On the Interaction of Ridehailing Usage Frequency, Vehicle Availability, and Expectations to Change Vehicle Ownership among Californians: A Latent-class Trivariate Model



Vehicle availability outcome model

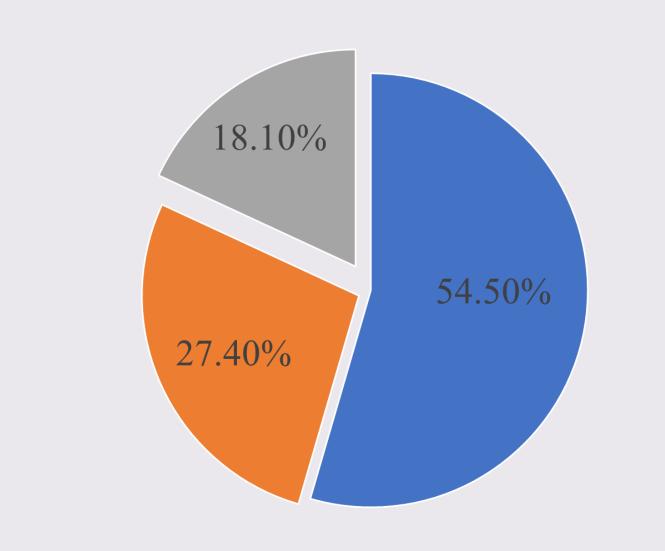
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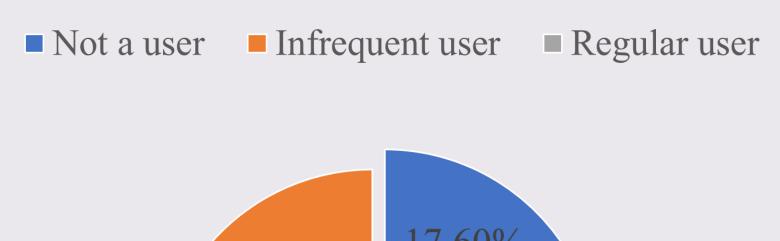
Objectives:

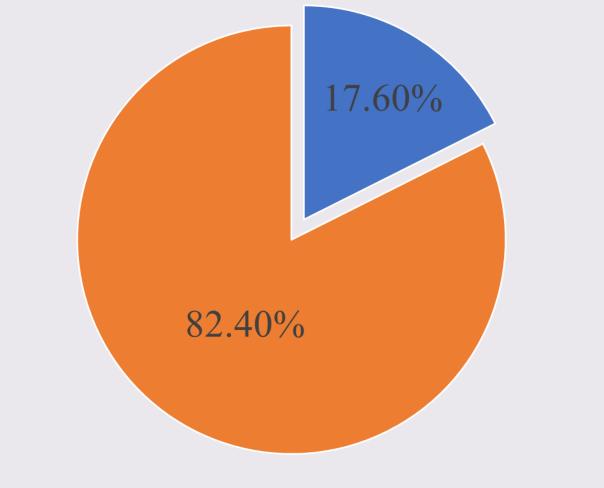
- Investigating the factors influencing ridehailing usage frequency, household vehicle availability, and intentions to change vehicle ownership while accounting for population heterogeneity.
- Investigating how the differing segments of the population vary with respect to the relationship among ridehailing usage and current and future vehicle ownership decisions.

Dataset

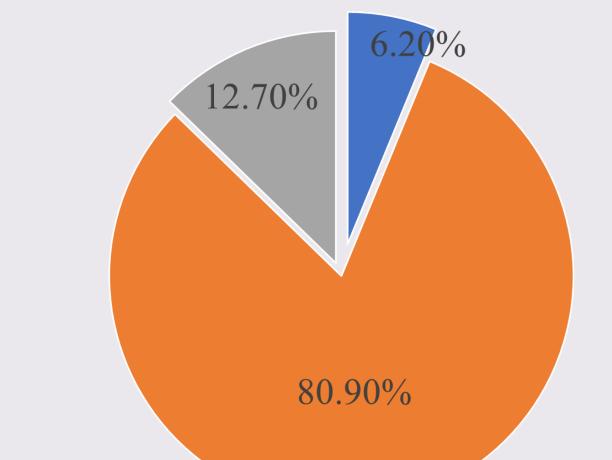
- California mobility dataset: Fall 2018 by U.C. Davis, survey sample within California; survey collected self-reported responses on the ridehailing usage frequency.
- Subset of those familiar with ridehailing used in this study (N=3141).







Vehicle sufficient HH



Vehicle deficient HH

■ Decrease intention ■ No/unclear intention ■ Increase intention

Ridehailing frequency

Not a user: "It's familiar but I've never used it"; "I used it in the past, but not anymore"

Infrequent user: "I use it less than once a month" Regular user: "I use it 1-3 times a month"; "I use it 1-2 times a week"; "I use it 3 or more times a week"

Vehicle availability

Vehicle deficient household: A household owning fewer vehicles than its number of licensed drivers

Vehicle sufficient household: A household owning more or equal the number of vehicles compared to its number of licensed drivers

Expectations to change vehicle ownership

Decrease expectation: decrease the number of cars No/unclear expectation: "Keep the same total but replace one or more cars"; "No change"; "I do not know"

Increase expectation: increase the number of cars

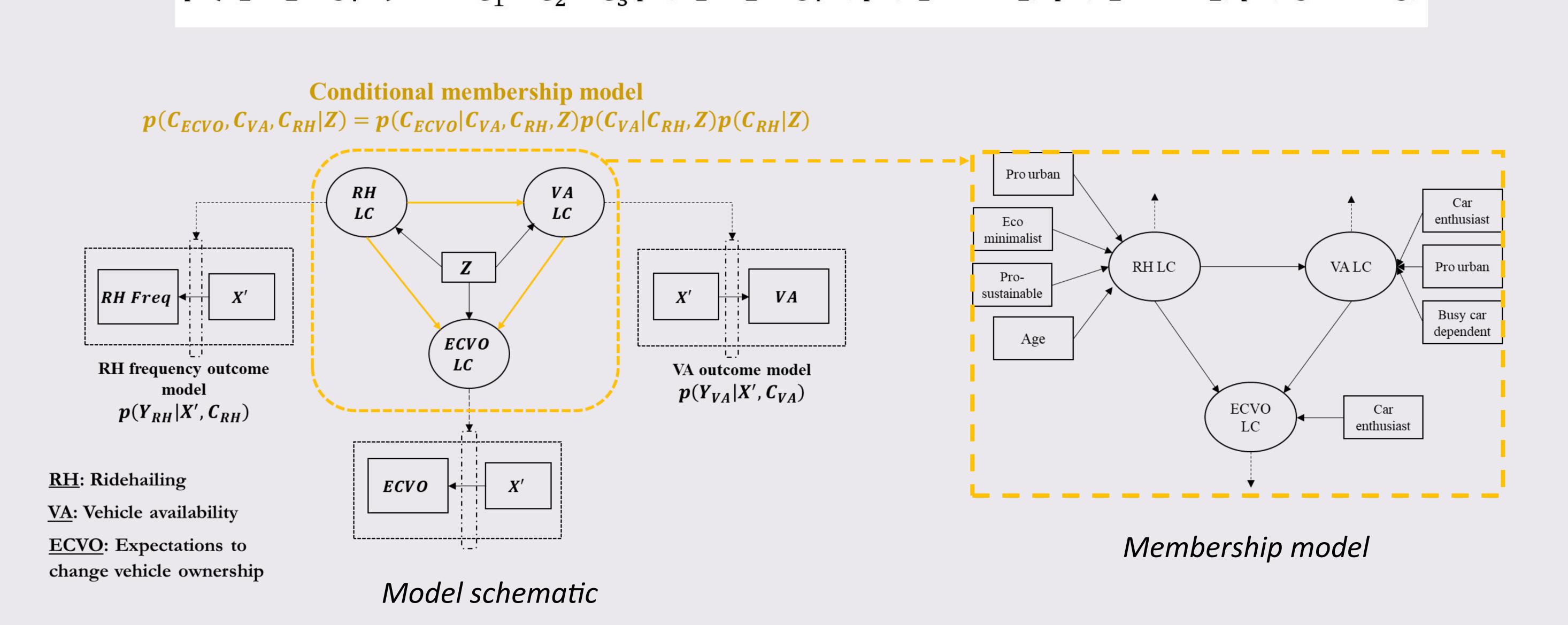
Main Takeaways

- Younger age should not be associated unequivocally with higher Ridehailing use: Attitudes help differentiate the heterogeneity among the younger population.
- Higher ridehailing usage clusters are generally positively associated with lower vehicle availability cluster.
- Our younger RH clusters are both positively associated with ECVO cluster with a higher share of VO increase intention, but members of the higher RH usage are comparatively less likely to belong to this ECVO cluster. This could point to a possible influence of RH on reducing future vehicle ownership.

Methodology: Latent-class Trivariate Model

— Full model formulation:

 $p(Y_1, Y_2, Y_3|X) = \sum_{C_1} \sum_{C_2} \sum_{C_3} p(C_1, C_2, C_3|Z) p(Y_1|X', C_1) p(Y_2|X', C_2) p(Y_3|X', C_3)$



Results:

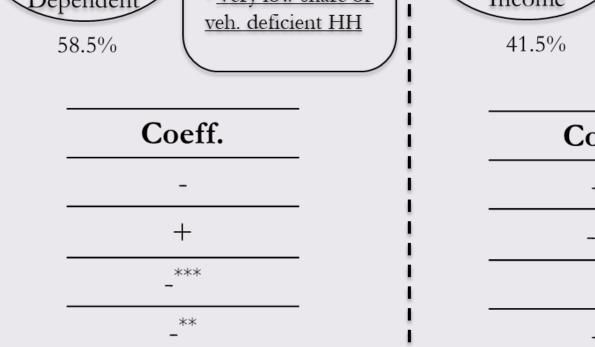
Outcome models

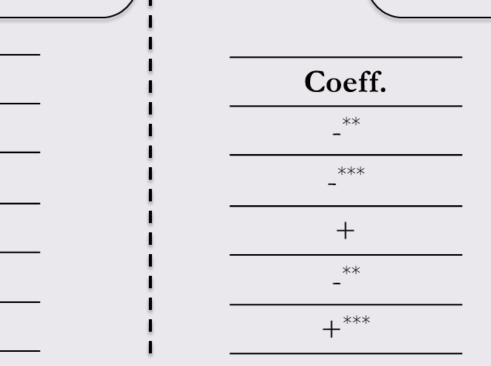
- Lower incomes tend to use ridehailing less often, while higher educated and urban dweller use it more often.
- Urban dweller are more likely to be vehicle deficient, and those identifying as White are less likely to be vehicle deficient.
- Members of the "ECVO: Non-eco-friendly Car Enthusiast" cluster who are among the adopters of carsharing services are more likely to have an intention to decrease their vehicle ownership.

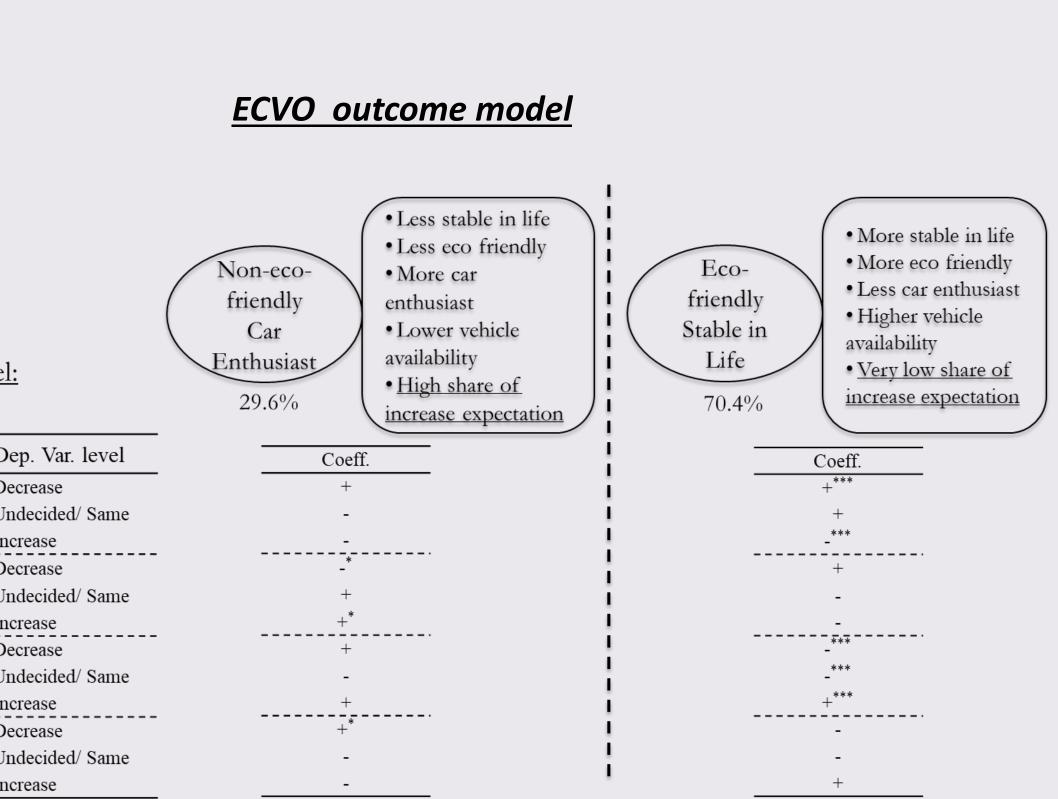
Ridehailing usage frequency outcome model

Ridehailing usage frequency outcome mode

Dep. Variable: Vehicle deficient status Outcome model: Binary logit	Car Enthusia & Depende 58.5%
Expl. variables	
High income HH	
No. of children under 15	







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- Higher ridehailing usage clusters are generally positively associated with lower vehicle availability cluster.
- Clusters with higher ridehailing usage are generally positively associated with lower vehicle availability clus-
- The younger RH clusters are both positively associated with ECVO cluster with a higher share of VO increase intention. Members of the higher RH usage are comparatively less likely to belong to this ECVO cluster.

		Dependent variables			
		Vehicle-deficient household		Expectations to change VO	
		LC		LC	
Explanatory variable	Clusters	Car Enthusiast & Dependent	Non-car Dependent Lower Income	Non-eco- friendly Car Enthusiast	Eco-friendly Stable in Life
		Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)
Ridehailing usage	Younger Eco- friendly	-0.0010 (0.106)	0.0010 (0.106)	0.499** (0.248)	-0.499** (0.248)
frequency LC	Younger Non-eco- friendly	-0.357* (0.214)	0.357* (0.214)	1.431*** (0.382)	-1.431*** (0.382)
	Older Car Enthusiast	0.358** (0.171)	-0.358** (0.171)	-1.930*** (0.501)	1.930*** (0.501)
Vehicle- deficient household LC	Car Enthusiast & Dependent			-0.710** (0.302)	0.710** (0.302)
	Non-car Dependent Lower Income			0.710** (0.302)	-0.710** (0.302)
***, **, * denote a statistical significance of better than 0.01, 0.05, 0.10, respectively.					

Acknowledgments

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