

San Francisco City CarShare

Travel & Car Ownership Impacts



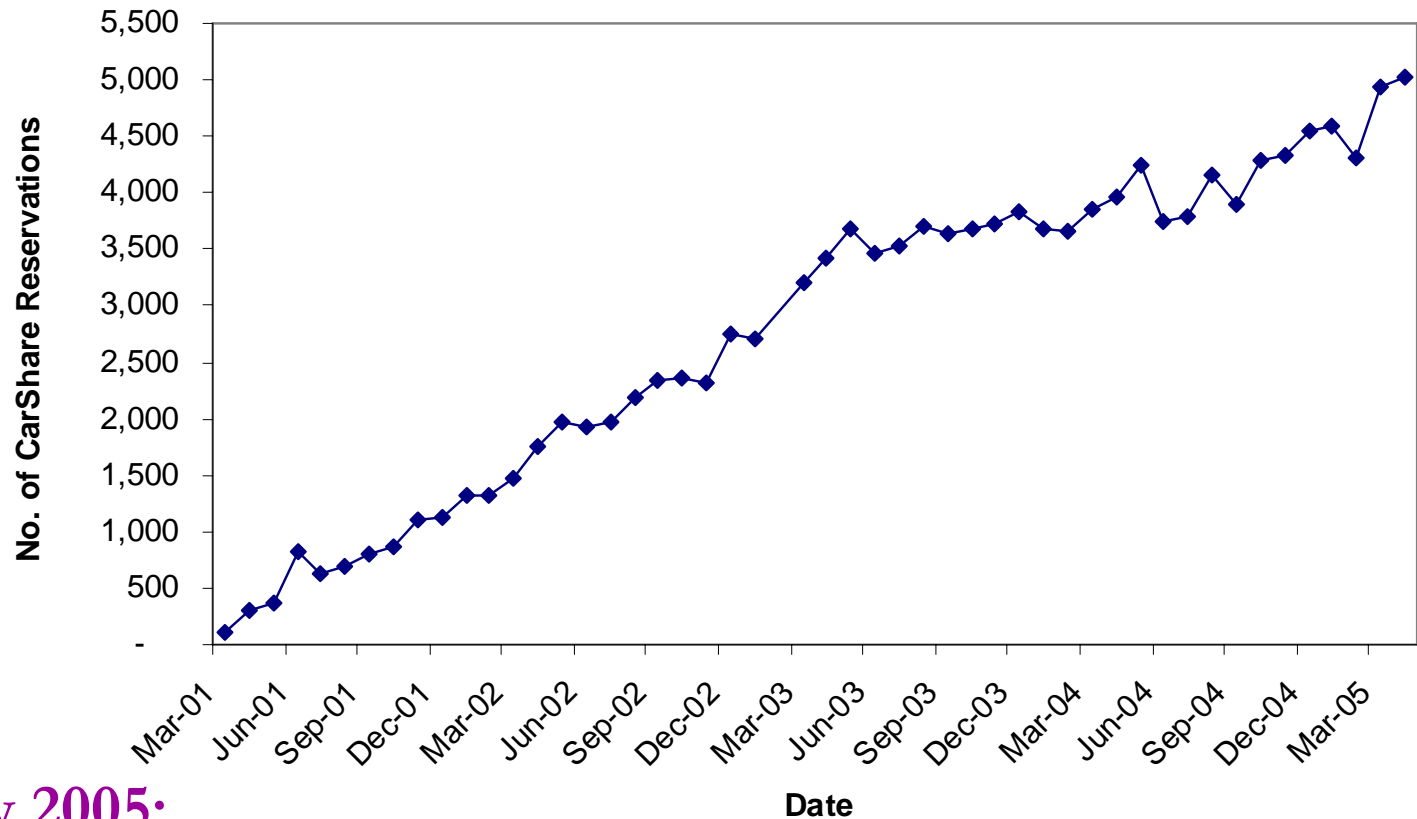
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Core Research Questions:

- *Do members significantly reduce car ownership with time?*
- *In contrast to near-term impacts, does this and other factors lead to travel reduction?*

San Francisco City CarShare: Steady Growth (4 Years into Program)



May 2005:

- **3800 Active Members**
- **87 vehicles among 43 PODs**
- **Average reservation distance:** 20 miles
- **Average reservation length:** 3.25 hours
- **Average reservation cost:** \$23.66
- **Most members:** occasional users (~ 50% once a month or less)

San Francisco City CarShare: In-Vehicle Survey April 2005

- **Mean Age of surveyed carshare users: 39.6 years**
- **Median Household Income: \$50,000**

- **3/4 of surveyed carshare users were from carless households**
- **Most live alone or in non-traditional households**

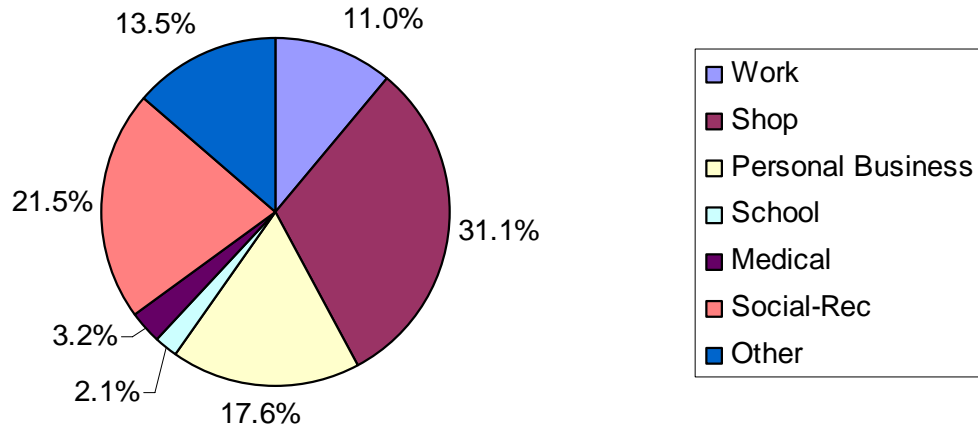
**Carsharing in the Bay Area clearly serves
a unique niche market:**

- **modest-income**
- **non-traditional households**
- **carless households**

San Francisco City CarShare: In-Vehicle Survey April 2005

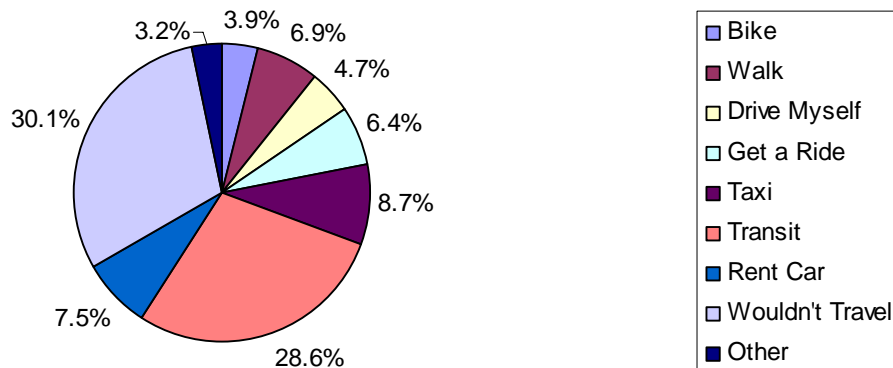


Trip Purposes, All Links



Most trips discretionary

How would have otherwise traveled



Only 11% would have been by private car (driven or as a passenger)

San Francisco City CarShare: No. Reservations as function of cost, supply, others: Selective Fit

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.863 ^a	.745	.713	.48603

a. Predictors: (Constant), LNTREND, LNCOSTMI, LNCOST, LNACF, LNPODS

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.852	1.449		6.111	.000
	LNCOST	-.683	.140	-.958	-4.881	.000
	LNPODS	-1.131	.706	-.755	-1.603	.117
	LNCOSTMI	-2.977	1.042	-.284	-2.856	.007
	LNACF	7.220	2.916	.409	2.476	.018
	LNTREND	1.666	.502	1.622	3.320	.002

a. Dependent Variable: LNRESERV

A doubling of costs to users led to a 2/3 reduction in number of reservations, controlling for other factors.

Analytical Framework

Difference of Difference of Means

FOCUS: 24 Month Impacts

$$Impact = (T_{t,4} - T_{t,1}) - (T_{c,4} - T_{c,1})$$

T = trip or impact measure;

t = "test" (car-sharing) cases;

c = "control" (non-car-sharing) cases;

4 = 4th survey; and

1 = 1st survey.

e.g., rainfall: survey #1 = 5.4"; #4 = 1.8"

Comparison of Car Ownership Trends: March 2001-March 2003

Change in Motor Vehicle Ownership	Members (A)	Non-members (B)	Difference between Members and Non-members (A-B)
Reduced by 2 or More	2.5%	0	2.5%
Reduced by 1	26.6%	8.0%	18.6%
Did Not Change	63.2%	80.0%	-16.8%
Increased by 1	7.2%	12.0%	-4.8%
Increased by 2 or More	0.4%	0	0.4%
Total	100.0%	100.0%	




- 67.5% of members (vs. 39.2% of non-members) said they forewent the purchase of a new car.
- In all, 73.3% of members reduced car ownership or opted not to buy a vehicle (vs. 42.9% of non-members).

Travel Consumption Metrics

- **VMT** = daily miles logged in motorized vehicles
- **MVMT** = mode-adjusted VMT
(VMT/occupancy level)
- **MEVMT** = mode & engine-size adjusted VMT
[(VMT*engine size)/occupancy level]
- **Gasoline Consumption** = MVMT/mpg
- **Greenhouse Gas Emissions** =
MVMT/(CO₂/mile)

Evaluation

Reduced or Induced Travel?

- Change 2001-2003 for typical weekday
- VMT, MVMT, MEVMT, Gas Consumption & CO₂ emissions:  for members &  non-members
- Travel Times: mean values  for both, though more rapidly for members

Difference of Difference Results

Changes of Members Minus Changes of
Non-Members, Weekday/Workday,
Survey #1 to Survey #4

	<u><i>Difference</i></u>	<u><i>T-Statistic</i></u>
MVMT	-1.12	-1.63
MEVMT	-1.671	-0.95
CO₂ Emissions	-0.76	-0.91
Travel Time	-6.06	-0.048

Predictive Models of Private Car Choice

Binomial Logit

- Controlling for Modal (e.g., travel time differentials), Trip (e.g., transit pass, purpose), and Socio-demographic (e.g., Vehs./HH member) attributes:
Likelihood of Private car use for a trip was 45% less for Carshare members than non-members

Conclusions



- Evidence of reduced travel (VMT fell for members but rose for non-members) over the longer term:
 - Reduced car ownership and foregoing of new purchases
 - Judicious use of car (in contrast to “perverse incentives” to drive when owning car)
- City CarShare reduces “ecological footprint”:
 - Lower VMT plus small, fuel-efficient cars and relatively high occupancy levels
 - Extrapolating to current fleet of ~85 cars & 3800 members, each weekday City CarShare saves:
 - **13,000 VMT**
 - **750 gallons of gasoline**

Conclusions



- Benefits of:
 - Faster average speeds (reduced travel times)
 - Increased mobility (often off-peak) and choices
- Generalizable?
 - Directionality? Yes
 - Magnitude? Probably on the high end given San Francisco as an outlier

For more Information

www.bayareasurvey.com

R. Cervero & Y. Tsai, *San Francisco City CarShare:
Travel-Demand Trends and Second-Year Impacts*,
August 2003