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Designing Light-Duty Vehicle Incentives for Low- and Moderate-Income Households

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Camp Resources XXIII

August 8, 2016

California Policy Background

- ❖ Goal: reduce GHG emissions and local air pollution
- ❖ Policies:
 - ❖ Enhanced Fleet Modernization Program (EFMP)
 - ❖ Clean Vehicle Rebate Program (CVRP)

Previous Work

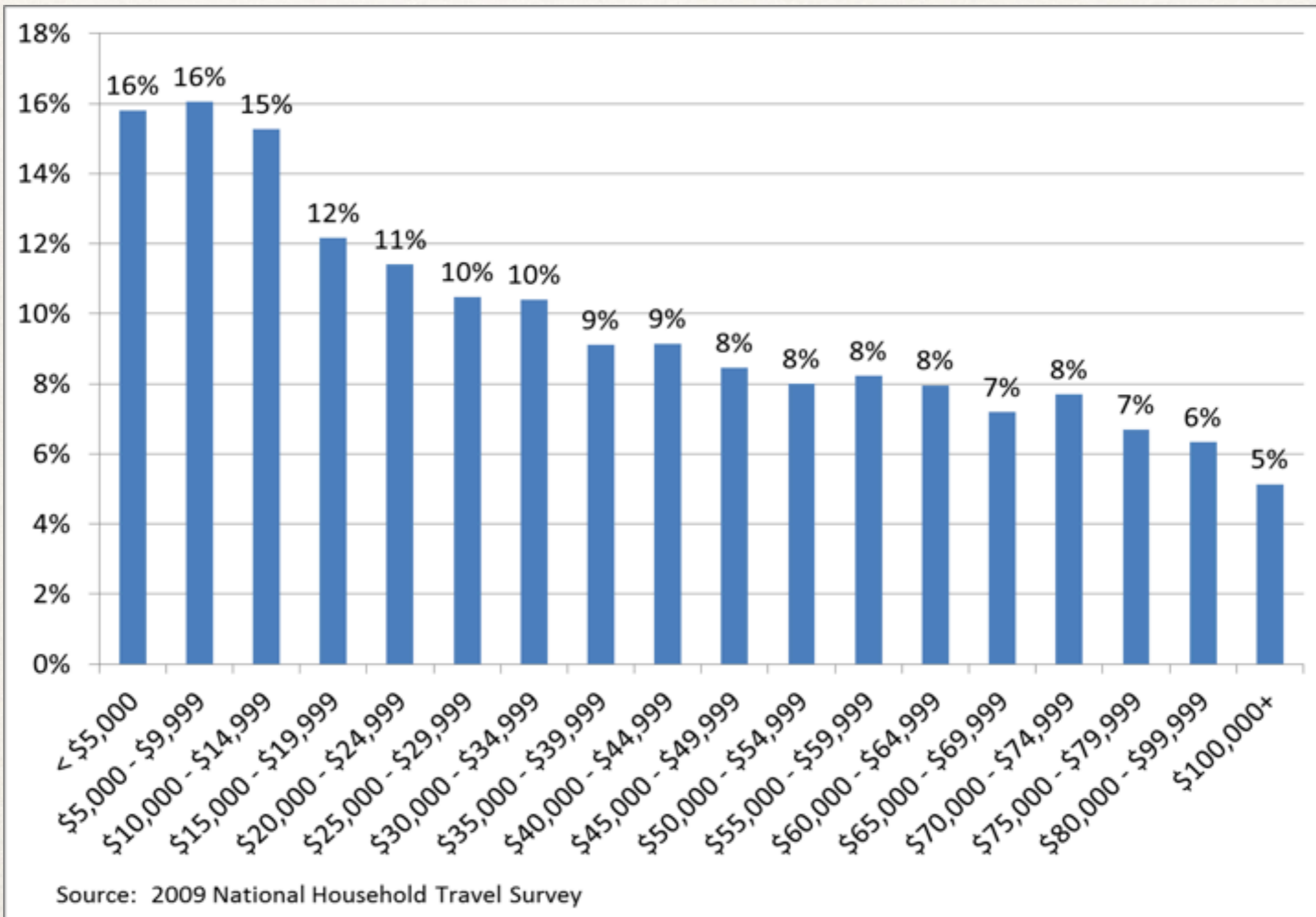
- ❖ Survey in Dec 2013 with choice experiments to characterize plug-in electric vehicle (PEV) and charging demand
- ❖ Findings
 - ❖ \$1,500-\$2,500 rebate not cost effective
 - ❖ Heterogeneity in BEV v. PHEV demand
 - ❖ Willingness to pay for public charging

New Focus on Low Income Consumers

- ❖ Tend to own older, higher emissions vehicles
- ❖ Disproportionately affected by air pollution
- ❖ Gas is a larger share of household budget
- ❖ Low participation rates in EFMP and CVRP

New Focus on Low Income Consumers

Percent of Vehicles 20+ Years Old



Research Goal

- ❖ Target low- and moderate-income consumers
- ❖ Identify policy strategies that
 - ❖ use incentives to promote **retirement** of functional, high-emitting vehicles
 - ❖ use incentives / financing programs to increase **adoption** of advanced clean vehicles

Research Scope

- ❖ Focus Group
- ❖ **Survey**
- ❖ Pilot Programs

Survey Population

- ❖ 1,400 households self-identified as used or new car buyers
- ❖ Eligible or actual EFMP participants
 - ❖ Low- and moderate-income households (HH income < \$65,000 for 2-income earners and < \$38,000 for single earner)
 - ❖ South Coast Air Quality Management District and San Joaquin Valley Air Pollution Districts

Survey Instrument Design

- ❖ Background questions
- ❖ Module 1: Choice experiment(s) on vehicle **retirement**
- ❖ Module 2: Choice experiment(s) on vehicle **replacement**
- ❖ Module 3: Choice experiment(s) on **ride-sharing/car-sharing?**
- ❖ Follow up questions

Survey Instrument Design

- ❖ Background

- ❖ Household information

- ❖ Fleet information

- ❖ RP data on vehicle search process

- ❖ Has the respondent heard of / participated in EFMP and / or CVRP?

Survey Instrument Design

- ❖ Module 1: Vehicle Retirement
 - ❖ Changes to average household fuel efficiency
 - ❖ Low-functioning versus high functioning high-emitting
 - ❖ Identify effective retirement incentives
 - ❖ Avoid free-riding
 - ❖ Promote retirement of functional, high-emitting vehicles?

Survey Instrument Design

Module 1: Vehicle Retirement (for respondents who plan to keep old vehicle)

Which of the following would you prefer?

Option 1	Option 2	Option 3
Keep Ford F150	Retire Ford F150	Retire Ford F150
Purchase Subaru Outback for \$25,000	Purchase Subaru Outback for \$20,000	Purchase Subaru Outback for \$22,000 with guaranteed/favorable financing
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Financing?

Survey Instrument Design

Module 1: Vehicle Retirement (for respondents who plan to **sell/trade in old vehicle)**

Which of the following would you prefer?

Option 1	Option 2	Option 3
Sell/Trade In Ford F150	Retire Ford F150	Retire Ford F150
Purchase Subaru Outback for \$25,000	Purchase Subaru Outback for \$20,000	Purchase Subaru Outback for \$22,000 with guaranteed/favorable financing
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Survey Instrument Design

Module 1: Vehicle Retirement (for respondents who plan to retire old vehicle)

Which of the following would you prefer?		
Option 1	Option 2	Option 3
Retire Ford F150	Retire Dodge Grand Caravan	Retire Dodge Grand Caravan
Purchase Subaru Outback for \$25,000	Purchase Subaru Outback for \$20,000	Purchase Subaru Outback for \$22,000 with guaranteed/favorable financing
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Only for respondents with >1 current vehicle.

How to select alternative vehicle if >2 current vehicles?

Survey Instrument Design

- ❖ Module 2: Vehicle Replacement
 - ❖ Barriers to adopting cleaner vehicles
 - ❖ Identify effective adoption incentives

Barriers to Clean Vehicle Adoption

- ❖ Lack of Information
- ❖ Price
- ❖ Financing (and associated issues of credit worthiness)
- ❖ Misperceptions of the fuel economy savings
- ❖ Misperceptions of appropriateness of the vehicle for their travel needs

Survey Instrument Design

Module 2: Vehicle Replacement

Which of the following vehicles would you choose for your next vehicle purchase?

Make & Model	Subaru Outback	Subaru Outback	Subaru Outback
Fuel Type	Gasoline	Gasoline	Dual Fuel (Gasoline and Electric)
Price	\$25,000	\$28,000	\$32,000
Fuel Efficiency	25 mpg	32 mpg	40 mpg
Financing		Favorable/ Guaranteed	
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Survey Instrument Design

Module 2: Randomize fuel efficiency / refueling cost?

Fuel Efficiency	25 mpg	32 mpg	40 mpg
Refuel Cost	Like \$3.00 per gallon gas	Like \$2.50 per gallon gas	Like \$1.50 per gallon gas
Estimated Monthly Refuel Costs	\$50	\$35	\$20

Survey Instrument Design

Module 2: Randomize how price is displayed?

Price	\$25,000	\$28,000	\$32,000
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Price	\$25,000	List Price: \$30,000 <u>Rebate: -\$2,000</u> You Pay: \$28,000	List Price: \$37,000 <u>Rebate: -\$5,000</u> You Pay: \$32,000
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Survey Instrument Design

- ❖ Module 3: Car-Sharing / Ride-Sharing
 - ❖ Identify barriers to mode-shifting
 - ❖ Identify effective ride-sharing policies
 - ❖ WTP for ride-sharing programs

Commuting to Work in an Uber This Month Costs Less Than Taking the Subway

By Madison Malone Kircher



This week, Uber is starting a new promotion for New York City riders. For \$79, users will be able to take unlimited uberPOOL rides (rides shared with strangers) during peak commute hours anywhere south of 125th Street, [Slate reports](#).

The rides are only available from 7 to 10 a.m. and 5 to 8 p.m. on weekdays, so you'll have to pay for another Uber or take the subway if you want to get anywhere on a Saturday or Sunday. Using the uberPOOL card to commute back and forth to work brings the cost per ride to just under \$2. By comparison, an unlimited monthly MetroCard costs about \$116. Which makes Uber a pretty decent deal if you are the kind of person who doesn't need much transportation beyond getting to work each day. (Find out more about purchasing a card [here](#).)

Source: <http://nymag.com/selectall/2016/07/commuting-to-work-in-an-uber-this-month-costs-less-than-taking-the-subway.html>

Survey Instrument Design

- ❖ Follow up questions
 - ❖ Why respondent did not choose hybrid / PHEV
 - ❖ Attitude towards gas price, environment, etc.

Issues

- ❖ How to present financing options
 - ❖ Show duration and monthly payment?
 - ❖ How to assess credit worthiness?
- ❖ Treatments for choice experiments
- ❖ Car-sharing / ride-sharing

Thank You!

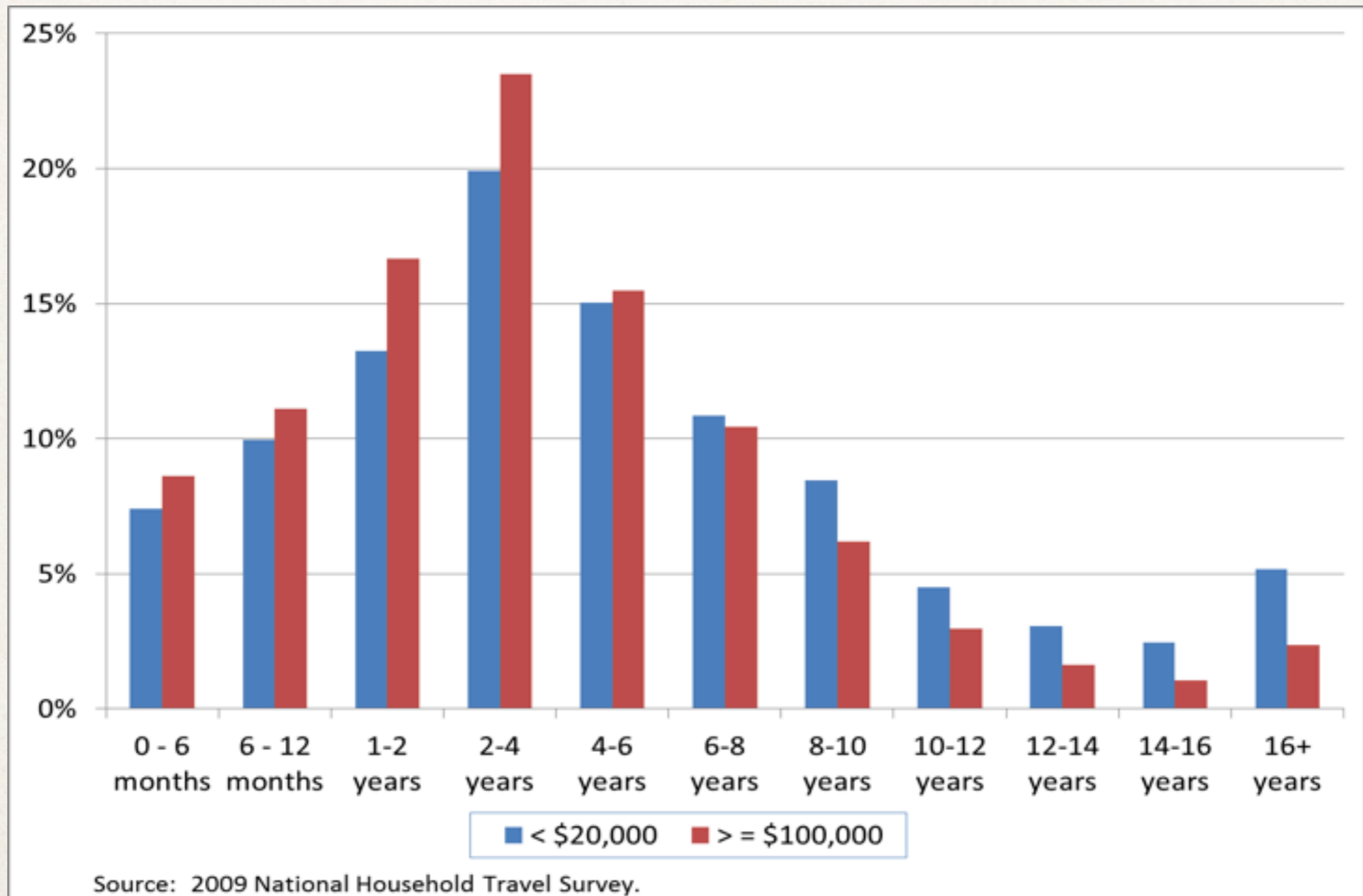
Questions / comments?

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Appendix

New Focus on Low Income Consumers

Vehicles by Years of Ownership and Household Income



Survey Goals

- ❖ Understand barriers to retirement/replacement
- ❖ Understand decisions governing fleet management
- ❖ Assess attractiveness of types/levels of incentives (e.g., rebates, financing)

Survey Instrument Design

- ❖ Module 1: Vehicle Retirement

- ❖ Which factors determine households' vehicle retirement decisions?
- ❖ Under what conditions does a retirement decision significantly change a household's average fuel economy for the remaining vehicle fleet?
- ❖ What are the factors that explain when households choose to retire low-functioning versus high functioning high-emitting vehicles?
- ❖ How can retirement incentive programs be designed to avoid adverse selection and free-riding and promote retirement of functional, high-emitting vehicles?

Survey Instrument Design

- ❖ Will this next vehicle purchase be a second household vehicle, or will it replace your Ford F150?
- ❖ [If REPLACE] What do you plan on doing with your Ford F150?
 - ❖ Selling
 - ❖ Trading in at dealer
 - ❖ Retiring

Survey Instrument Design

- ❖ [If REPLACE] Please rank the following reasons for replacing your Ford F150.
 - ❖ Vehicle reliability
 - ❖ Repair costs
 - ❖ Fuel costs / fuel efficiency
 - ❖ Changes in travel needs

Survey Instrument Design

- ❖ [If REPLACE] Which of the following best describes your decision to replace your Ford F150?
- ❖ My Ford F150 is in such poor condition that I need a different vehicle to reliably get to work/school.
- ❖ I could keep driving my Ford F150 for several more years, but it is so costly to do so that I would prefer to trade it in for a different vehicle.
- ❖ I could keep driving my Ford F150 for several more years, but I prefer to upgrade to a newer vehicle.

Survey Instrument Design

- ❖ Module 2: Vehicle Replacement
 - ❖ What factors determine households' choice of a vehicle?
 - ❖ What are households' barriers to purchasing more low and zero-emissions vehicles?
 - ❖ What incentive levels and associated vehicle eligibility requirements would incentivize households to purchase low- and zero emission vehicles?

Survey Instrument Design

- ❖ Have you considered purchasing a “clean vehicle” that costs more but pollutes less and reduces refueling costs, such as a hybrid or electric vehicle?
- ❖ [If NO] Why have you not considered purchasing a “clean vehicle”?
 - ❖ Not aware of them
 - ❖ Cost too much
 - ❖ Doubt I can get the financing for one
 - ❖ Don't think the premium is worth the fuel savings