. Not yet separate modes for single-ride (UberX) versus shared-ride (UberPool) TNC.
  - Also added as an access mode to transit (similar to “kiss and ride”)
- Separate skims\trip tables and assignment for TNCs or AVs is optional
  - Would require significant Cube script changes
- No vehicle repositioning (“deadheading”) model for TNCs or private AVs
  - Can add multiplicative factors on AV trips to reflect increased VMT for repositioning



# Use of these new DaySim capabilities

- **Jacksonville**
  - Exploratory modeling and analysis for FHWA, with Caliper and TransModeler DTA
  - NFTPO is starting to tests scenarios for their next RTP
- **San Francisco**
  - SFCTA is using for their SFConnect scenarios
- **Seattle/Tacoma**
  - PSRC is starting to tests scenarios for their next RTP
- **Sacramento**
  - TNC mode estimated in mode choice models on new household travel survey data.
  - SACOG is testing scenarios for the new RTP, which we will hear about after this presentation...

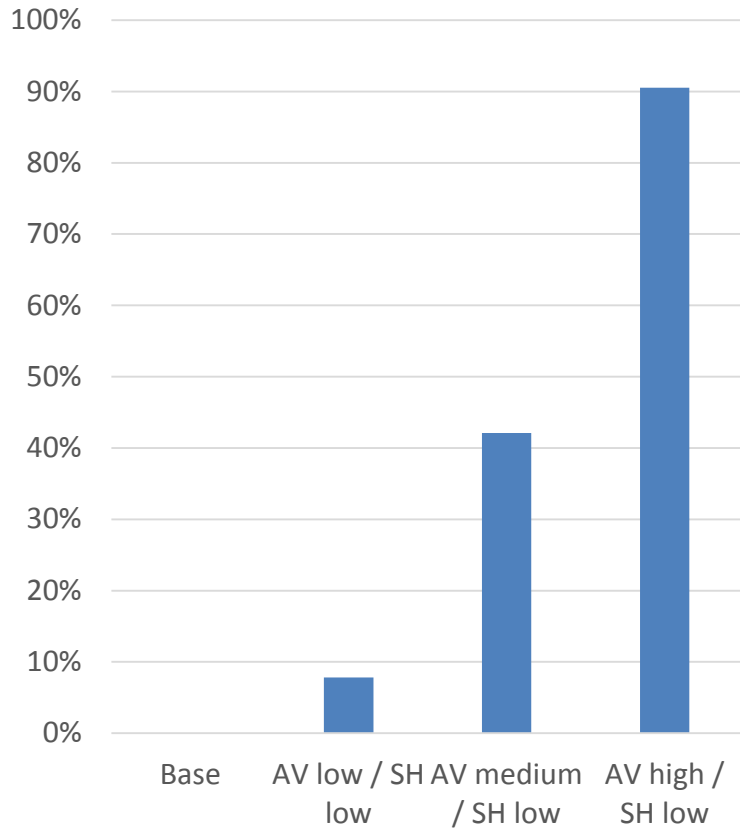


# AV Ownership

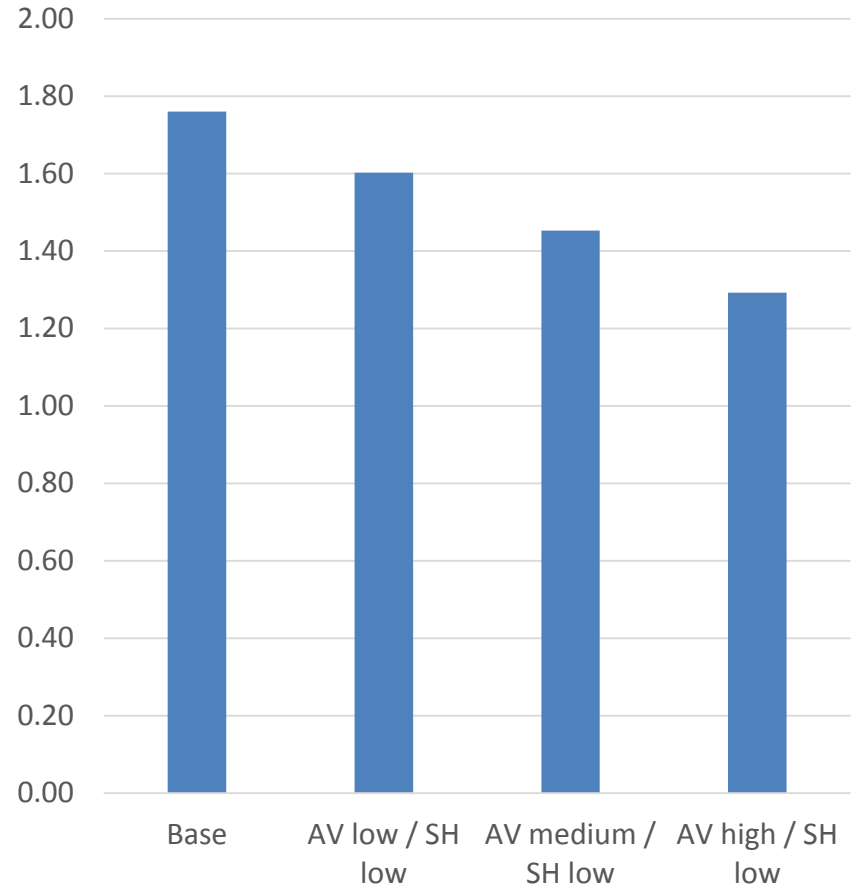
- Influenced by income (+), age of household head (-), commute time (+). (The age effects can be “turned off” for future scenarios.)
- AV ownership can be specified to increase the chance that the household owns fewer vehicles than drivers
- Auto ownership level can also be influenced by land use density to reflect increased use of shared vehicles in denser areas.
- The share of households owning autonomous vehicles is set by the user as a scenario variable. (It is NOT a forecast.)



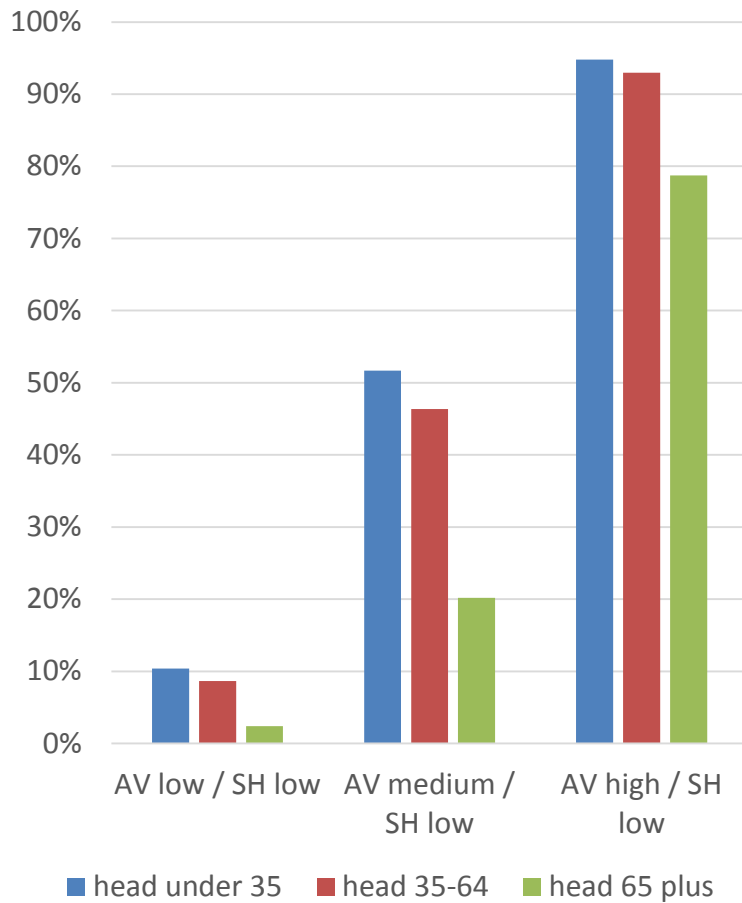
Percent of private vehicles that are AV's by AV scenario



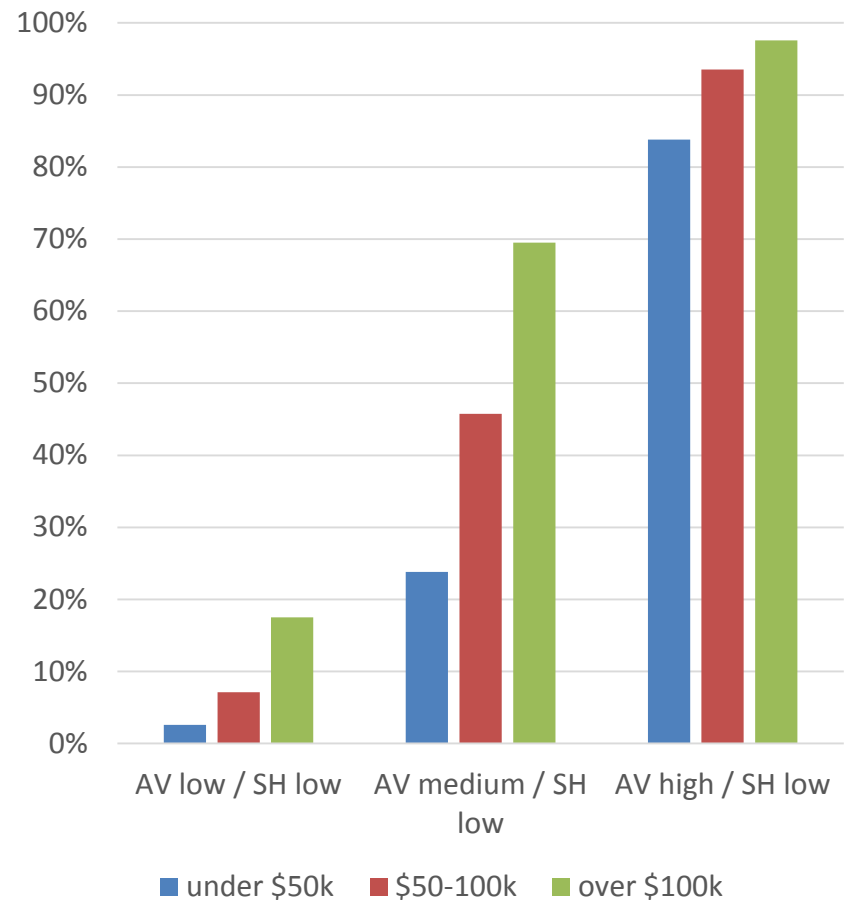
Avg. vehicles/household by AV scenario



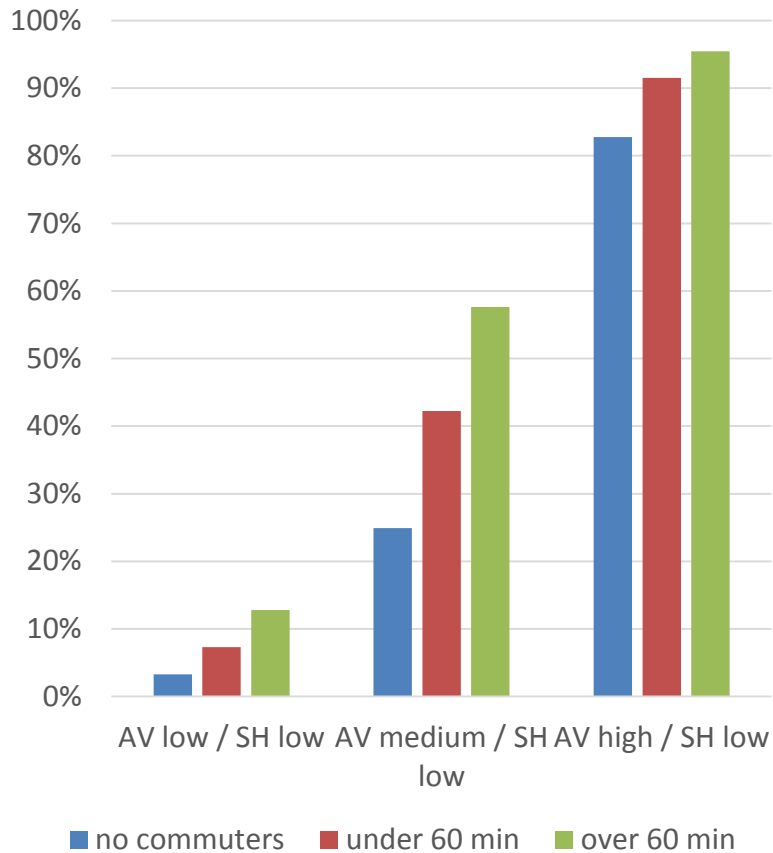
Percent of private vehicles that are AVs by age category of head of household



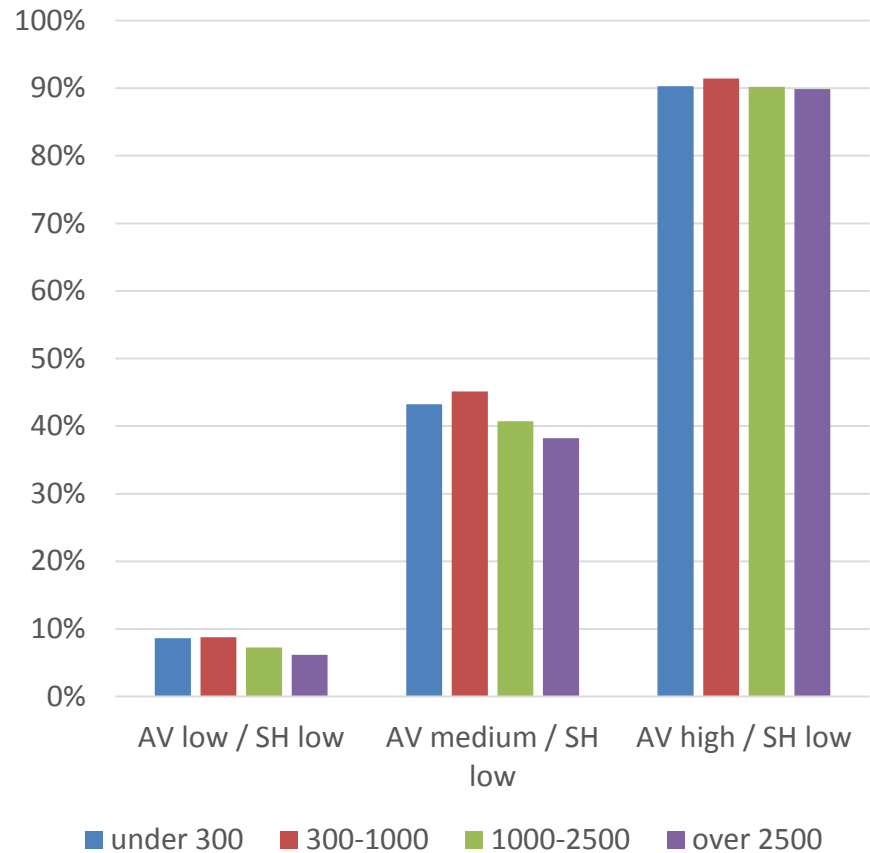
Percent of private vehicles that are AVs by household income category



Percent of private vehicles that are AVs by total household commuting travel time per day



Percent of private vehicles that are AVs by land use density within buffer around residence



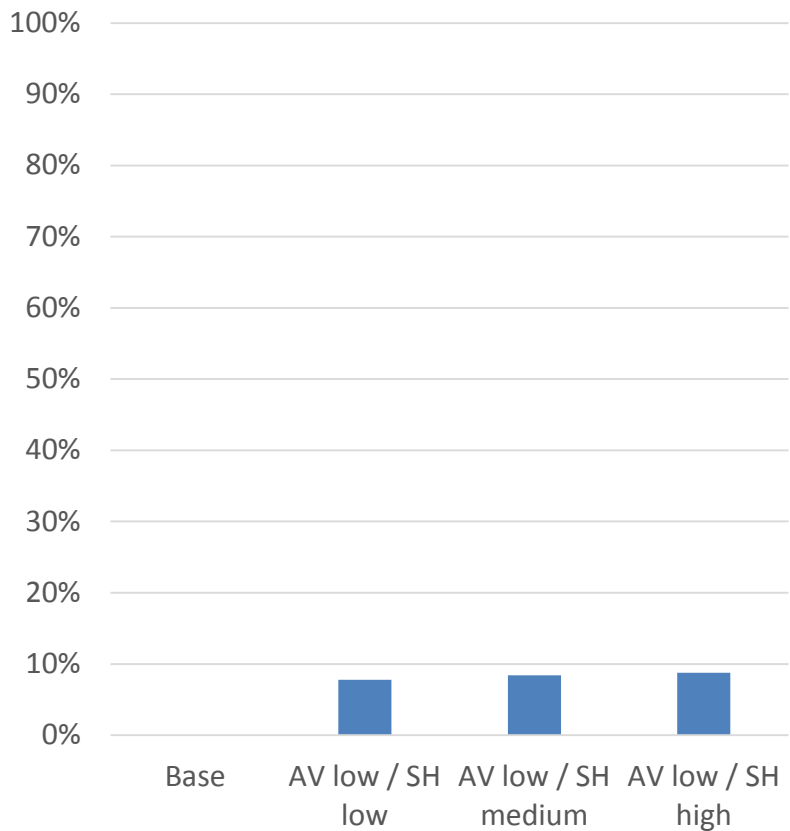
# AVs and TNCs in mode choice

- Can use modified parameters for in-vehicle time, to reflect less stressful/more productive use of time.
  - Can lead to longer trips, more VMT
- TNC costs based on fixed per ride cost and an additional cost per mile
  - Higher per-mile costs lead to shorter trips for TNC.
- TNC availability/wait time effects proxied by land use density
  - TNC use is higher in more urban areas. Can compete with transit use.
- Specify in scenarios whether TNCs are AVs or conventional vehicles (all or nothing)
  
- The mode share for TNCs is set by the user as a scenario input. (It is NOT a forecast.)
- The use also sets the occupancy distribution for TNCs, to reflect the extent of pooled use. (Can have a large effect on VMT.)

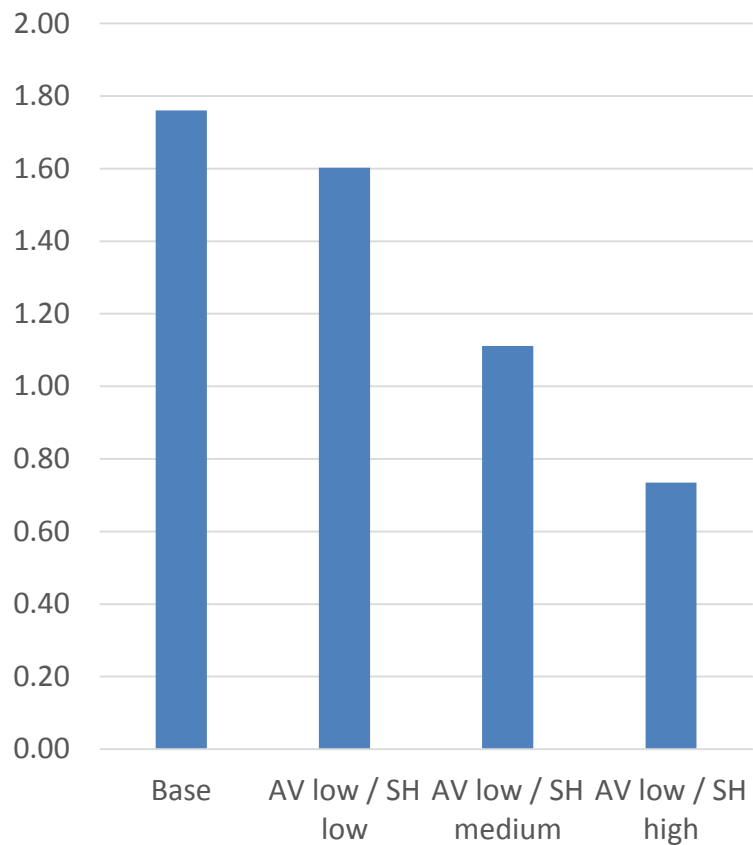




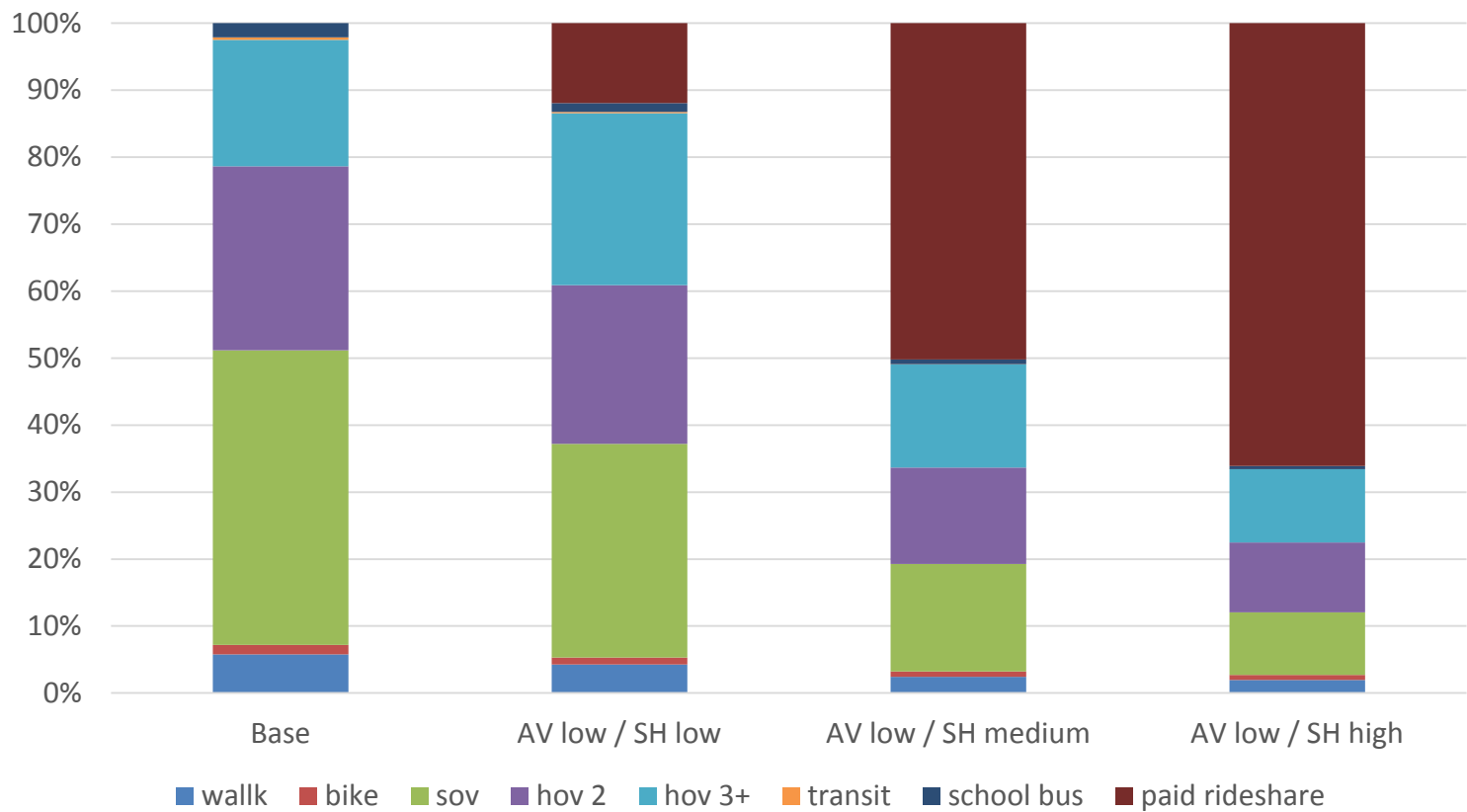
Percent of private vehicles that are AVs by SH scenario



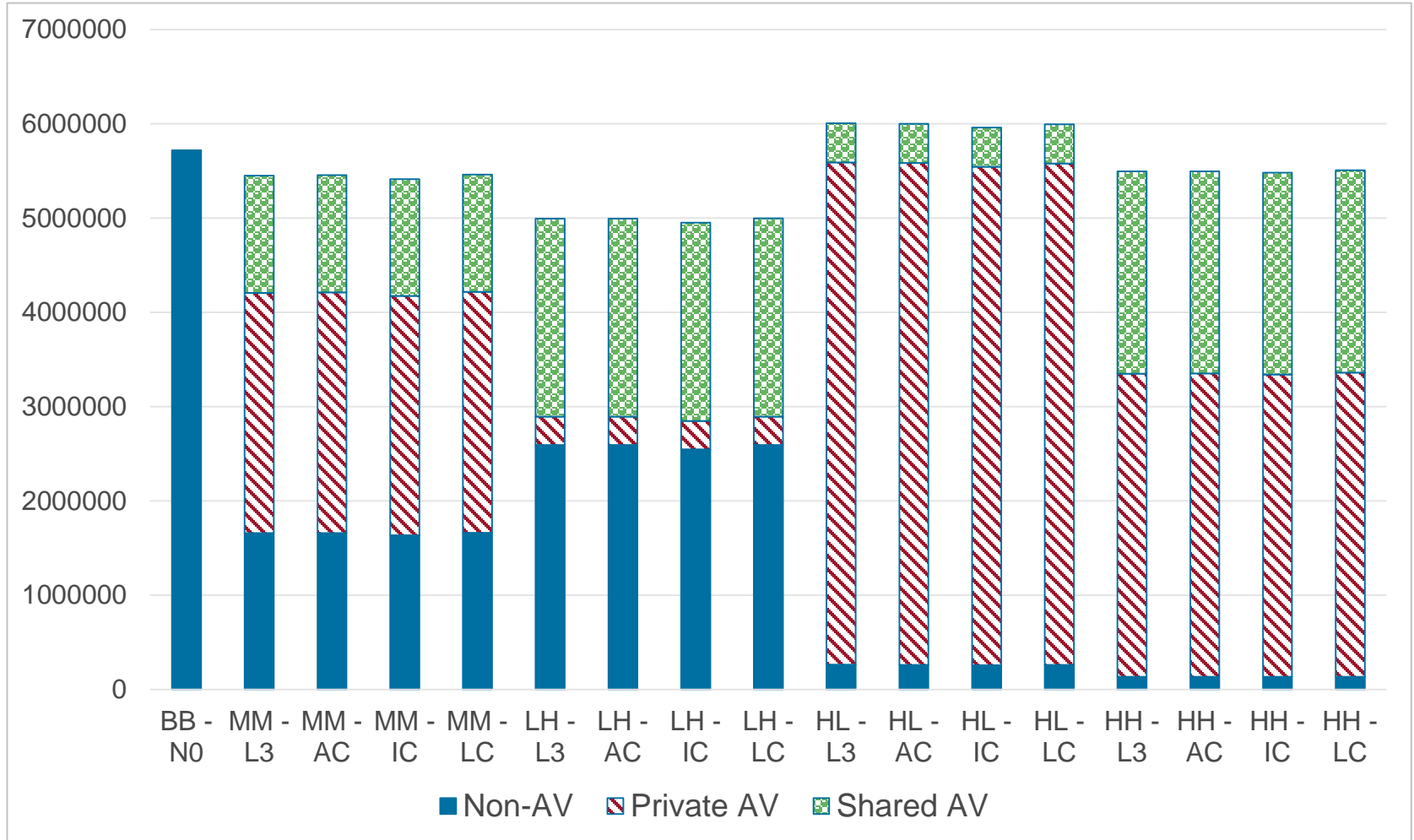
Avg. vehicles/household by scenario



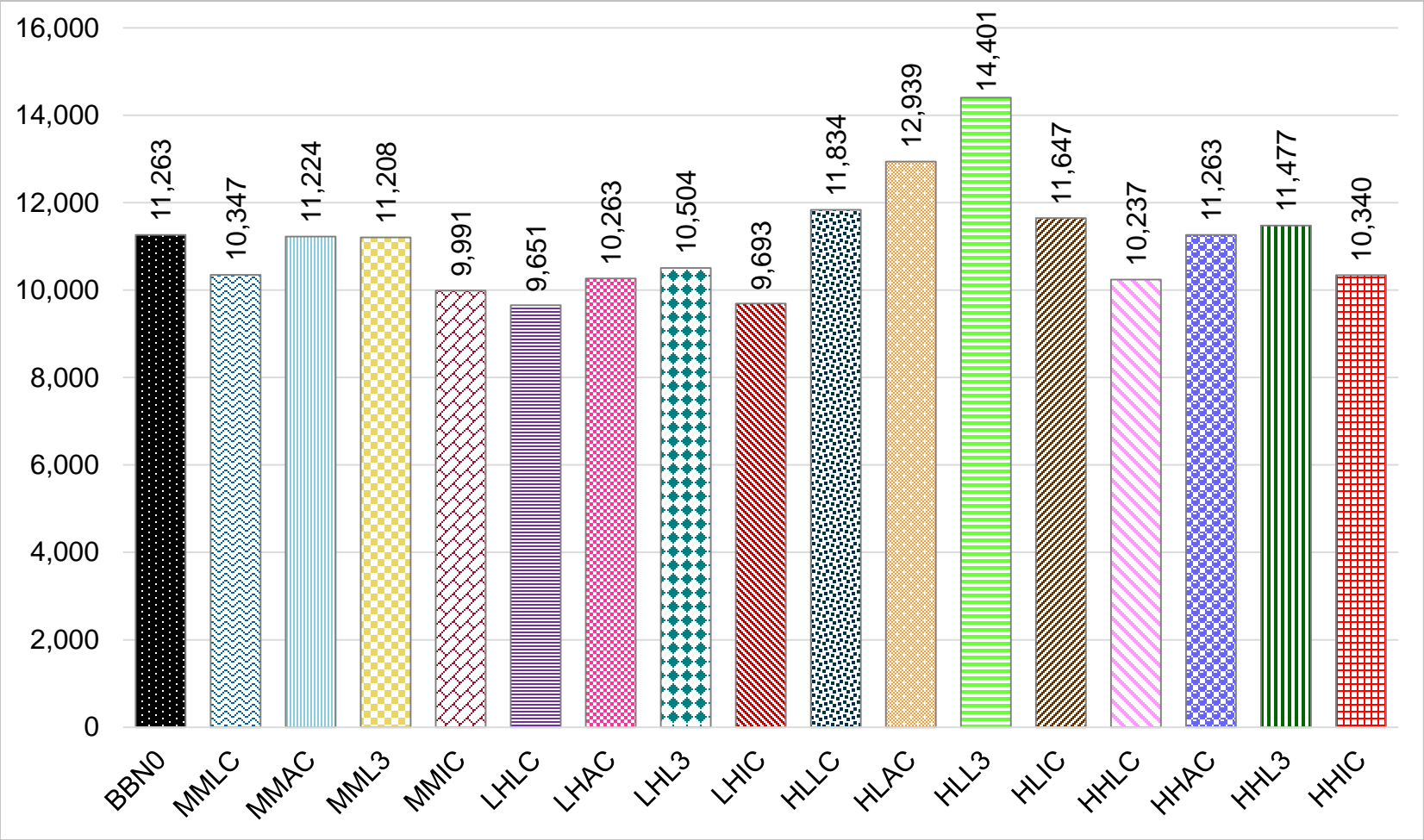
Person-trip mode share by SH scenario



# AM VMT, by Vehicle Type and Scenario



# DTA Vehicle-Hours of Delay, by Scenario



# TNC occupancies and AV/TNC trips

- Can be specified as average persons per vehicle or using a distribution of 1, 2, and 3+ persons
- Cube code must be modified to add TNCs to appropriate trip tables prior to assignment
- Cube scripts can account for vehicle repositioning using TNC trip table factors.
- The same could be done for zero-occupant vehicle (ZOV) trips using private AV trip tables.



# Conclusions

- DaySim provides functionality to reflect our assumptions about future AV and TNC use
- Assumptions about future AV and TNC use, changes in auto ownership, changes in use of other modes, and changes in trip patterns are kept as internally consistent as possible...
- However, DaySim cannot forecast what that future use will be.





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Average distance per person-trip (miles) by scenario

