SCAG ABM
Mobility Choices

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SCAG Modeling Task Force

Modeling and Forecasting

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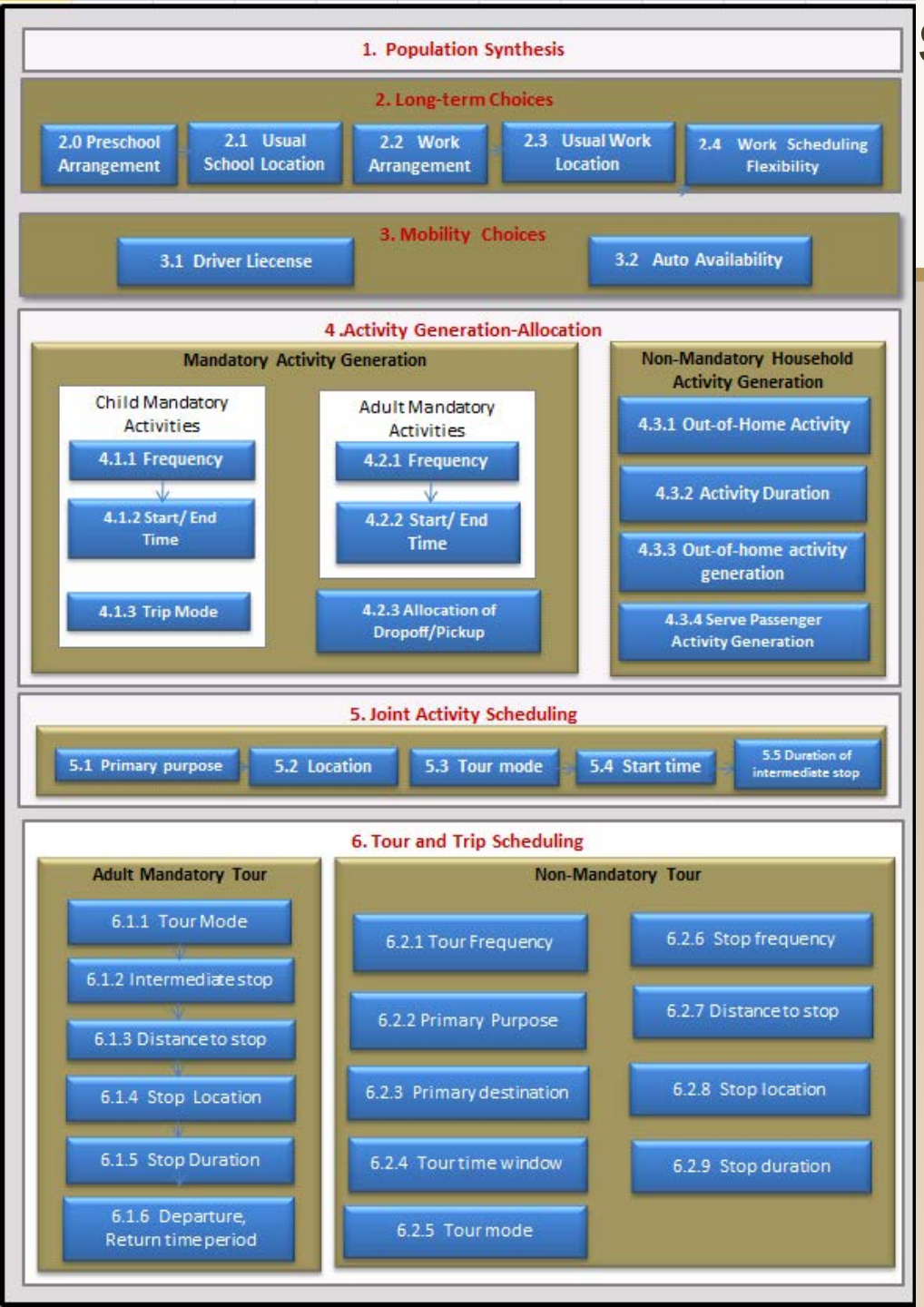
SOUTHERN CALIFORNIA ASSOCIATION of GOVERNMENTS

50 YEARS

Outline

- ABM Flow Chart
- Framework of Mobility Choice Models
- Survey Analysis
- Summary of Model Estimation Results

SCAG Activity Based Model



Person types

Person type	Name
1	Worker
2	Working college student
3	Non-working college student
4	Working HS student
5	Non-working high school student
6	Adult non-worker
7	Children 6-15 years old
8	Children 0-5
9	Non-school kids 6-15

Activity types

- Mandatory
  - Work
  - School
- Non-mandatory
  - Shopping
  - Maintenance
  - Social
  - Entertainment
  - Visit
  - Active Recreation
  - Eat out
  - Other
  - Work-related

Mobility Choice Models

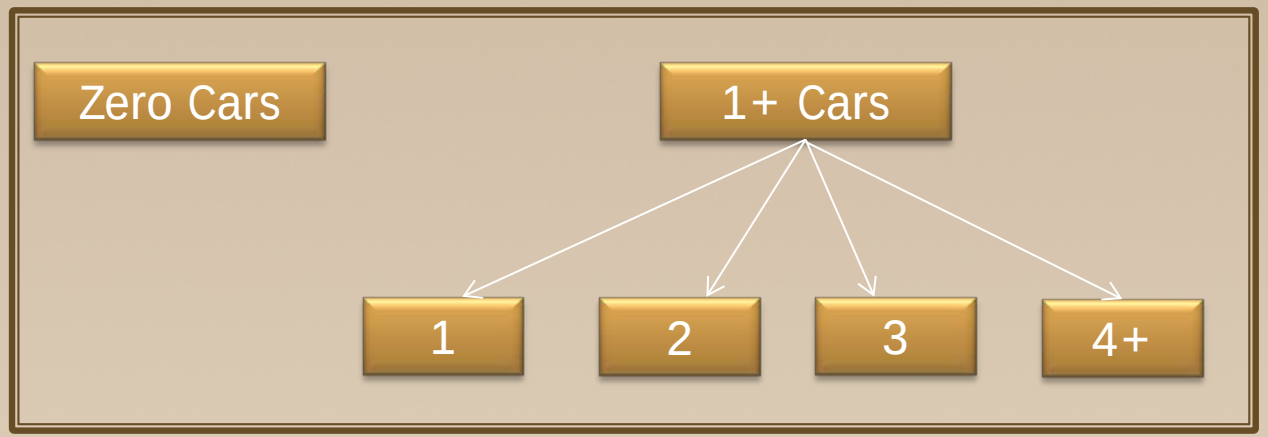
Driver License

- Model predicts whether an individual holds a valid driving license or not
- Binary Logit

Auto Ownership

- Predicts number of household vehicles
- Nested Logit

Model Structure: Auto Ownership



Survey Data Analysis

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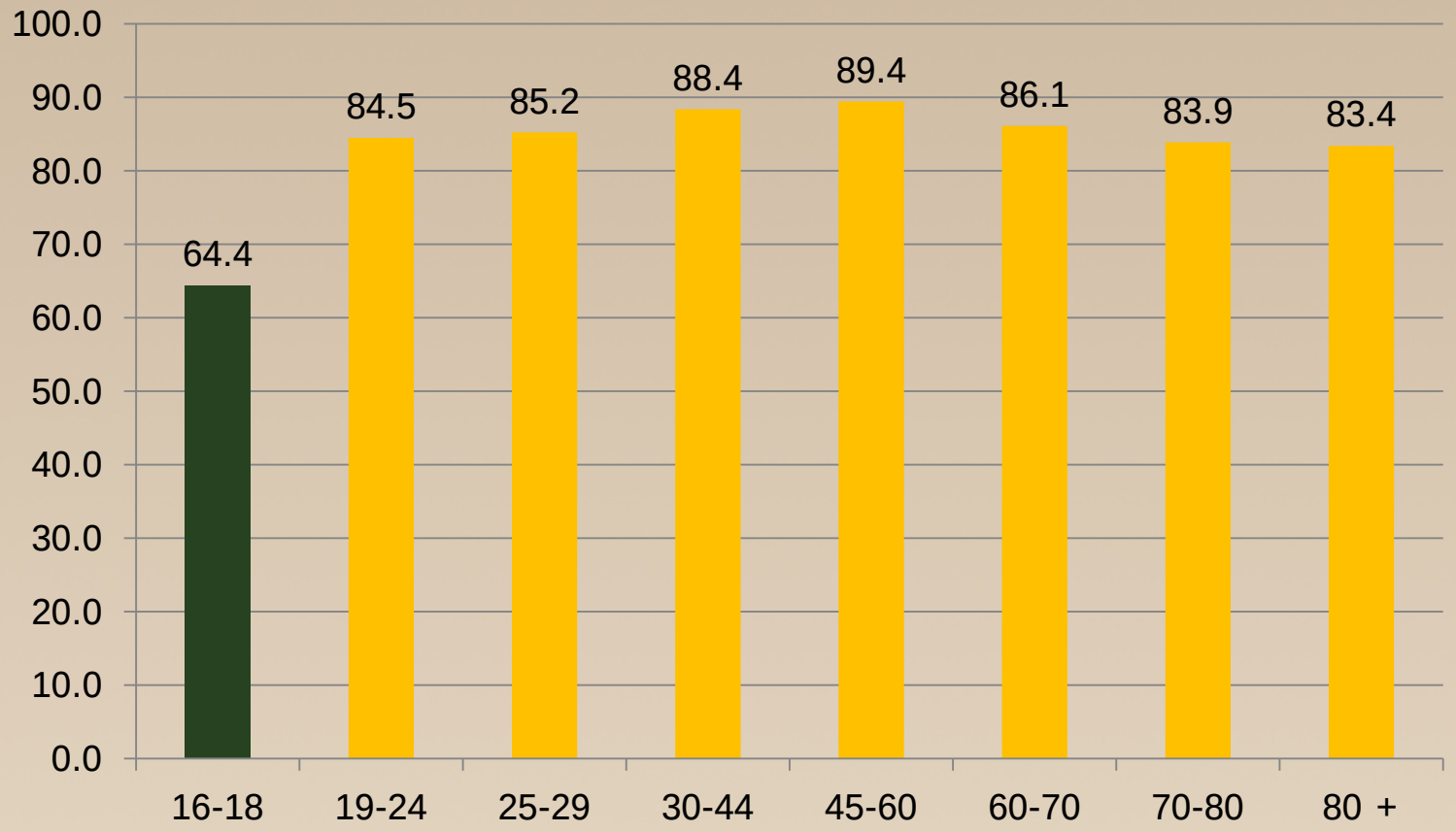
Driver License

- 86.26% of adults age 16 or older have driver license (from HTS un-weighted data)
- After a person get a driver license, she is more likely to keep it. Younger has lower % license than older.
- Assumed it's more related to person type or personal characteristics.

% with License by Age



Younger people (age 16-18) have much lower % .

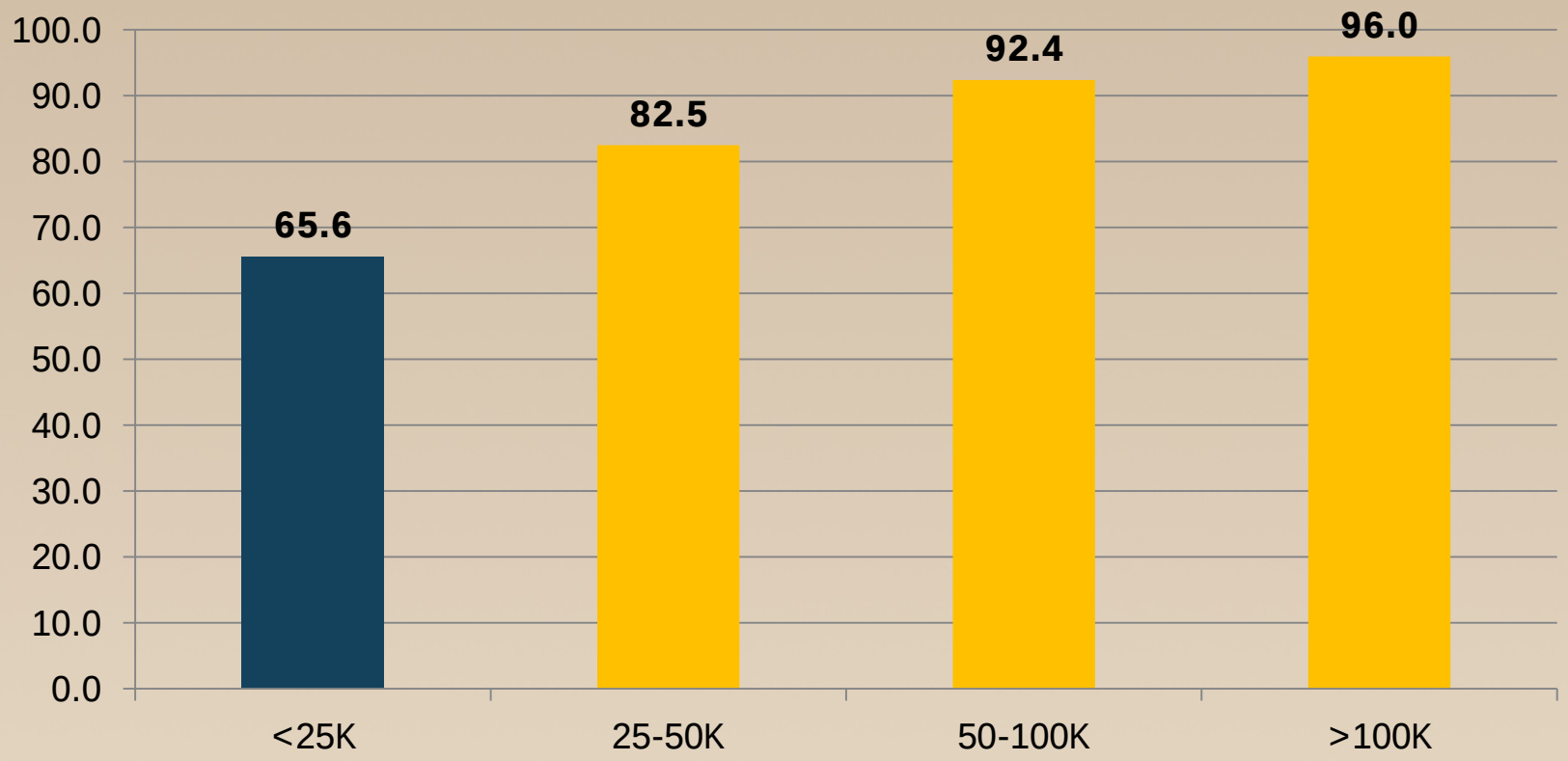
Person Type

- Workers have higher % of driver license

Person Type	% License	Note
Full time worker	**95.26**	Higher %
Part time worker	**89.99**	Higher %
University student	80.06	
Non-worker	80.25	
Retiree	79.05	Correlated with age
Driving age school child	44.71	Correlated with age

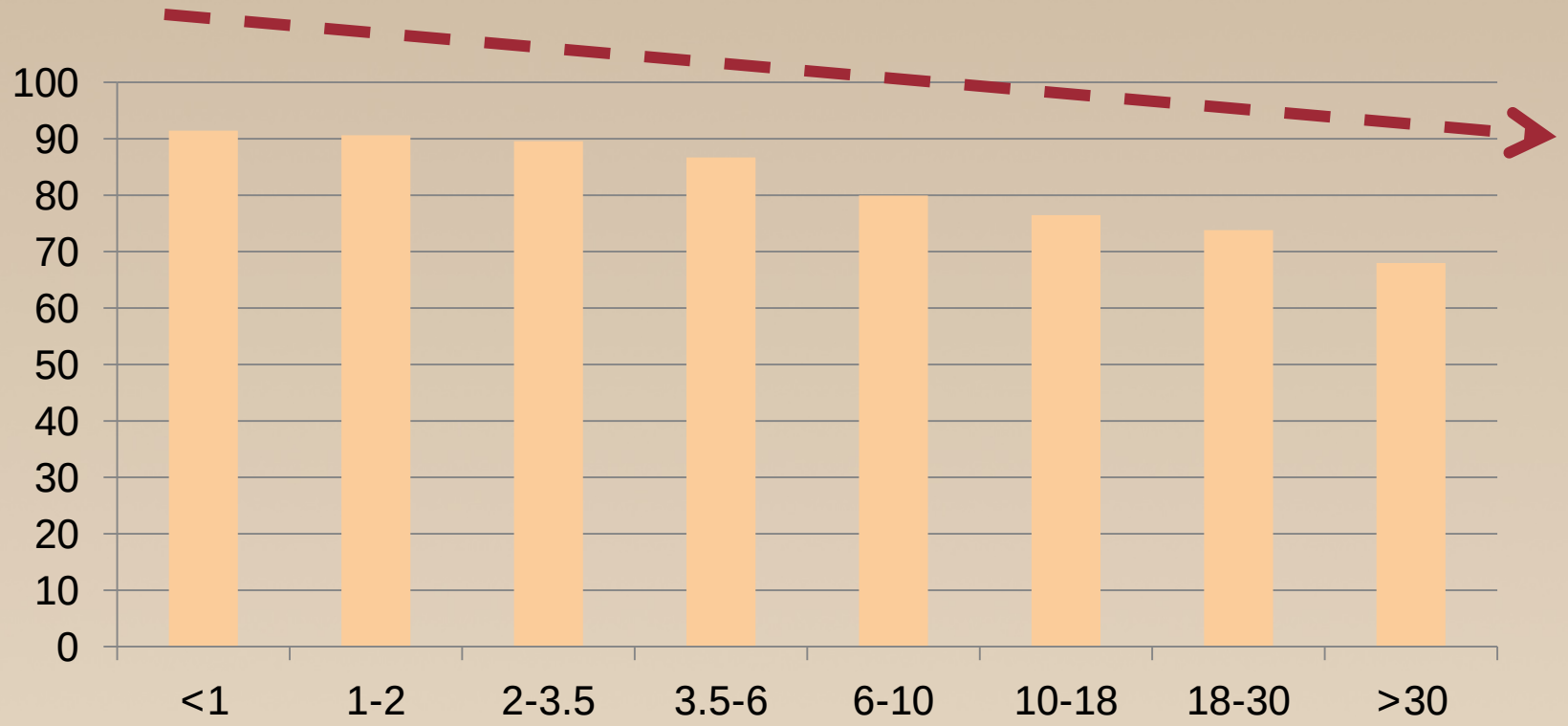
Household Income

Lower HH income→ lower % of driver license



Residential (Household) Density

Higher density → lower % of driver license

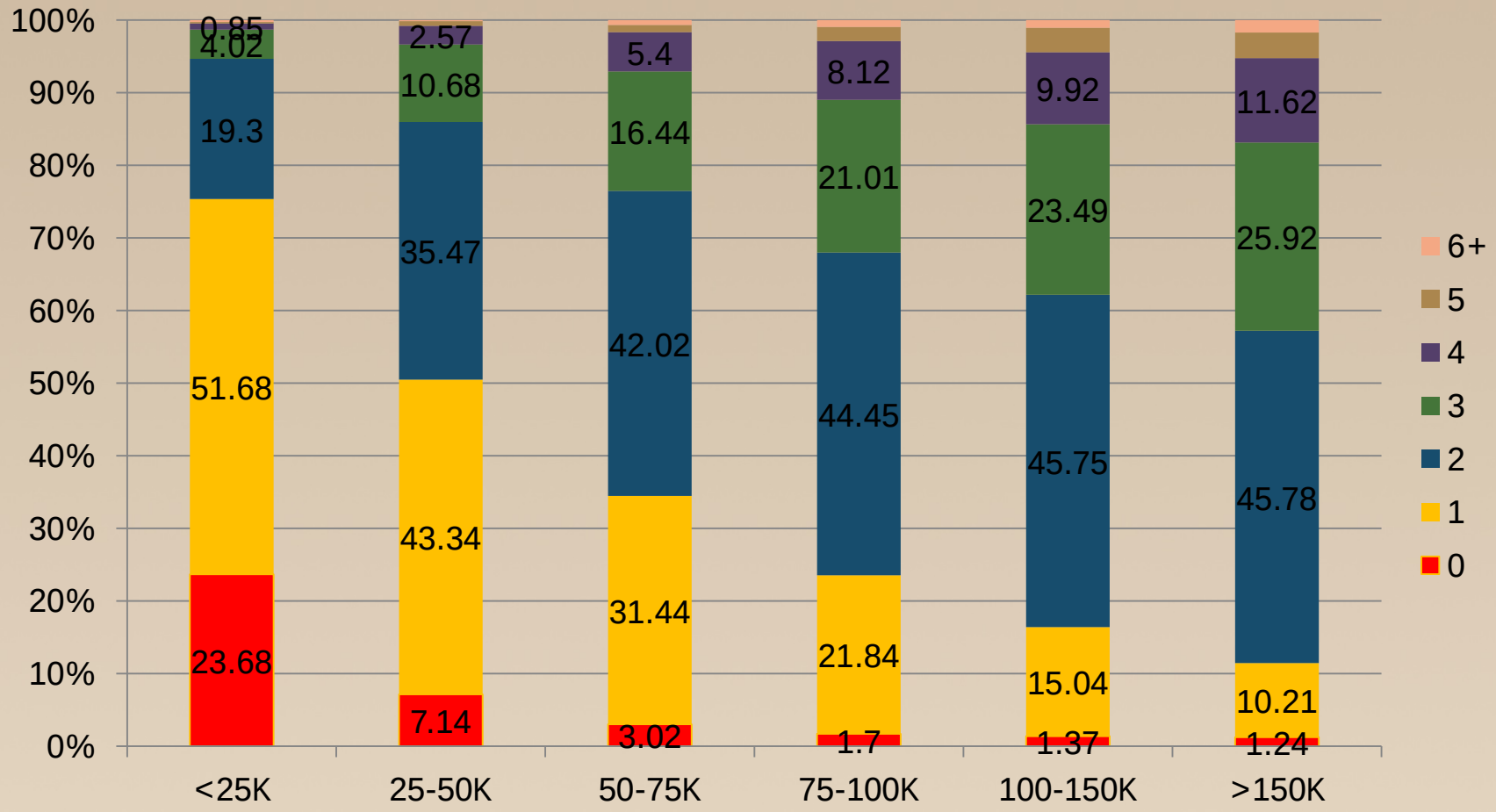


Auto Ownership

% Households by Number of Vehicle (ACS)					
0Cars	1Car	2Cars	3Cars	4+Cars	Total
7.65%	32.28%	37.22%	15.03%	7.81%	100.00%
% Households by Number of Vehicle (HTS)					
0Cars	1Car	2Cars	3Cars	4+Cars	Total
7.56%	31.86%	38.88%	14.81%	6.89%	100.00%

HH Vehicles by HH Income

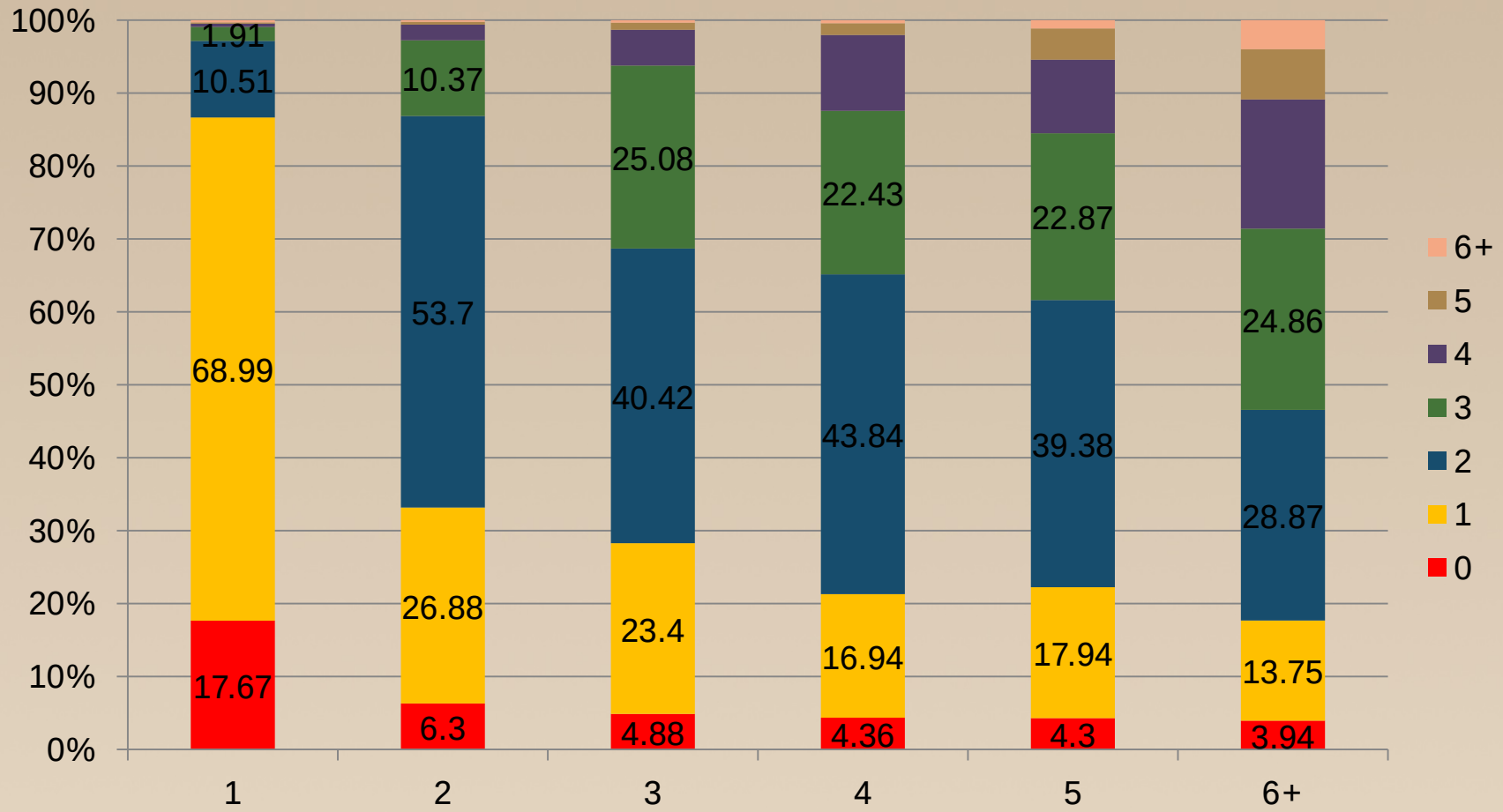
(*higher Income, more cars)*



Mean	**1.08**	**1.61**	**1.95**	**2.22**	**2.40**	**2.54**

HH Vehicles by HH Size

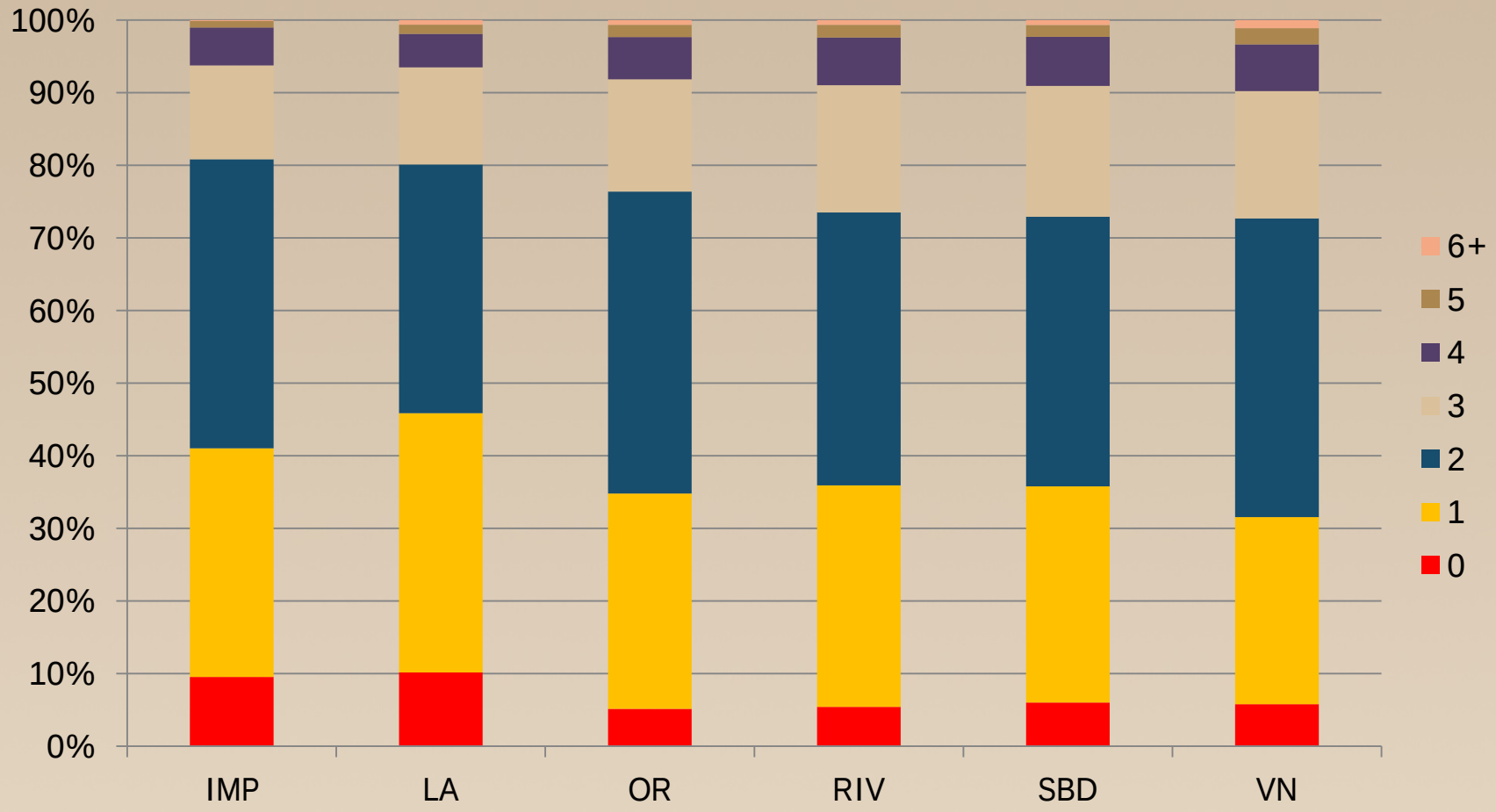
(*larger hhsize, more cars)*



	1	2	3	4	5	6+
Mean	**1.00**	**1.77**	**2.06**	**2.24**	**2.34**	**2.75**

By County

(related to land use/accessibility)



	IMP	LA	OR	RIV	SBD	VN
Mean	1.76	1.73	1.95	1.97	1.97	**2.04**

Model Estimation Output

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Driver License: Explanatory Variables

- **Household income group**
  - Low income (*HHINC* less than $35,000)
  - Medium income (*HHINC* $35,000-$100,000)
  - High income (*HHINC* $100,001 or more)
- **Person Demographics**
  - Age of the individual
  - Gender of the individual
  - Person type category of the individual

Home TAZ land use & built environment

- Household density

Estimation results: Driver License

Variable	1 (Driver)
	3.378
Household income <35K	-1.20900
Household income >100K	0.95200
Single family	0.89300
Log (HHDEN)	-0.56400
Full time worker	0.34900
Non-worker	-0.76800
Retiree	-2.96900
Female	-0.37000
Age 16-18	-0.66700

Most of the parameters in the model relate to aspects that reduce a person's likelihood of holding a license

Driver License: Summary

- Age and household income play a significant role
- The oldest members of society the least likely to hold a driver's license
- The gender of the person has an impact, with women modestly less likely to possess driver's licenses.

Driver license variable is used as a major input for household vehicle ownership model

Auto Ownership: Model Estimation Output

	Number of household vehicle				
	0	**1**	**2**	**3**	**4+**
	beta	beta	beta	beta	beta
Constant	-8.4602	1.2901		-1.6720	-2.6726
HH has two people with valid DL	-5.4638	-2.8622		-0.0259	-0.4653
HH has three people with valid DL	-7.2101	-3.1794		2.4913	2.0436
HH has four+ people with valid DL	-5.7364	-3.4677		2.7202	4.5444
Household worker's Autodependency	-2.8807	-0.3992		0.0904	0.1802
Low income household <=35K	4.1700	0.7553		-0.4884	-0.9408
High income household >100K	-2.4676	-0.7104		0.3335	0.5782
household is in high transit priority area	1.0524	0.2035		-0.0272	-0.0518
Employment density within 3 miles	-0.0090	-0.0031		-0.0289	-0.0401
Accessibility to NM activities by NM	0.5134	0.0771		-0.0420	-0.1092
Accessibility to NM activities by Transit					
Low <0.2 (base)					
Medium 0.2-1	0.4746	0.0886		-0.1130	-0.1430
High 1-2	0.8538	0.0967		-0.1726	-0.2459
Very high >2	1.8514	0.4379		-0.1209	-0.3160

Estimation results: Auto-Ownership

- The number of driving-age household members with valid DL has a strong impact on household car ownership
- The mandatory travel auto dependency variable represents how much household members' work tours are dependent on the auto mode: (-) for 1 or 1 car and (+) for 3 and 4+
- Logically, higher-income households are more likely to own more cars when compared to lower income households
- Land Use & Accessibility
  - Household is in high transit priority area- less likely to own more cars
  - Accessibility to NM activities by NM
  - Accessibility to NM activities by Transit

Thank You

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