

The Effects of Different Generational Sociodemographic Characteristics on Dynamic Ridesharing

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Research Questions



- **WHERE** are ridesharing services?
 - Highest ridesharing rates by MSA
- **FREQUENCY** of ridesharing service use?
- **WHO** is using services?
 - Respondent & Households
 - Across age groups
 - Young Adults
 - Gen X
 - Seniors



FLICKR

Ridesharing vs. Ride-hailing



RIDESHARING: sharing a ride with another passenger

- a.k.a. carpooling or van-pooling
- Traditionally no fees
- Drivers are NOT contracted and do not make profit



CarpoolNow

RIDE-HAILING: customer hires driver to take them

- passengers and driver do NOT share same destination
- a.k.a. ridesharing service (e.g. Uber & Lyft)

BOTH?



LYFT LINE

Previous Findings: % Who have Ride-hailed



- **2014-15 ITS at UC Davis survey**
 - **21%** ridership among adults in cities
 - 24% use service weekly/daily
 - 41% use 1-3 times a month
 - 34% use < once a month
 - 36% young adults vs. 4% seniors
 - 25% Bachelor's Degree vs. 11% no college
 - 33% earn >\$150k vs. 15% earn <\$35k

- **2015 Pew Research study survey**
 - **15%** ridership among adults
 - 28% young adults vs. 4% seniors
 - 29% college degree vs. 6% no college
 - 26% earn >\$75k vs. 10% earn <\$30k
 - 21% in urban area vs. 3% in rural area

Ride-hailing popular among young adults, urbanites, college grads

% who have used a ride-hailing service like Uber or Lyft

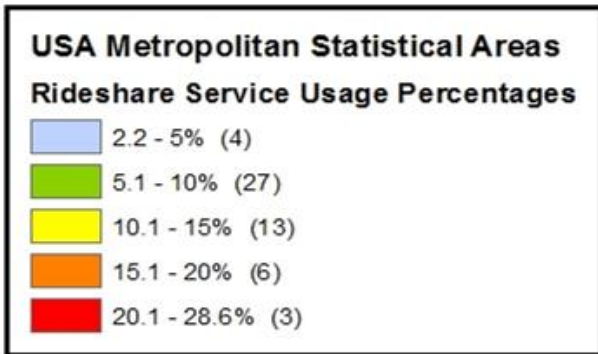
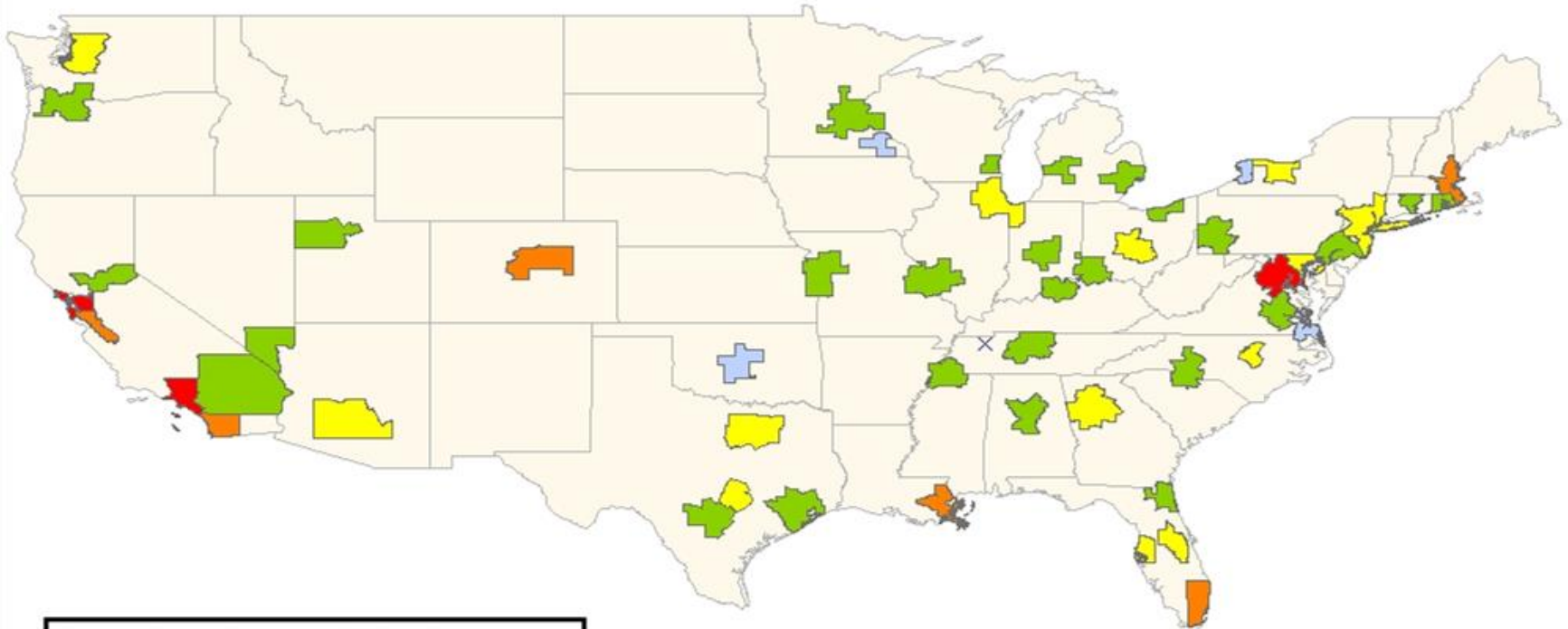
All U.S. adults	15%
Men	16
Women	14
White	14
Black	15
Latino	18
18-29	28
30-49	19
50-64	8
65+	4
HS grad or less	6
Some college	15
College grad	29
<\$30,000	10
\$30,000-\$74,999	13
\$75,000+	26
Urban	21
Suburban	15
Rural	3

Source: Survey conducted Nov. 24-Dec. 21, 2015.

"Shared, Collaborative and On Demand: The New Digital Economy"

PEW RESEARCH CENTER

Rideshare Service Use by MSA

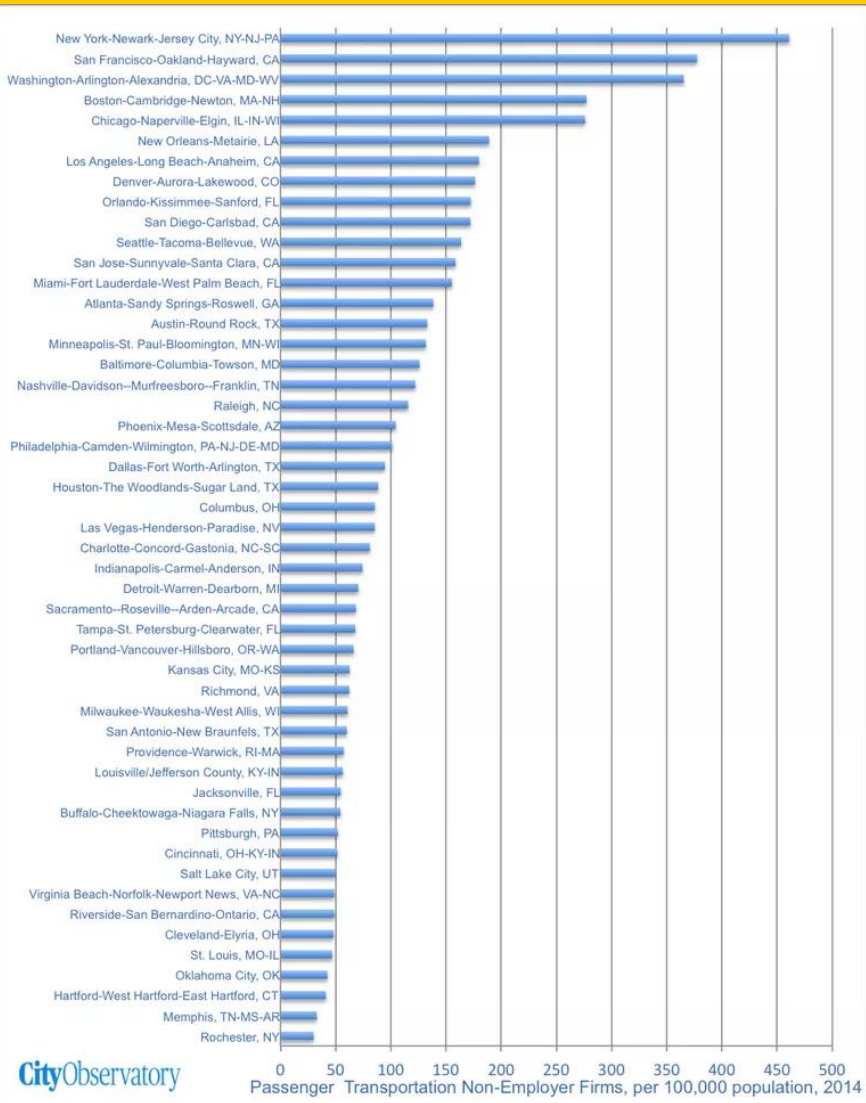


2017 NHTS Data

TOP 5 Dynamic Rideshare Service MSA's

1. **San Francisco - Oakland - Hayward** (28.6%)
2. **Washington D.C. - Arlington - Alexandria** (25.8%)
3. **Los Angeles - Long Beach - Anaheim** (20.7%)
4. **Denver - Aurora - Lakewood** (19.2%)
5. **San Jose - Sunnyvale - Santa Clara** (19.0%)

Rideshare Service Supply by MSA



- Independent contractors involved in providing passenger ground transportation services
- 7 of top 10 cities with highest rates of riders & drivers match
- Over saturation in NYC or alternative transportation faster?

TOP 5 Transportation Non-employers per capita by MSA

1. New York City - Newark - Jersey City
2. San Francisco - Oakland - Hayward
3. Washington D.C. - Arlington - Alexandria
4. Boston - Cambridge - Newton
5. Chicago - Naperville - Elgin

Source: <http://cityobservatory.org/where-is-ridesharing-growing-fastest/>

Age Groups



3 Cohorts:

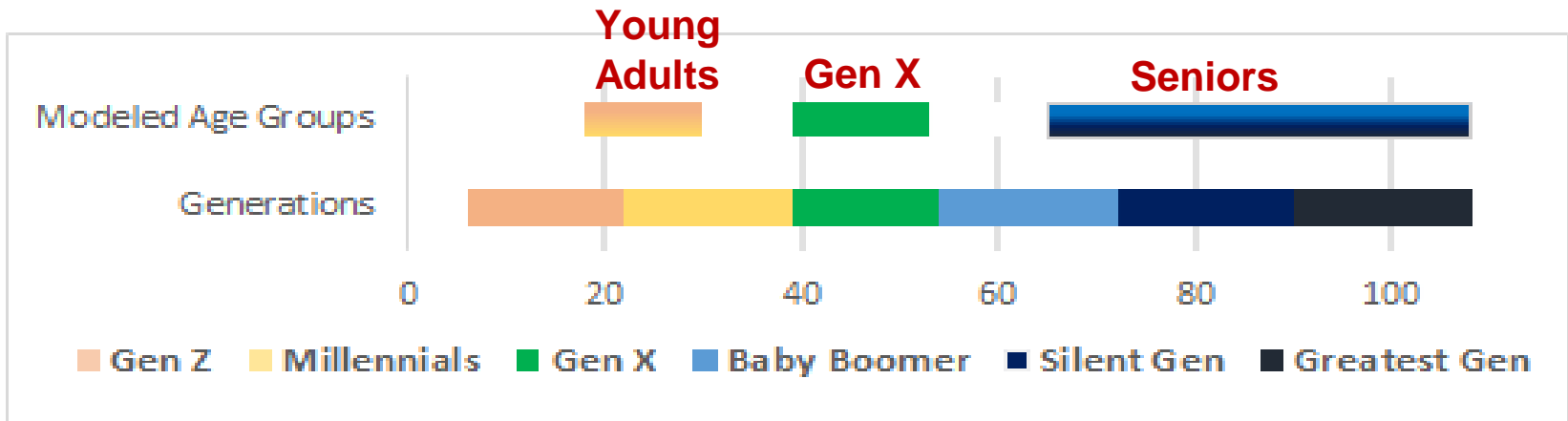
Young Adults: 18-30 y/o

Generation X: 39-54 y/o

Seniors: +65 y/o

Rideshare Service Sample Stats

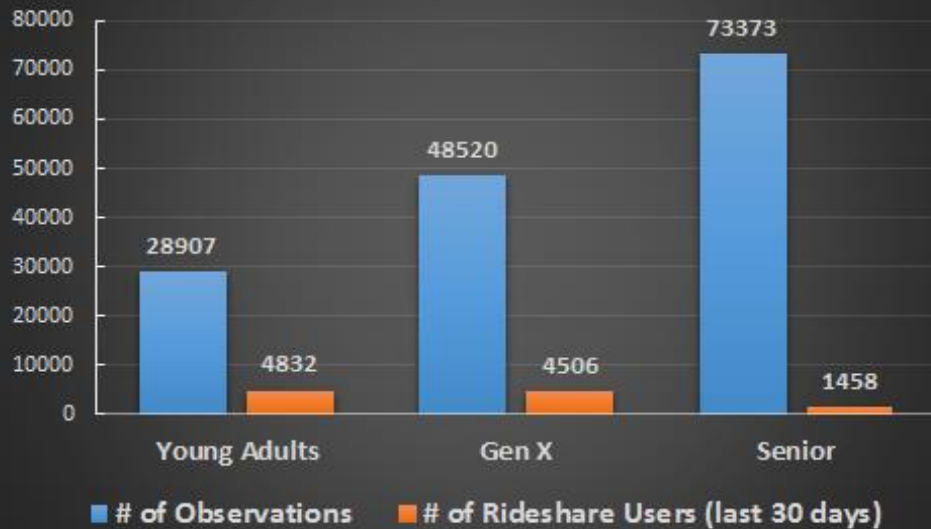
Young Adult	Generation X	Seniors
$\bar{X} = 0.77$	$\bar{X} = 0.35$	$\bar{X} = 0.06$
$s = 0.017$	$s = 0.008$	$s = 0.003$
Max = 99	Max = 65	Max = 66
$n = 28,907$	$n = 48,520$	$n = 73,373$



Frequency of Ridesharing Service Usage



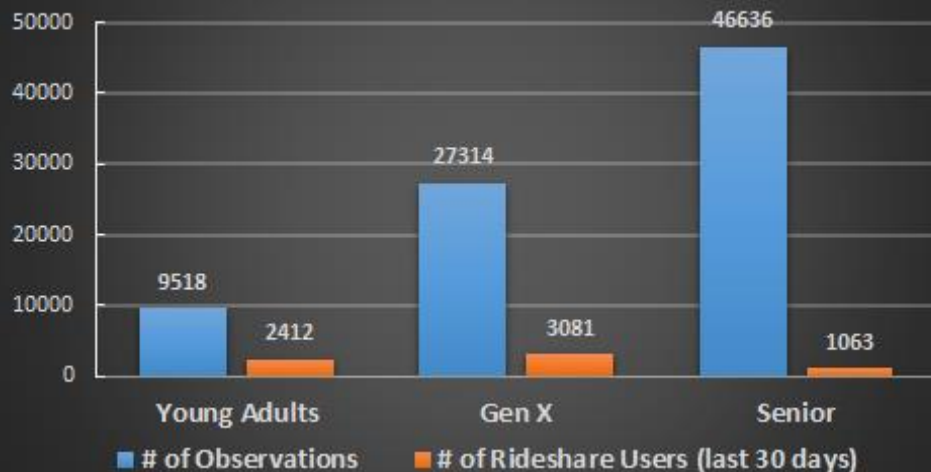
Respondents



Of all **236,089** survey respondents:
(total ridership: 9.8%)

- Young Adults: 16.7%
- Gen X: 9.3%
- Seniors: 2.0%

Households



Of **129,637** 1st household respondents:

- Young Adults: 25.4%
- Gen X: 11.3%
- Seniors: 2.3%

Variables Included



<i>Variable Type</i>	<i>Variable Name</i>
<i>Personal</i>	Gender Race Education Health Driver Status
<i>Household</i>	Home Ownership Household Size Income Number of Vehicles & Drivers Family Status (Single, Children)
<i>Land Use</i>	Urban Size Population & Housing Density Renter-Occupied Housing Percentage

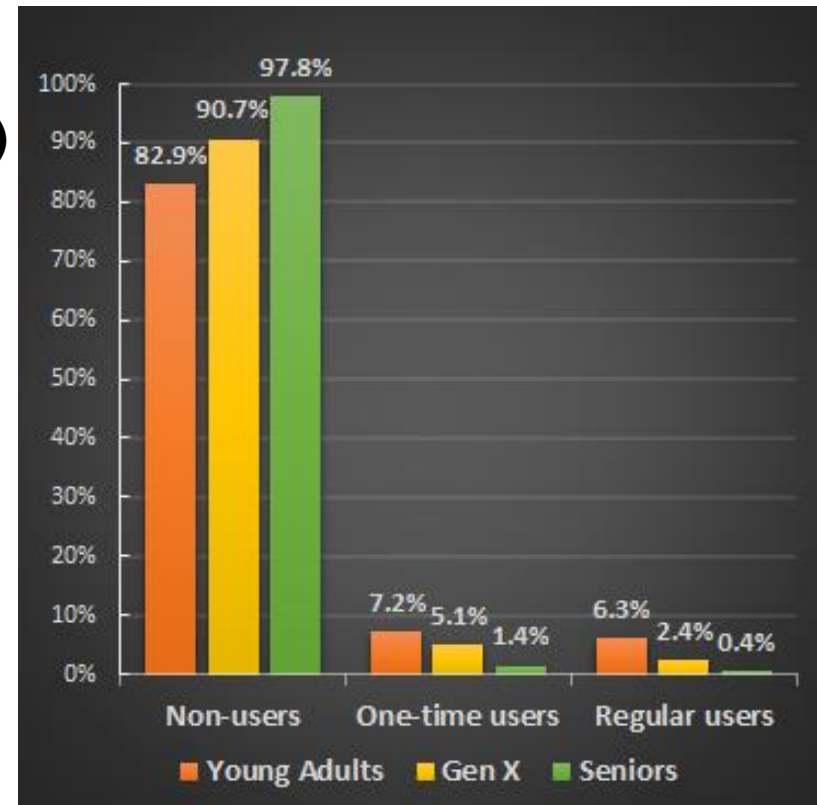
Response Variable



- Number of times rideshare app used to purchase a ride in the **last 30 days** prior to survey interview
 - includes Uber & Lyft
- Response alternatives:
 - Not a User
 - One-time User (1 - 2 ride purchases)
 - Regular User (+5 ride purchases)

Not a User	1-time User	Regular User
n = 218,614	n = 9,356	n = 4,731

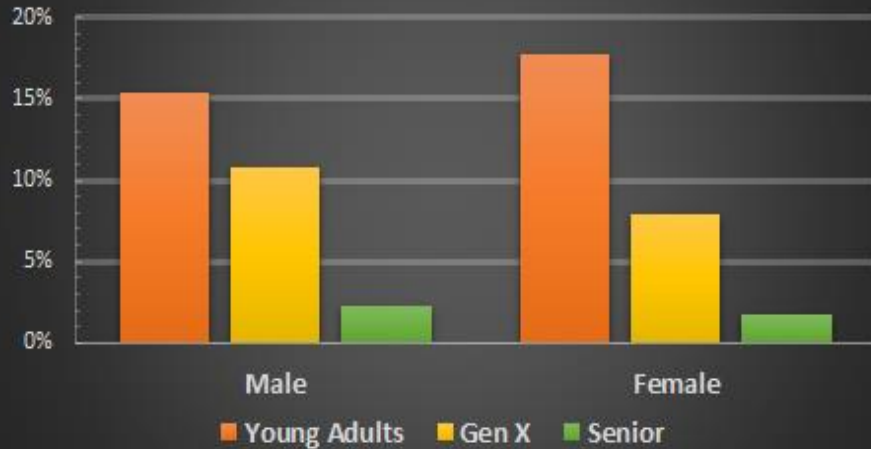
U.S. Rideshare Service Usership



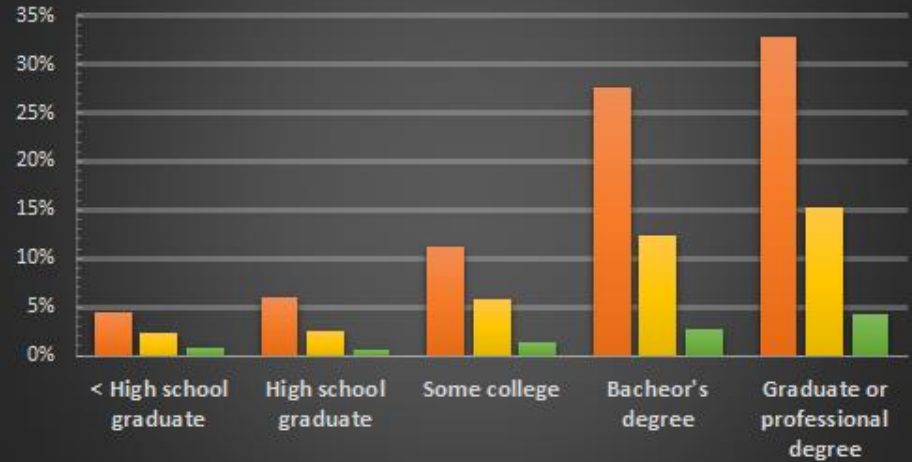
Descriptive Statistics (Demographics)



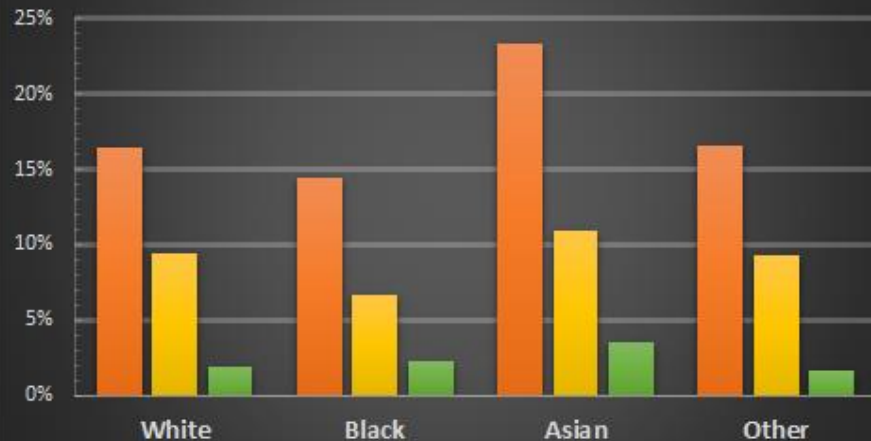
GENDER



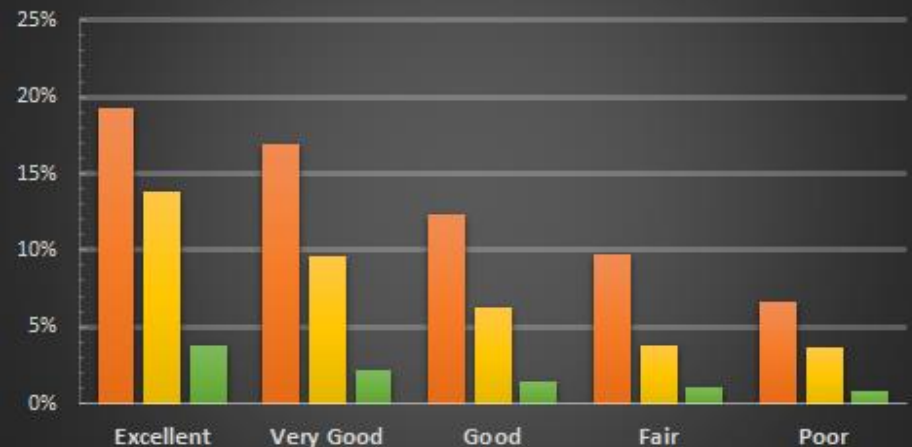
EDUCATION



RACE



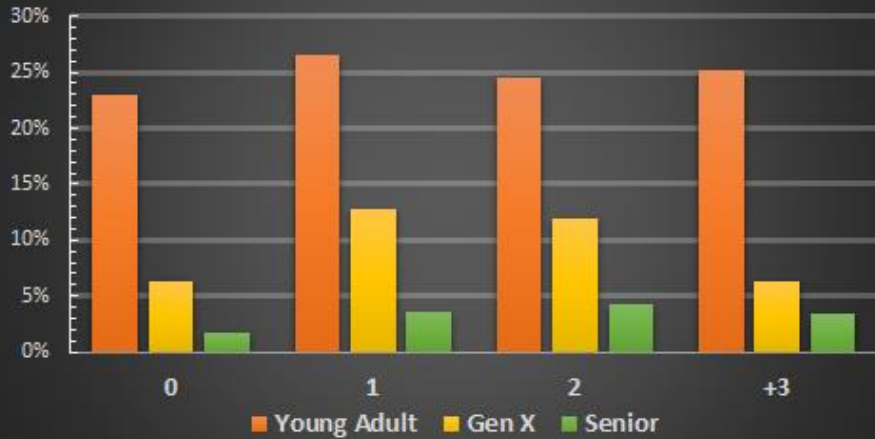
HEALTH



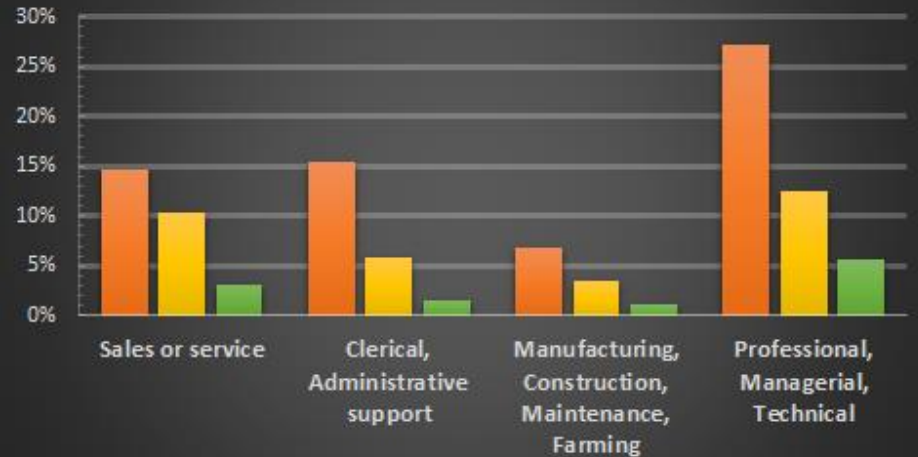
Descriptive Statistics (Worker)



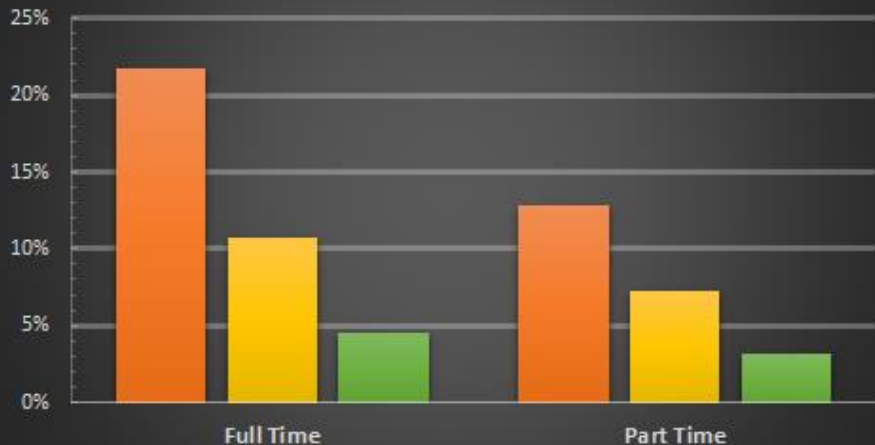
OF WORKERS in HH



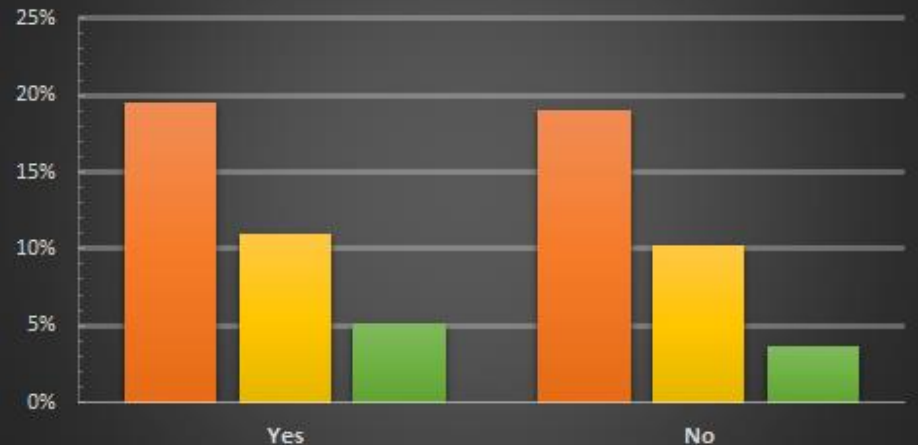
OCCUPATION



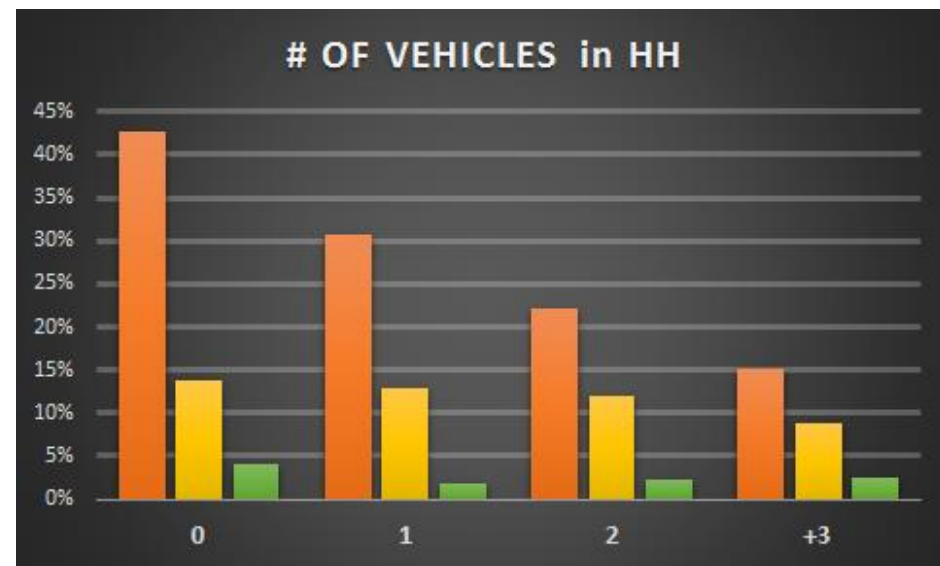
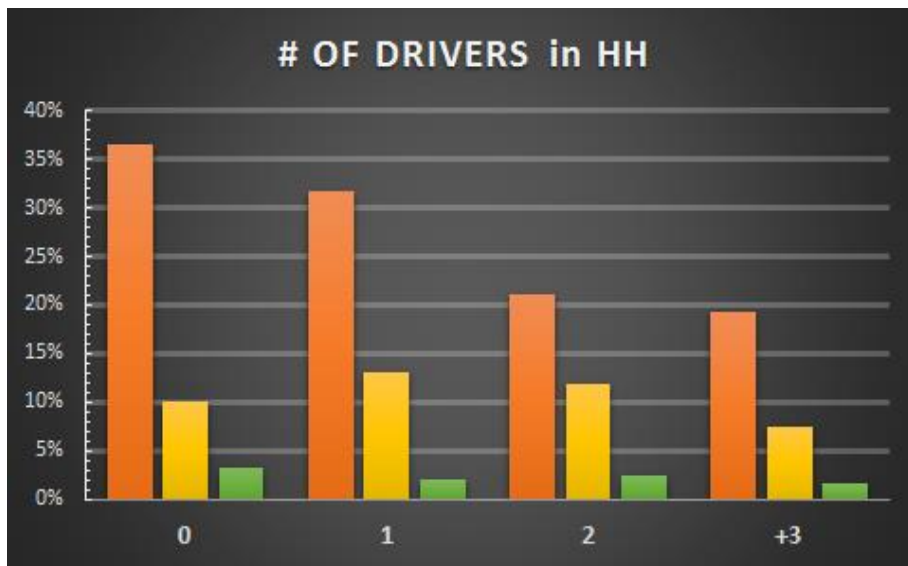
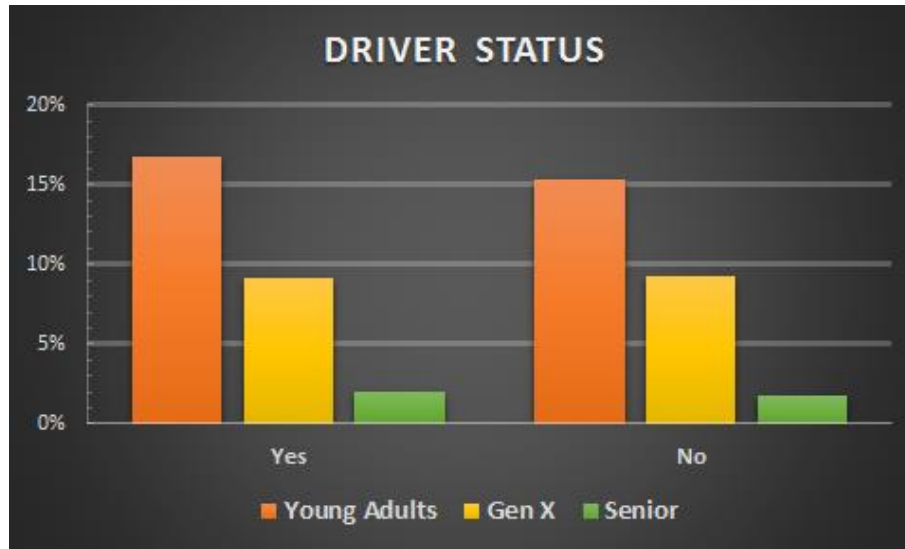
EMPLOYMENT STATUS



MORE THAN 1 JOB



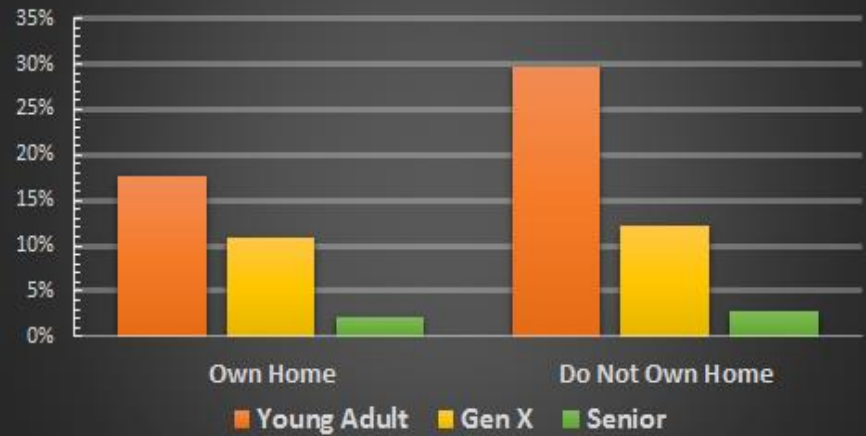
Descriptive Statistics (Driver)



Descriptive Statistics (Household)



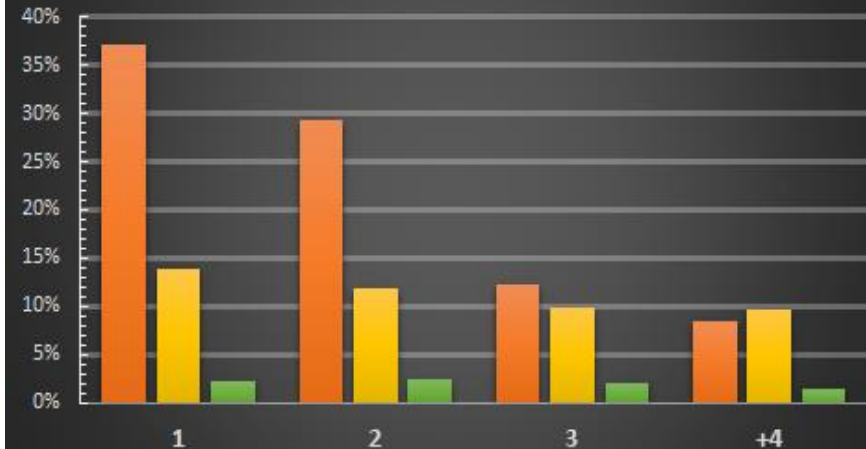
HOME OWNERSHIP



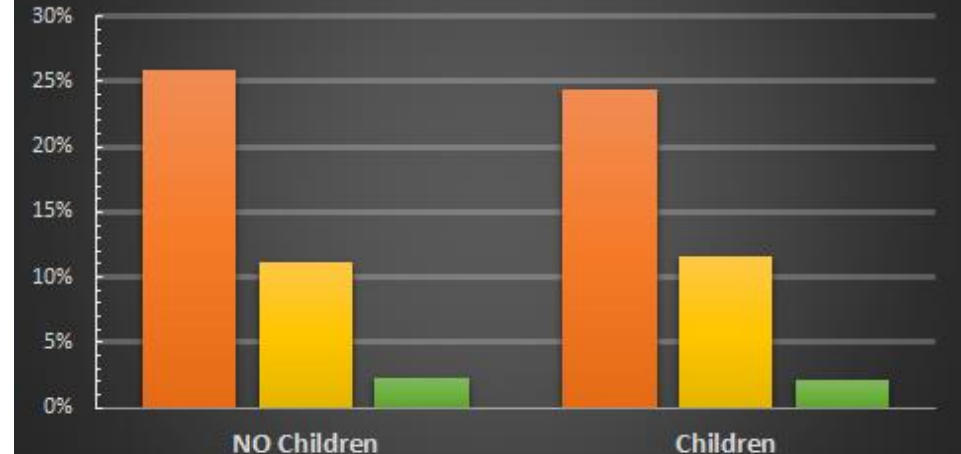
INCOME



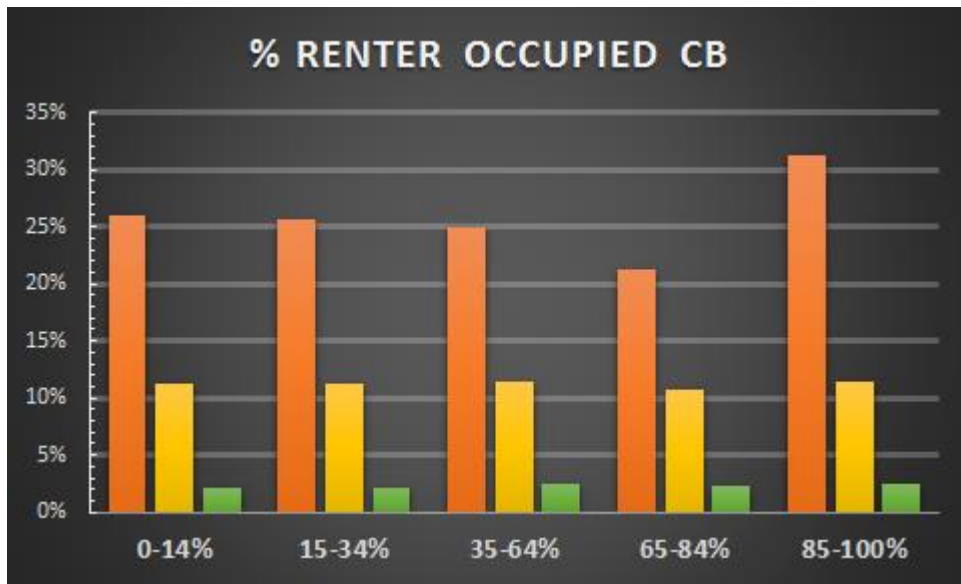
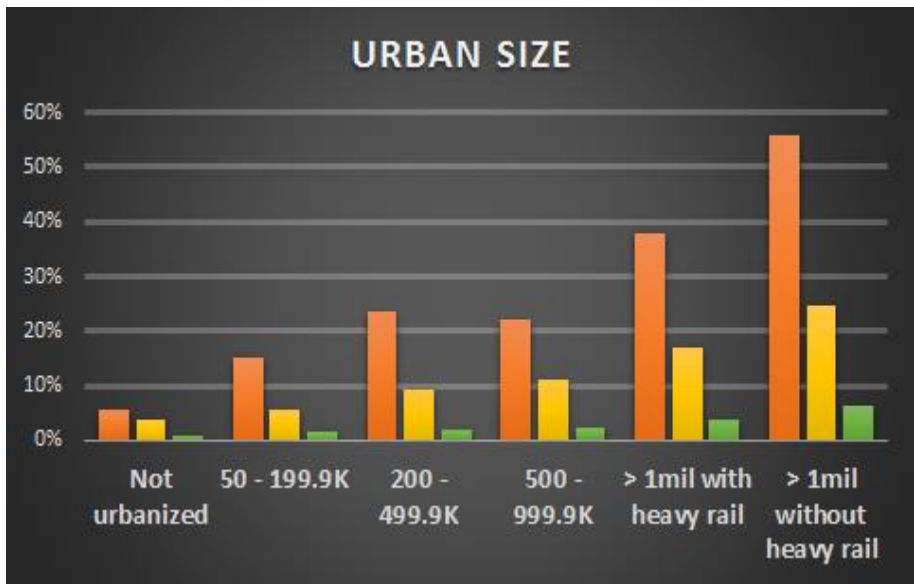
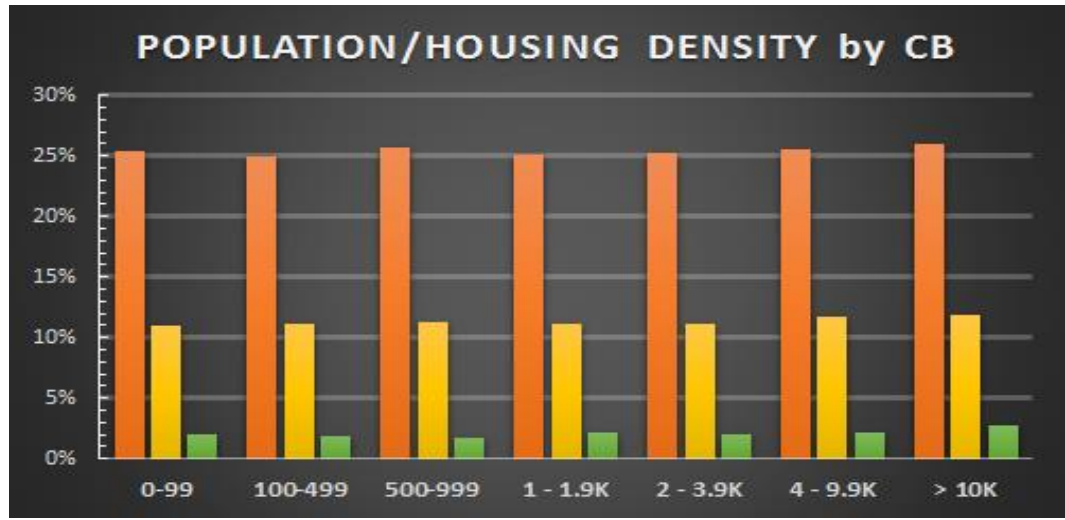
HOUSEHOLD SIZE



CHILDREN PRESENT



Descriptive Statistics (Land-Use)



Multinomial Logit Model



- Determine significant individual/household predictors of rideshare service users
- General Model:

$$\text{Logit} (P_{\text{Frequency}}) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

Where:

$P_{\text{Frequency}}$	Probability that an individual makes number of purchases of rideshare
β_0	Intercept
β_i	Coefficients (effects) of variables related to characteristics
X_i	Variables related to characteristics

MNL Results (I)



Variable	Young Adult (18-30 yrs old)		Gen X (39-53 yrs old)		Senior (65+ yrs old)	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
1: One-Time Users (intercept)	-4.271	2.20E-16	-4.950	< 2.2e-16	-6.339	2.20E-16
2: Regular Users (intercept)	-6.024	2.20E-16	-7.212	< 2.2e-16	-8.629	2.20E-16
Personal Characteristics						
1:Gender (Female)	-	-	-0.313	4.10E-13	-	-
2:Gender (Female)	-	-	-0.474	3.51E-07	-	-
1:Education	0.366	2.20E-16	0.283	< 2.2e-16	0.319	2.20E-16
2:Education	0.213	4.24E-06	0.187	0.00039	0.253	0.013872
1:Health	-0.162	5.52E-08	-0.175	3.43E-11	-0.249	9.04E-10
2:Health	-0.255	5.53E-07	-0.157	0.00472	-0.179	0.099841
1: Drives Status (Yes)	0.072	0.4488642	-0.279	0.03677	-0.101	0.540001
2: Driver Status (Yes)	-0.639	1.70E-07	-1.236	1.73E-10	-1.397	7.94E-07

- Driver Status has significant negative effect on frequent users
- Greater perception of Health → greater odds of ridesharing usage
- Females likely rideshare less than males in Generation X
- Higher educated persons predicted to rideshare more often
 - However, higher educated persons are more likely 1-time users

MNL Results (II)



Variable	Young Adult (18-30 yrs old)		Gen X (39-53 yrs old)		Senior (65+ yrs old)	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Household Characteristics						
1: Home Ownership (Owned)	-0.349	5.73E-09	-0.374	9.22E-10	-0.381	0.001321
2: Home Ownership (Owned)	-0.726	3.92E-12	-0.552	2.14E-06	-0.688	0.013527
1: Household Size	-0.207	1.73E-08	-0.184	< 2.2e-16	-0.437	1.57E-10
2: Household Size	-0.081	0.2073507	-0.469	< 2.2e-16	-0.209	0.188574
1: # of Vehicles	-0.085	0.0030938	-	-	-	-
2: # of Vehicles	-0.445	8.88E-16	-	-	-	-
1: # of Workers	0.117	0.0008136	-	-	-	-
2: # of Workers	0.210	0.0008281	-	-	-	-
1: Income Level	0.104	2.20E-16	0.234	< 2.2e-16	0.280	2.20E-16
2: Income Level	0.267	2.20E-16	0.436	< 2.2e-16	0.298	1.02E-09
1: # of Adults (+2 Adults)	-0.284	0.0001413	-	-	-	-
2: # of Adults (+2 Adults)	-0.605	5.67E-07	-	-	-	-
1: # of Children (Have Children)	-0.354	1.70E-06	-	-	-	-
2: # of Children (Have Children)	-0.920	3.54E-11	-	-	-	-

- Home ownership adversely affects person's decision when purchasing rideshare trips
- Young adults: Increase in number of vehicles, adults, and children in the family reduces odds of choosing to use rideshare services
- Income does not affect senior's frequency of rideshare use

MNL Results (III)



Variable	Young Adult (18-30 yrs old)		Gen X (39-53 yrs old)		Senior (65+ yrs old)	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Land Use Characteristics						
1: Population Density	0.114	9.06E-10	-	-	-	-
2: Population Density	0.236	5.11E-11	-	-	-	-
1: # of housing units per sq mi	-	-	0.135	2.20E-13	0.238	2.20E-16
2: # of housing units per sq mi	-	-	0.272	1.49E-12	0.503	4.44E-16
1: % of renter occupied housing	0.087	0.0002734	0.002	0.05691	-	-
2: % of renter occupied housing	0.093	0.0213919	0.013	1.91E-09	-	-
1: Urban Size	0.223	2.20E-16	0.221	< 2.2e-16	-	-
2: Urban Size	0.496	2.20E-16	0.313	< 2.2e-16	-	-

- **Either Population or Housing Unit Density Works in the model because of collinearity**
- **Senior groups are less affected by land use variables in their decision of purchasing a ride**

Model Predictions (I)



- **GENERATION Xers:**

- who drive are 71% & 24% less likely to use a rideshare service regularly (+5 times in month) & one time
- who are females are 38% & 27% less likely to use the service regularly & one time than males
- with higher incomes are 54% more likely to purchase rides frequently

- **SENIORS:**

- in dense housing areas have 65% greater chance of regularly purchasing rides
- who drive are 75% less likely to use a rideshare service regularly

{Not many characteristics affect decision to purchase rides}

Model Predictions (II)



- **YOUNG ADULTS:**

- with children are:
 - 30% less likely to rideshare for the first time and
 - 60% less likely to rideshare on a regular basis
- who drive are 48% less probable to choose rideshare regularly
- who own homes are
 - 30% less likely to be a one-time user of rideshare and
 - 52% less likely to choose rideshare as their regular mode
- with higher incomes have 30% higher chances of using rideshare

{MANY variables affect Millennials' decision to purchase rides}

Takeaways



Younger Adults Dominate Rideshare Usage

- **Some Characteristics affect ALL Age Groups:**

(+) Education, Health Opinion, Household Income

(-) Household Size, Home Ownership, Driver (yes)

- Higher Education
- Good Health Opinion
- Do NOT Own Home
- Higher Income
- Increase household size
- NOT a Driver

} Higher Rideshare Probability

- **Other Characteristics affect Age Groups individually:**

- gender and land use characteristics
- Young adults more sensitive to sociodemographic traits

- **Our findings support previous research findings**

Thank You For Your Attention!

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