



Examining Changes in Households Spending Patterns in Response to Changes in Transportation Usage and Transportation Unit Costs

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Bureau of Labor Statistics

2018 Consumer Expenditure Surveys (CE) Microdata Users' Workshop

Washington, DC

July 17, 2019

How did we
(Transportation Finance Folks & Urban Planners)
wind up here at the BLS?
Part IV (2014, 2017, 2018 & 2019)

Why are we interested in tracking the
cost of transport services and fees?

The Changing US Portfolio of Travel

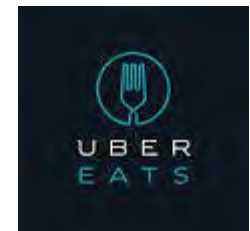
- Look at aspects of travel costs that are changing.
- How are these costs reflected in the CEX?
- How are these cost measured through other methods?
- How are these costs spread across income groups?
- How can we plan to measure future costs?
- How do people change their consumption basket in response to additional costs/goods/services?



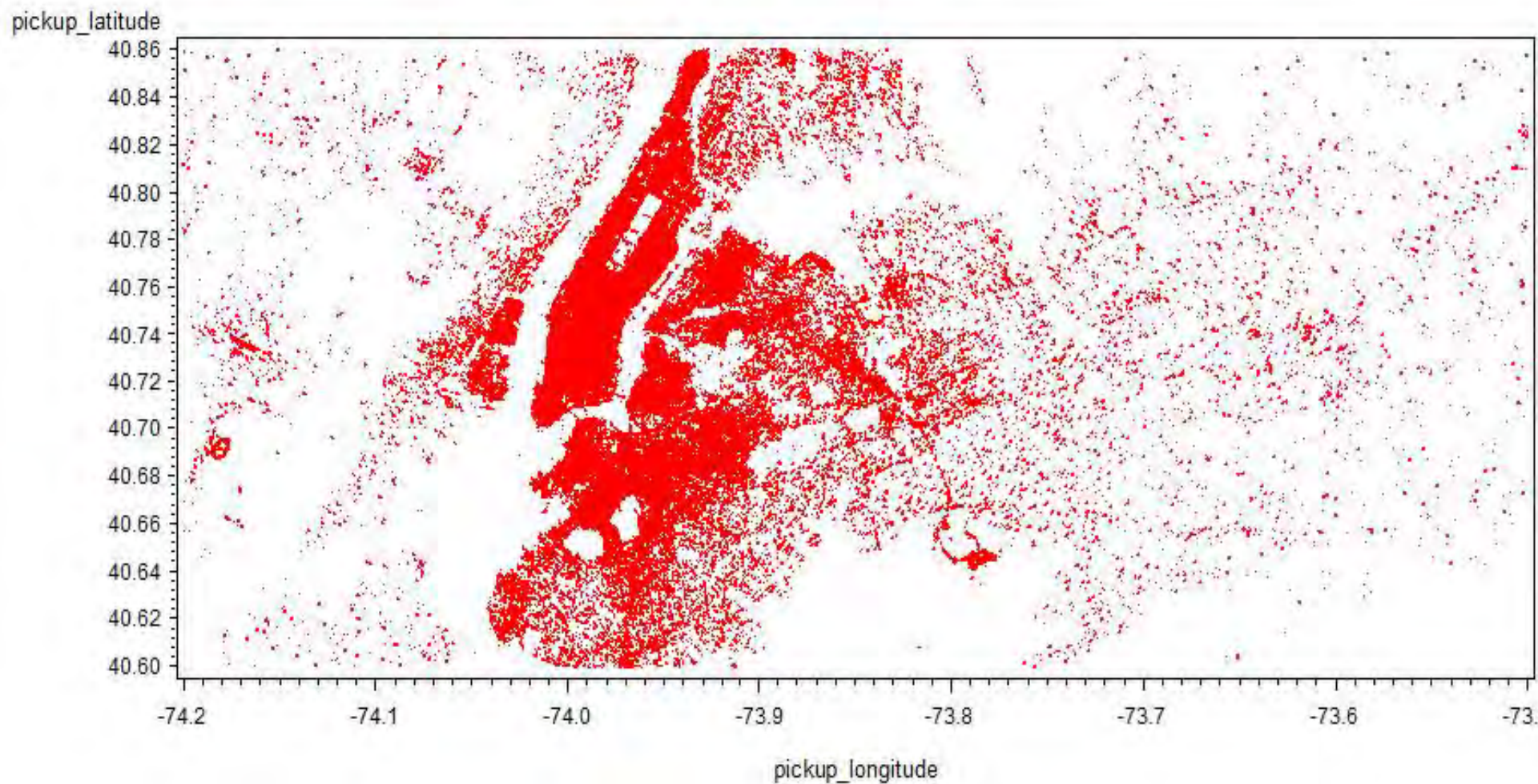
Ola Cabs - India



Sidecar - DOA



Uber Trips Origins in “New York” – From Uber



Data Obtained From Uber by NYC Taxi and Limousine Commission for April – October 2014

New York City For Hire Vehicle Trips

Trips per day



Data via NYC TLC
toddwschneider.com



Hitchin' a ride: Fewer Americans have their own vehicle

Jan 23, 2014 Contact Bernie DeGroat



11

ANN ARBOR—American households without a vehicle have increased nearly every year since 2007 —providing further evidence that motorization may have peaked in the United States, says a University of Michigan researcher.

Following up his research from last year showing that Americans own fewer light-duty vehicles per household, drive them less and consume less fuel than in the past, Michael Sivak of the U-M

Transportation Research Institute examined recent

trends (2005-12) in the proportion of U.S. households without a car, pickup truck, SUV or minivan. He also studied variations in this proportion for the 30 largest U.S. cities for 2007 and 2012.

Sivak found that 9.2 percent of U.S. households



U.S. households without a vehicle (9%)

US Households Without a Vehicle

Rank	City	% car-free
1	New York City	56%
2	Washington, DC	38%
3	Boston	37%
4	Philadelphia	33%
5	San Francisco	31%
6	Baltimore	31%
7	Chicago	28%
8	Detroit	26%

U.S. Average = 9.22%

Household Modes of Travel

- Private Automobile
- Shared Vehicle – Carpool / Fampool
- Shared Vehicle – Taxi, Jitney, Lyft, Uber
- Walking
- Bicycle
- Mass Transit – Commuter Rail, Metro, Bus, Ferry
- Air Travel
- Non-Travel – Online Shopping / Video Meetings
- And Lodging - AirBNB versus Hotels



Changing Households

- Households used to travel a lot to get goods and services.
- Go to store to rent a DVD or buy a CD – Now Netflix and I-Tunes.
- Go to a restaurant to get a meal
- Go to store to purchase a physical map – now cell phone and GPS services
- Buy a car and have it for your own use every day – now Lyft, Uber and Zipcar.
- Travel to a location to have a meeting – now Skype or GotoMeeting.
- Now these services are bundled in some cases with transportation services, communications or the delivery of goods.
- **It will move the stuff between the UCC boxes.**

Transportation Usage

- Transport costs are shifting away from -
- An average cost model (meaning once you buy a car and insurance there are few additional costs, so you can make assumptions about the average cost of a trip if you know how much travel is happening) to
- A marginal cost model - where travelers are paying more out of pocket for each trip taken.
- This shift will have profound implications for travel models and such, as marginal costs affect behavior more than average costs (which are sunk, anyway).

Our First Project - 2014

Examining Tolling in BLS Data

Price Data Should be in
Producer Price Index (PPI)
or
Consumer Price Index (CPI)

For Whom the Consumer Price Index Tolls

Reporting of Road Pricing in the Consumer Expenditure Survey

Jonathan Peters, David A. King, Cameron Gordon, and Nora Tabori Santiago



User fees have long been seen as an efficient financing mechanism because beneficiaries of services pay for the benefits received. This point of view is especially applicable to public services with commercial aspects and in situations for which links between consumption and price are relatively easy to make. However, road pricing, such as tolls, can be very high and important to local price levels. This paper examines the way in which expenditures on tolls are tracked and measured in the United States through the consumer expenditure survey (CES) run by the U.S. Bureau of Labor Statistics. The paper describes the CES and its methods, both generally and for tolls and road charges specifically, and compares those

RISE OF ROAD PRICING IN AMERICA

During the 20th century in the United States, the primary national source of funding for highways and, later on, transit was the fuel excise, or gas tax. Beginning with Oregon, all U.S. states and the District of Columbia implemented a fuel tax between 1919 and 1929. President Hoover initially instituted the federal tax with the Revenue Act of 1932. These taxes are a specific excise that is a fixed price per unit sold (as opposed to an ad valorem, or percentage of sales price) tax. This tax is collected at the national and state levels and has the advantage of being easy to collect, typically at the rack or distributor level, hard

Consumer Expenditure Survey

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Section 12 Part C - Vehicle Operating Expenses - Other Vehicle Operating Expenses

Section 12, Part C deals with other vehicle operating expenses, including a monthly average expenditure on gasoline, purchases of oil and other fluids, parking fees, towing charges, docking or landing fees, and expenses for auto repair service policies and clubs.

Since the first of reference month not including this month --

what has been your your/household's AVERAGE MONTHLY expense for gasoline and other fuels for all vehicles? [\[enter value\]](#)

For definitions [Information Booklet](#) »

Was any of this expense for diesel fuel?

[1. Yes](#)[2. No](#)

How much? [\[enter value\]](#)

What percentage of the AVERAGE MONTHLY COST was counted as a business expense? [\[enter value\]](#)

Since the first of the reference month not including this month --

have you or any member of your household purchased any oil for operating vehicles?

[1. Yes](#)[2. No](#)

What was the total cost? [\[enter value\]](#)

Since the first of the reference month not including this month --

have you or any member of your household purchased any antifreeze, brake fluid, transmission fluid, windshield wiper fluid, or additives, except if purchased with a tune-up?



CE TOPICS

REPORTS ▶

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How much? [\[enter value\]](#) _____

What percentage of the AVERAGE MONTHLY COST was counted as a business expense? [\[enter value\]](#) _____

Since the first of the reference month not including this month --
have you or any member of your household purchased any oil for operating vehicles?

[1. Yes](#)

[2. No](#)

What was the total cost? [\[enter value\]](#) _____

Since the first of the reference month not including this month --
have you or any member of your household purchased any antifreeze, brake fluid, transmission fluid, windshield wiper fluid, or additives,
except if purchased with a tune-up?

[1. Yes](#)

[2. No](#)

What was the total cost of these purchases? [\[enter value\]](#) _____

Since the first of the reference month not including this month --

Had any expenses for parking, such as parking garages, parking lot fees, or parking meters? Do not include expenses that are part of your property ownership or rental costs, a business expense or expenses that will be totally reimbursed.

[1. Yes](#)

[2. No](#)

How much was paid, not including any payments made this month? [\[enter value\]](#) _____

Since the first of the reference month not including this month, have you or any member of your household had any expenses for -

Local tolls or electronic toll passes?

[1. Yes](#)

[2. No](#)

How much was paid, not including any payments made this month? [\[enter value\]](#) _____

Since the first of the reference month not including this month, have you or any member of your household had expenses for -

Docking and landing fees for boats and planes?

NEW

Subscribe
to the CEX
Update



Email Address



Consumer Unit (CU) Characteristics And Income – FMLY

Summary Expenditure Data

VARIABLE_NAME	VARIABLE_DESCRIPTION	Format	Note
MADNRPPQ	Maintenance and repairs last quarter 470220 480110 480212 480213 480214 480215 490110 490211 490212 490221 490231 490232 490311 490312 490313 490314 490318 490319 490411 490412 490413 490501 490900	NUM(12,4)	
MADNRPCQ	Maintenance and repairs this quarter same UCCs as above	NUM(12,4)	
VEHINSPQ	Vehicle insurance last quarter 500110	NUM(12,4)	
VEHINSCQ	Vehicle insurance this quarter same UCC as above	NUM(12,4)	
VRNTLOPQ	Vehicle rental, leases, licenses, and other charges last quarter 450310 450313 450314 450410 450413 450414 520110 520310 520410 520511 520512 520521 520522 520531 520532 520541 520542 520550 520560 520902 520905 620113	NUM(12,4)	
VRNTLOCQ	Vehicle rental, leases, licenses, and other charges this quarter same UCCs as above	NUM(12,4)	
* PUBTRAPQ	Public and other transportation last quarter TRNTRPPQ + TRNOTHPQ	NUM(12,4)	C(Y112)
* PUBTRACQ	Public and other transportation this quarter same composition as above	NUM(12,4)	C(Y112)
* TRNTRPPQ	Public and other transportation on trips last quarter 530110 530210 530312 530411 530510 530901	NUM(12,4)	C(Y112)

Abstract

There has been an explosive growth in various types of new transportation options and fees over the last 15 years. With growing structural deficits in state Departments of Transportation (DOTs) and stagnant sources of federal revenue, there has been a rapid deployment of new and proposed road use charges to fill these funding gaps. Cities have realized that parking is a scarce resource and started to use pricing as a way to manage demand as well as traffic. At the same time, transportation users have more options to reduce private automobile use through new technology enabled transportation options (mass transit, transportation network companies (Uber, Lyft and such) and car sharing. Yet the extent of these new tolls, fees and fares—as well as their actual prevalence rather than hype—is not well documented, and there are no easily accessible data sources to do so. In part, this is because many of the new payments are made to private firms that do not readily share information about their revenues or overall use. This research describes the growth of these fees through a study of consumer expenditures. All of these new services should be reflected in household consumption expenditures and are altering the consumption basket of households.

Research Questions

This project explores the following questions:

- Are household expenditures on transportation changing?
- What is the effect of perceived growth in tolls, parking and taxis on household spending? Does actual spending reflect popular hype?
- What are the geographic and income differences in household transportation spending?

Introduction

In the past decade or so transport spending has changed, however. Popular press and investors have promoted the idea that there is a revolution in passenger travel underway, where fewer people are driving and more people are using app-based mobility services. State have responded to shrinking transport spending and public demands to manage congestion with new toll facilities, such as conversion of High Occupancy Vehicle (HOV) lanes to High Occupancy Toll (HOT) lanes that solo drivers can pay a fee to use. Cities are reducing parking requirements, which makes parking more scarce and likely to be charged. Cities are also increasing the use of parking meters as a source of municipal revenue by extending the hours enforced and raising the parking rate. Road tolls have also increased. The federal government has not increased the gas tax since the early 1990s, which led to ever more limited funding available through the highway trust fund, and a declining share of federal spending on total transportation investment. As a response, most states have increased their own gas taxes. To a lesser degree, but still substantial, states have pursued toll roads either through contracts, public-private partnerships or opening their own toll facilities. Transponder technology has made tolling technologically more feasible, and currently well over half of all US have at least one tolled facility. This all represents a substantial shift in how households spend their transport budget. It may be that households spend more overall with these new charges, or it may be that households change the composition of their spending bundle. The growth of these types of charges also introduces higher marginal costs of travel for many trips, which has implications for traffic modeling and planning.

Data

This research uses data from the Bureau of Labor Statistics Consumer Expenditure Survey (CEX). The CEX is composed of interview and diary survey data collected from households by the BLS, which is part of the U.S. Census Bureau. Households selected for the interview survey are interviewed quarterly for a year, with rolling participation so that during each quarterly interview period 25 percent of respondents are replaced with new households. The diary survey is collected over a two-week period concurrent with the interview period. By design, the interview survey is intended to capture large and/or recurring expenditures such as car purchases or rent, while the diary survey is meant to capture smaller and more variable purchases. At any time, there are approximately 7,000 households participating. This sample size allows for detailed analysis at fine geographic and socio-demographic scales.

Table 1: Changes in Selected Consumer Expenditures by User and Household, All Households, 2005-2015

Category	2005				2015				Change 2005-2015	
	Households with User	Average Paid by User	% of Household Spending	% of Total Expenditure	Households with User	Average Paid by User	% of Household Spending	% of Total Expenditure	% Change in User Spending	% Change in Total Expenditure
Tolls	2600	3.6%	0.00%	0.00%	4600	13.3%	0.00%	0.00%	270%	270%
Local Parking	2500	9.7%	0.20%	0.00%	4400	12.3%	0.00%	0.00%	26%	26%
Taxi/Car Services	7400	3.3%	0.00%	0.00%	6400	3.0%	0.00%	0.00%	-10%	-10%
Gasoline	7300	10.7%	0.00%	0.00%	6300	10.0%	0.00%	0.00%	-7%	-7%
Transit	7400	1.8%	0.00%	0.00%	6400	2.0%	0.00%	0.00%	11%	11%
Motorist Miles Traveled	7400	3.4%	0.00%	0.00%	6400	3.0%	0.00%	0.00%	-12%	-12%

Table 1 shows:

- Growth in all spending categories except gasoline
- Spending on tolls roughly doubled 2005-15
- Use of taxis increased by 50%, though fares paid declined. This is likely due to Uber/Lyft subsidy.
- Paid parking increased overall.

Table 2: Changes in Selected Consumer Expenditures by User and Household, Top 1% by Income, 2005-2015

Category	2005				2015				Change 2005-2015	
	Households with User	Average Paid by User	% of Household Spending	% of Total Expenditure	Households with User	Average Paid by User	% of Household Spending	% of Total Expenditure	% Change in User Spending	% Change in Total Expenditure
Tolls	50	22.3%	0.00%	0.00%	50	31.0%	0.00%	0.00%	40%	40%
Local Parking	50	57.5%	0.00%	0.00%	50	53.5%	0.00%	0.00%	-7%	-7%
Taxi/Car Services	50	12.1%	0.00%	0.00%	50	24.0%	0.00%	0.00%	198%	198%
Gasoline	50	46.7%	0.00%	0.00%	50	40.0%	0.00%	0.00%	-14%	-14%
Transit	50	4.9%	0.00%	0.00%	50	12.4%	0.00%	0.00%	155%	155%
Motorist Miles Traveled	50	10.0%	0.00%	0.00%	50	9.0%	0.00%	0.00%	-10%	-10%

Table 2:

- Top 1% by income increased transport spending and use in all categories except gasoline.
- Large increases in tolls and taxi usage.

Table 3: Changes in Selected Consumer Expenditures by User and Household, Middle Income Households, 2005-2015

Category	2005				2015				Change 2005-2015	
	Households with User	Average Paid by User	% of Household Spending	% of Total Expenditure	Households with User	Average Paid by User	% of Household Spending	% of Total Expenditure	% Change in User Spending	% Change in Total Expenditure
Tolls	710	2.2%	0.00%	0.00%	640	8.0%	0.00%	0.00%	270%	270%
Local Parking	710	2.4%	0.00%	0.00%	640	1.7%	0.00%	0.00%	-29%	-29%
Taxi/Car Services	710	1.0%	0.00%	0.00%	640	1.4%	0.00%	0.00%	40%	40%
Gasoline	710	9.0%	0.00%	0.00%	640	8.0%	0.00%	0.00%	-11%	-11%
Transit	710	1.0%	0.00%	0.00%	640	1.0%	0.00%	0.00%	0%	0%
Motorist Miles Traveled	710	7.1%	0.00%	0.00%	640	5.0%	0.00%	0.00%	-30%	-30%

Table 3:

- Middle income households saw the largest increase in toll usage and payment.
- Parking and taxi usage increased while fees and fares paid declined.

Table 4: Changes in Selected Consumer Expenditures by User and Household, Lowest Income Households, 2005-2015

Category	2005				2015				Change 2005-2015	
	Households with User	Average Paid by User	% of Household Spending	% of Total Expenditure	Households with User	Average Paid by User	% of Household Spending	% of Total Expenditure	% Change in User Spending	% Change in Total Expenditure
Tolls	120	5.0%	0.00%	0.00%	100	9.0%	0.00%	0.00%	80%	80%
Local Parking	120	5.0%	0.00%	0.00%	100	5.0%	0.00%	0.00%	0%	0%
Taxi/Car Services	120	4.7%	0.00%	0.00%	100	4.7%	0.00%	0.00%	0%	0%
Gasoline	120	75.0%	0.00%	0.00%	100	77.1%	0.00%	0.00%	-3%	-3%
Transit	120	0.0%	0.00%	0.00%	100	1.7%	0.00%	0.00%	100%	100%
Motorist Miles Traveled	120	11.3%	0.00%	0.00%	100	13.0%	0.00%	0.00%	15%	15%

Table 4:

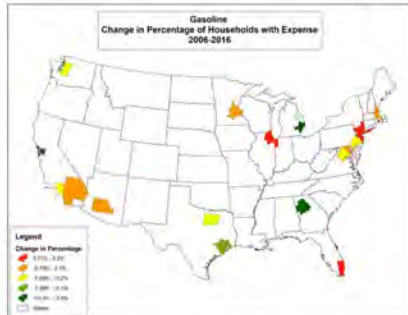
- Lowest income households saw large increases in parking fees.
- Flat trends for tolls paid, though usage increased.
- No meaningful difference in taxi usage or payments.
- Gasoline is a non-trivial household expense.

Change in Consumer Expenditures by PSU

	2005				2015				Change 2005-2015	
	% of HH with User	Average Paid by User	% of Household Spending	% of Total Expenditure	% of HH with User	Average Paid by User	% of Household Spending	% of Total Expenditure	% Change in User Spending	% Change in Total Expenditure
San Francisco, CA	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
New York, NY	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
Los Angeles, CA	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
Chicago, IL	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
San Jose, CA	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
San Diego, CA	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
Seattle, WA	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
Portland, OR	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
Phoenix, AZ	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
San Antonio, TX	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
San Francisco, CA	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
New York, NY	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
Los Angeles, CA	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
Chicago, IL	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
San Jose, CA	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
San Diego, CA	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
Seattle, WA	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
Portland, OR	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
Phoenix, AZ	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%
San Antonio, TX	100	10.0%	0.00%	0.00%	100	10.0%	0.00%	0.00%	0%	0%

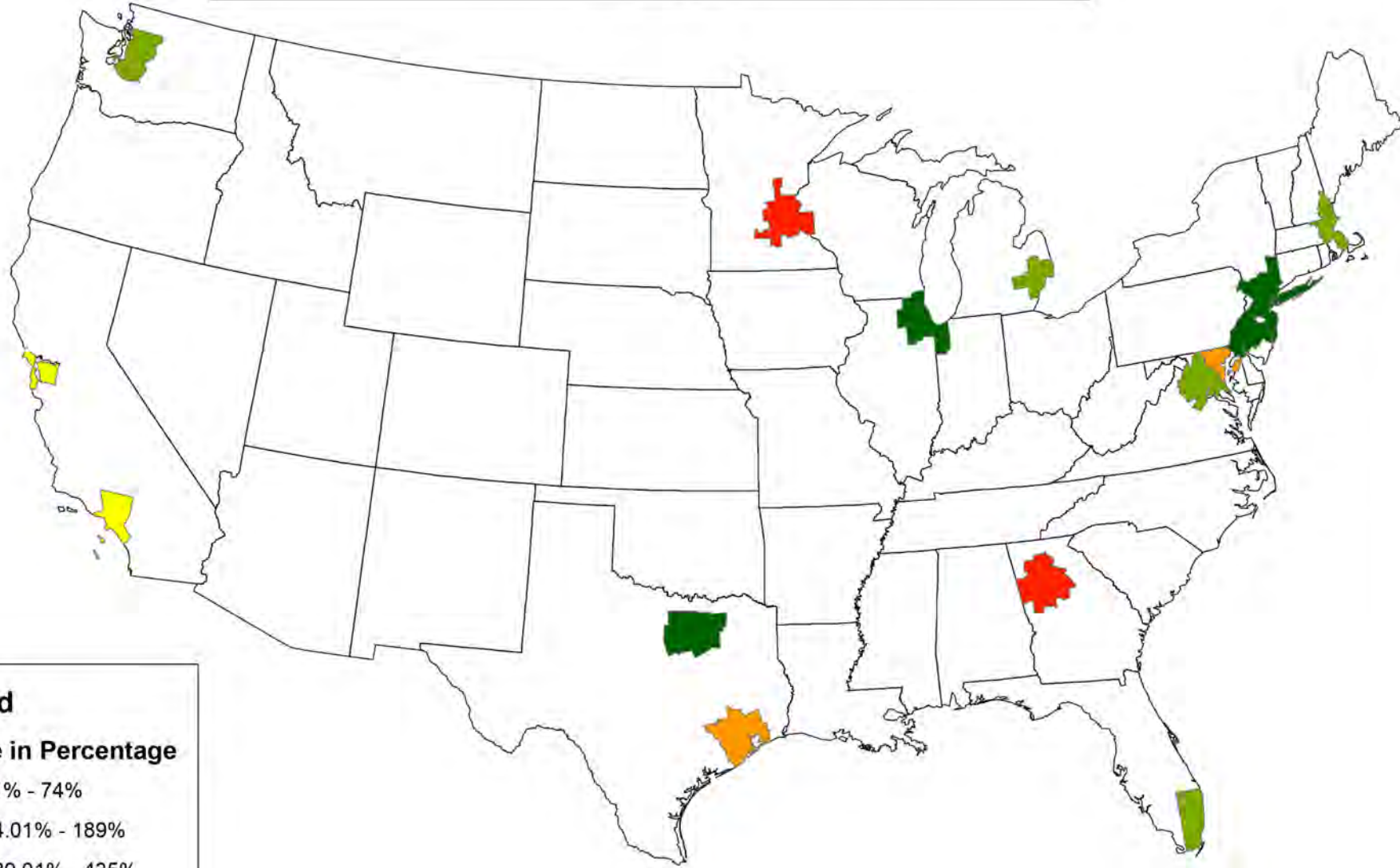
Consumer Expenditures on Local Tolls

	2016		
	Avg for All HH	% of HH with	Average Spending
		Expense	All HH
NON-PSU AREAS	\$1.73	10%	\$0.46
Boston-Cambridge-Newton, MA-NH	\$10.83	39%	\$3.67
New York-Newark-Jersey City, NY-NJ-PA	\$12.54	29%	\$3.73
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	\$9.74	30%	\$5.47
Chicago-Naperville-Elgin, IL-IN-WI	\$6.51	25%	\$2.98
Detroit-Warren-Dearborn, MI	\$1.43	3%	\$1.18
Minneapolis-St. Paul-Bloomington, MN-WI	\$0.23	3%	\$0.67
Washington-Arlington-Alexandria, DC-VA-MD-WV	\$3.88	22%	\$0.83
Miami-Fort Lauderdale-West Palm Beach, FL	\$6.30	33%	\$5.85
Atlanta-Sandy Springs-Roswell, GA	\$0.39	1%	\$0.39
Baltimore-Columbia-Towson, MD	\$8.62	28%	\$1.99
Dallas-Fort Worth-Arlington, TX	\$11.54	33%	\$2.84
Houston-The Woodlands-Sugar Land, TX	\$8.33	37%	\$8.82
Phoenix-Mesa-Scottsdale, AZ	.	.	\$0.07
Los Angeles-Long Beach-Anaheim, CA	\$4.05	10%	\$0.72
San Francisco-Oakland-Hayward, CA	\$11.43	50%	\$7.25
Riverside-San Bernardino-Ontario, CA	\$2.62	7%	\$9.27
Seattle-Tacoma-Bellevue, WA	\$4.68	34%	\$0.18
San Diego-Carlsbad, CA	\$2.21	12%	\$1.73



Taxi and Car Services

Change in Percentage of Household with Expense 2006-2016



Legend

Change in Percentage

- 11% - 74%
- 74.01% - 189%
- 189.01% - 435%
- 435.01% - 757%
- 757.01% - 1225%

States

CES Data from (Public Use Microsample)

Data on Transportation Series

Why Use the CEX?

- Both Income and Consumption for households
- Longitudinal aspects of data
- Well organized and documented
- Has various aspects of household lifestyle
- Has geographic location
- Can compare consumption of various goods in same household

Options for Descriptives in the CEX

- Consumption by PSU
- Consumption by State (new – some states)
- Consumption by Income Group
- Consumption by Age Cohort (Generation)
- Consumption by Educational Status
- Consumption by Gender
- Consumption by Race
- Consumption patterns over time

Some Transportation Costs

- Local Tolls
- Parking Fees
- Taxi Type Services – Out of Town Trips
- Taxi Type Services – Local Use
- Gasoline Consumption
- Diesel Consumption
- Intracity Mass Transit


```
*libname DIARY 'c:\ces2011\diary\';  
libname EXPN 'c:\ces2015\EXPN15\';  
libname INTERV 'c:\ces2015\INTRVw15\';
```

```
data cesstate; set interv.cesstate3;  
    statename = state;  
        state=sct;  
        sc=sct;
```

```
proc sort; by sc;
```

```
data qtr1; set interv.mtbi153;  
    where ucc in ("470111") and ref_mo = "06";
```

```
    tcount = 1;
```

```
proc sort; by newid;
```

```
proc corr;
```

```
data family; set interv.fmli153;  
    fcount =1;  
        sc=state+0;
```

```
PROC SORT; BY newid state cuid;
```

```
data allbang; merge family qtr1;  
    by newid;
```

```
    *incclass = 4;  
        if    0 lt inc_rank le .10 then incclass = 1;  
        if .10001 lt inc_rank le .20 then incclass = 2;  
        if .20001 lt inc_rank le .30 then incclass = 3;  
        if .30001 lt inc_rank le .40 then incclass = 4;  
        if .40001 lt inc_rank le .50 then incclass = 5;  
        if .50001 lt inc_rank le .60 then incclass = 6;  
        if .60001 lt inc_rank le .70 then incclass = 7;
```

Income Class	Surveys	Payers	Expenditures (Gasoline)	MVE	Avg MVE	Ave Payer (Gasoline)	Avg All (Gasoline)	Percent Consuming
1	1644	1207	\$195,249	\$9,373	\$5.70	\$161.76	\$118.76	73.4%
2	1646	1447	\$215,969	\$13,663	\$8.30	\$149.25	\$131.21	87.9%
3	1600	1534	\$295,553	\$18,246	\$11.40	\$192.67	\$184.72	95.9%
4	1591	1553	\$393,117	\$60,652	\$38.12	\$253.13	\$247.09	97.6%
	=====	=====	=====	=====				
	6481	5741	\$1,099,888	\$101,934				

Note about 90% of HH in CEX consume gasoline

Lower Income HHs have a 73.4% Gasoline Usage Rate

High Income HH have a 97.6% Gasoline Usage Rate

Gasoline Consumption is 10x the level of Miscellaneous Vehicle Expenditures

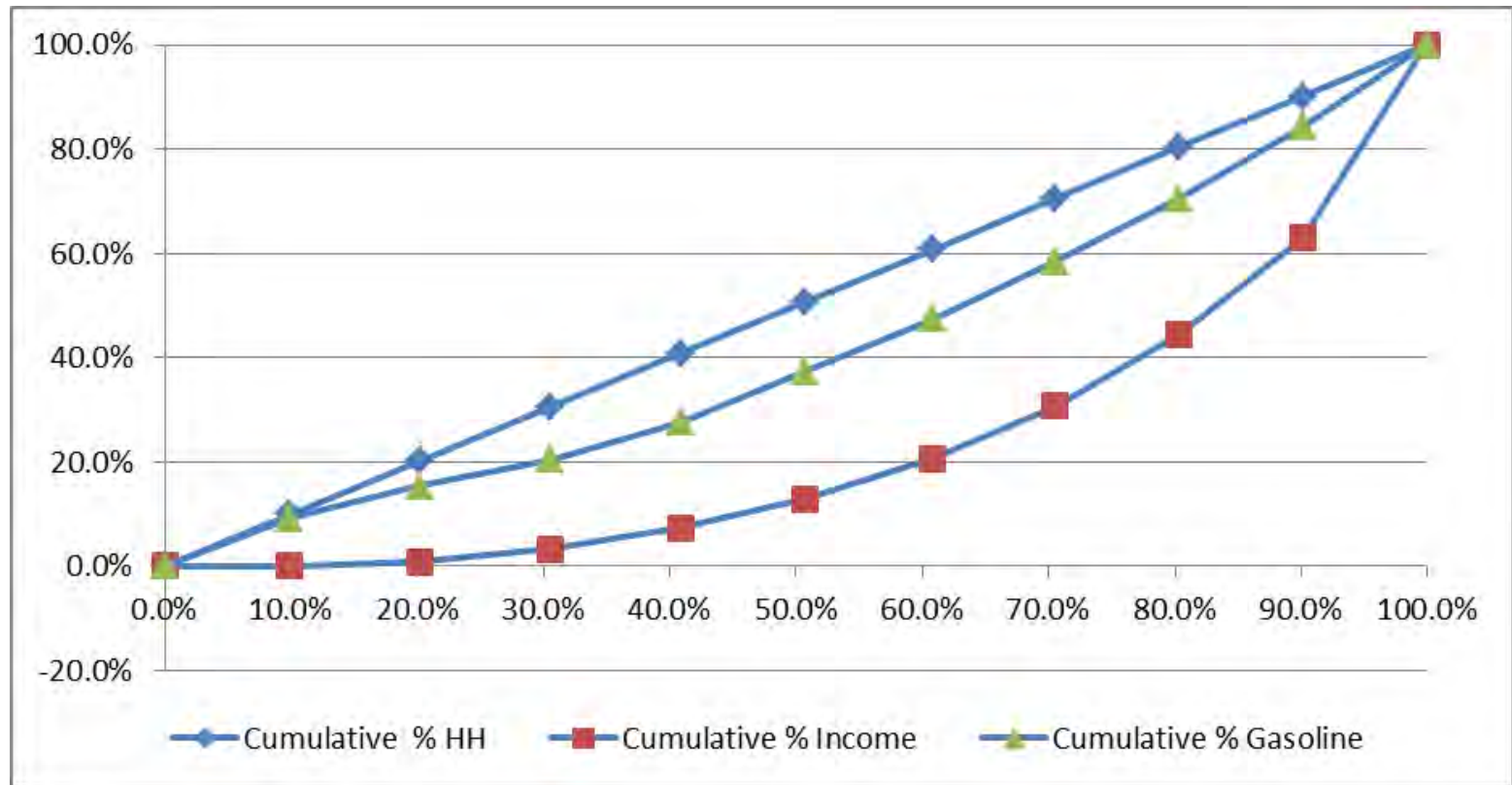
Fuel Taxation is regressive as a source of tax revenue.

Cohort	Total Income	Ann HH Income
0% to 25%	\$ 6,812,904	\$ 4,144
25% to 50%	\$ 41,901,198	\$ 25,456
50% to 75%	\$ 91,367,932	\$ 57,105
75% to 100%	\$ 238,313,343	\$ 149,788

Income	VEHQ		Veh per HH		Age_Ref	Ave. Age
0% to 25%	2,023		1.23		86,271	52.48
25% to 50%	2,413		1.47		90,940	55.25
50% to 75%	3,343		2.09		78,409	49.01
75% to 100%	4,089		2.57		76,450	48.05
Total	11,868		1.83		332,070	51.24

Income Group	% of HHs	% of Income	% of Gaso	Equity	Cumulative % HH	Cumulative % Income	Cumulative % Gasoline
				0.0%	0.0%	0.0%	0
0-10%	9.9%	0.0%	9.2%	9.9%	9.9%	0.0%	9.2%
10%-20%	10.3%	0.7%	6.1%	20.2%	20.2%	0.7%	15.3%
20% - 30%	10.4%	2.5%	5.2%	30.6%	30.6%	3.3%	20.5%
30%-40%	10.3%	4.0%	7.0%	40.8%	40.8%	7.3%	27.5%
40% - 50%	9.9%	5.6%	9.8%	50.7%	50.7%	12.9%	37.4%
50% - 60%	10.0%	7.7%	10.1%	60.8%	60.8%	20.6%	47.5%
60% - 70%	9.7%	10.1%	11.0%	70.5%	70.5%	30.7%	58.4%
70% - 80%	9.8%	13.7%	12.0%	80.4%	80.4%	44.4%	70.5%
80% - 90%	9.7%	18.5%	13.9%	90.1%	90.1%	62.9%	84.4%
90% - 100	9.9%	37.1%	15.6%	100.0%	100.0%	100.0%	100.0%

Then – We can plot a Lorenz Curve





March 2018

Fun facts about Millennials: comparing expenditure patterns from the latest through the Greatest generation

This article compares the spending patterns of Millennials with those of earlier generations. The analysis uses data from a 2015 Consumer Expenditure Surveys experimental table, which provides information on generational demographics, income, and expenditures. Although some patterns, particularly those related to demographics, are different across generations, others are substantially similar, especially with respect to shares of expenditures allocated to food and apparel.

It is almost axiomatic that each generation of Americans believes that the next generation will be better off, or at least that this has been so historically.¹ It is not surprising, then, that a new generation now coming of age—the



Geoffrey D. Paulin

2018 - Generations in the CEX

- So – Geoffrey Paulin’s article and comments gave us a few new ideas as to how we can use the data.
- And it sent us back to the detailed PUMS data for further analysis.
- We then cut the data by generation



Gen-Z
73.61M

Born 1947-1965
(Age in 2016: 51 to 69)

Baby Boomers
75.52M

Millennials
79.41M

Born 1929-1946
(Age in 2016: 70 to 87)

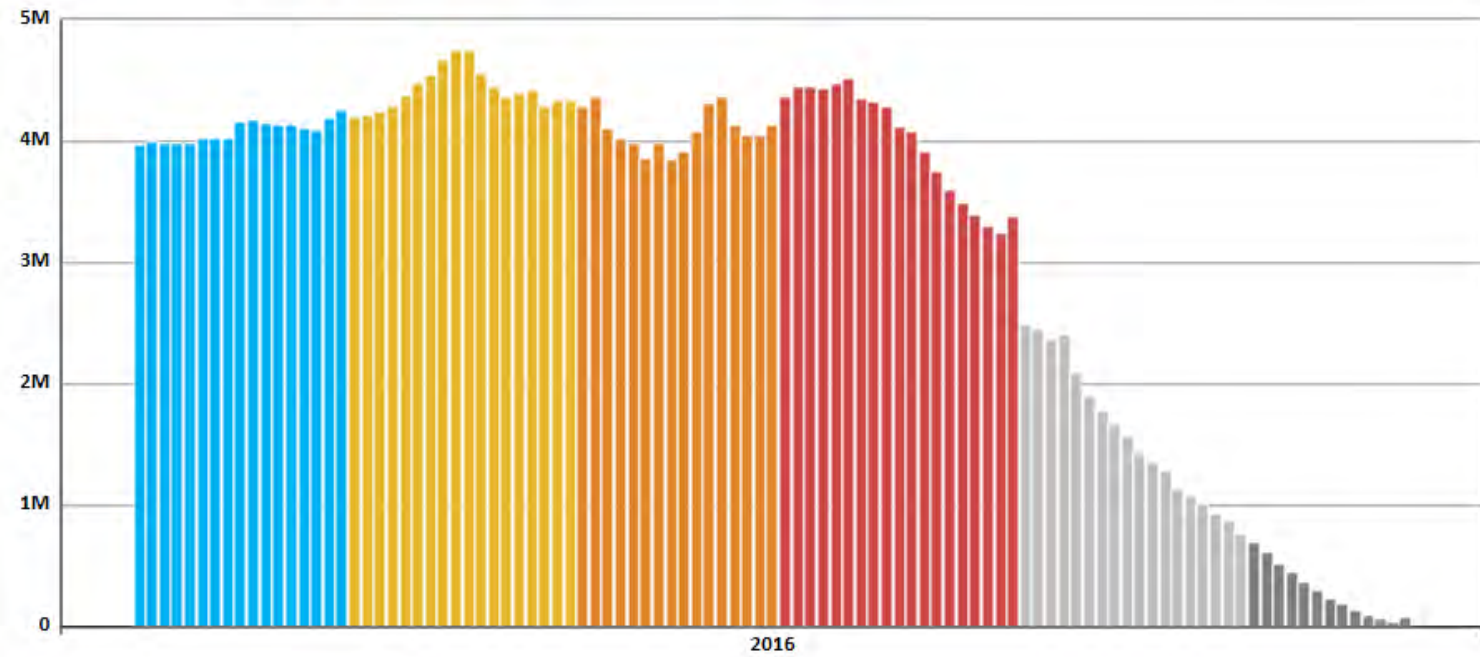
Silent Gen
28.32M

Gen-X
65.72M

Born 1916-1928
(Age in 2016: 88 to 100)

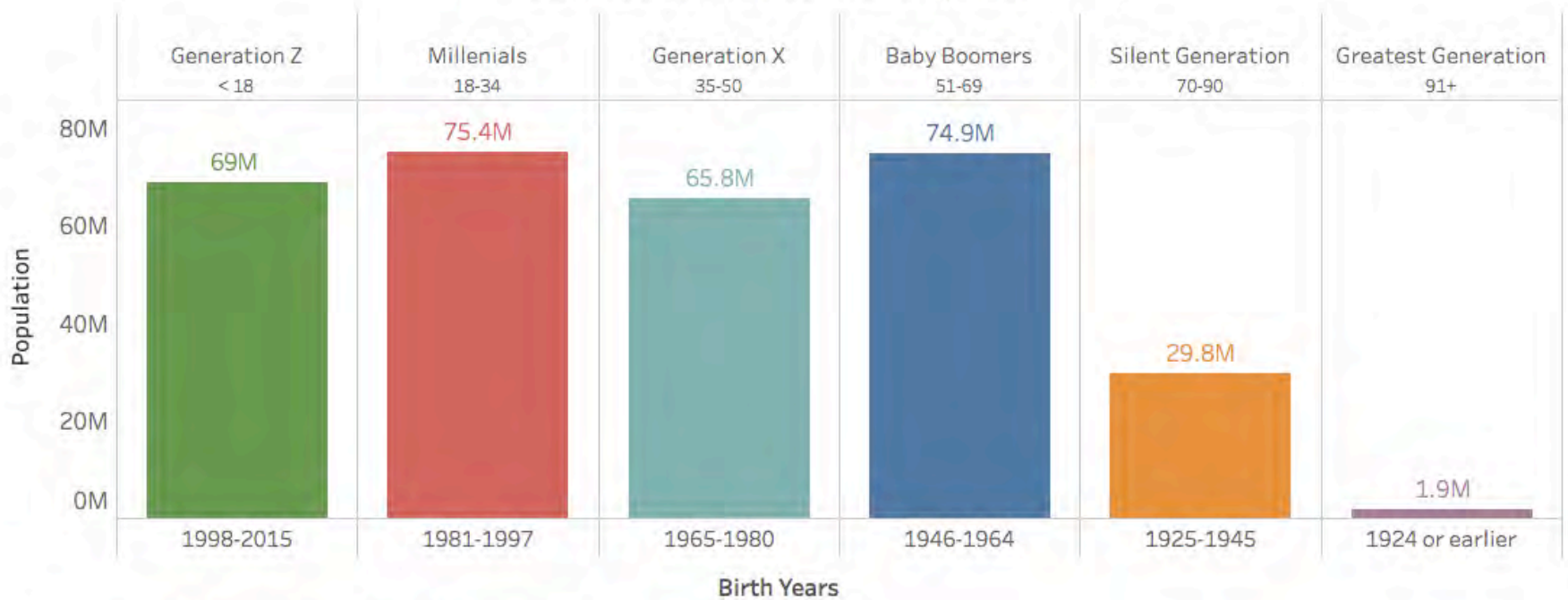
Greatest Gen
3.79M

Total US Population by Age
(Persons)



Total US Population by Generation
(share of total population)

U.S. Population by Generation (2015)



Source: U.S. Census Bureau, Pew Research Center

SAS Code for 2015

```
IF    AGE_REF GE 87 THEN GEN = "1 GREATEST ";  
IF 70 Le AGE_REF LE 86 THEN GEN = "2 SILENT  ";  
IF 51 Le AGE_REF LE 69 THEN GEN = "3 BABYBOOM ";  
IF 35 Le AGE_REF LE 50 THEN GEN = "4 GENERAT X";  
IF    AGE_REF LE 34 THEN GEN = "5 MILLENIAI";
```

SAS Code for 2005

```
IF    AGE_REF GE 77 THEN GEN = "1 GREATEST ";  
IF 60 Le AGE_REF LE 76 THEN GEN = "2 SILENT  ";  
IF 41 Le AGE_REF LE 59 THEN GEN = "3 BABYBOOM ";  
IF 25 Le AGE_REF LE 40 THEN GEN = "4 GENERAT X";  
IF    AGE_REF LE 24 THEN GEN = "5 MILLENIAL";
```

Comparison of BLS CEX Data and U.S. Population - 2015

	Average	US	% of US	BLS CEX	% of CEX		Delta
Generation	Age	Population	Population	Surveys	Surveys		CEX to POP
GREATEST	87.00	1.9	1%	274	4%		-3%
SILENT	75.17	29.8	12%	790	12%		0%
BABYBOOM	59.86	79.9	32%	2,245	35%		-3%
GENERAT X	42.74	65.8	26%	1,773	27%		-1%
MILLENIAL	27.65	75.4	30%	1,399	22%		8%
		252.8	100%	6,481			

Detailed Tables by Age Cohort

Transportation Fees and Goods

			Paid Parking - UCC 520531 - All Households - June 2005					
Generation	Total Surveys	Parking User %	Ann. Avg. Exp. Paid Parking Of Users	Ann. Avg. Exp. Paid Parking All HH	Percent of HH Spending on Paid Parking	Number of Paid Parking Users	Average Income	Average Vehicles Per HH
GREATEST	611	3.27%	\$232.20	\$7.60	0.03%	20	\$28,766	1.152
SILENT	1503	8.45%	\$145.70	\$12.31	0.02%	127	\$50,570	1.929
BABYBOOM	2806	10.51%	\$280.08	\$29.45	0.04%	295	\$75,555	2.304
GENERAT X	2082	11.34%	\$255.32	\$28.94	0.05%	236	\$62,962	1.836
MILLENIAL	454	9.69%	\$286.73	\$27.79	0.10%	44	\$29,109	1.366
	-----					-----		
	7456	9.7%		\$23.96		722	\$60,340	

			Paid Parking - UCC 520531 - All Households - June 2015					
Generation	Total Surveys	Parking User %	Ann. Avg. Exp. Paid Parking Of Users	Ann. Avg. Exp. Paid Parking All HH	Percent of HH Spending on Paid Parking	Number of Paid Parking Users	Average Income	Average Vehicles Per HH
GREATEST	274	4.01%	\$362.55	\$14.55	0.05%	11	\$28,050	0.956
SILENT	790	7.97%	\$267.49	\$21.33	0.05%	63	\$45,049	1.670
BABYBOOM	2245	12.43%	\$307.48	\$38.21	0.05%	279	\$73,219	2.103
GENERAT X	1773	14.44%	\$375.03	\$54.15	0.06%	256	\$88,275	1.966
MILLENIAL	1399	14.58%	\$358.10	\$52.22	0.09%	204	\$57,957	1.486
	-----					-----		
	6481	12.5%		\$42.54		813	\$68,700	

	Local Use - Taxi Type Services - UCC 530412 - All Households - June 2005							
	Total	Taxi Type Services - UC	Ann. Avg. l	Ann. Avg.	Percent of	Number o	Average	Average
Generation	Surveys	User %	Taxi Type	Taxi Type	HH Spend	Taxi Type	Income	Vehicles
			Of Users	All HH	on Taxi Ty	Users		Per HH
GREATEST	611	2.29%	\$364.00	\$8.34	0.03%	14	\$28,766	1.152
SILENT	1503	3.06%	\$353.57	\$10.82	0.02%	46	\$50,570	1.929
BABYBOOM	2806	3.31%	\$541.51	\$17.95	0.02%	93	\$75,555	2.304
GENERAT X	2082	3.94%	\$499.61	\$19.68	0.03%	82	\$62,962	1.836
MILLENNIAL	454	3.08%	\$510.29	\$15.74	0.05%	14	\$29,109	1.366
	-----					-----		
	7456	3.3%		\$16.07		249		1.946

Local Use - Taxi Type Services - UCC 530412 - All Households - June 2015

	Total	Taxi Type Services - UC	Ann. Avg. I	Ann. Avg.	Percent of	Number o	Average	Average
Generation	Surveys	User %	Taxi Type	Taxi Type	HH Spend	Taxi Type	Income	Vehicles
			Of Users	All HH	on Taxi Ty	Users		Per HH
GREATEST	274	3.28%	\$241.78	\$7.94	0.03%	9	\$28,050	0.956
SILENT	790	3.92%	\$709.68	\$27.85	0.06%	31	\$45,049	1.670
BABYBOOM	2245	3.43%	\$475.27	\$16.30	0.02%	77	\$73,219	2.103
GENERAT X	1773	5.64%	\$563.36	\$31.77	0.04%	100	\$88,275	1.966
MILLENNIAL	1399	7.43%	\$388.31	\$28.87	0.05%	104	\$57,957	1.486
	-----					-----		
	6481	5.0%		\$24.30		321		1.831

	Gasoline Consumption - UCC 470111 - All Households - June 2005							
	Total	Gasoline	Ann. Avg. Exp.	Ann. Avg. Exp.	Percent of	Number of	Average	Average
Generation	Surveys	User %	Gasoline	Gasoline	HH Spending	Gasoline	Income	Vehicles
			Of Users	All HH	Gasoline	Users		Per HH
GREATEST	611	77.74%	\$1,065.75	\$828.53	2.88%	475	\$28,766	1.152
SILENT	1503	90.69%	\$1,726.42	\$1,565.61	3.10%	1363	\$50,570	1.929
BABYBOOM	2806	91.59%	\$2,569.17	\$2,353.09	3.11%	2570	\$75,555	2.304
GENERAT X	2082	90.63%	\$2,387.34	\$2,163.74	3.44%	1887	\$62,962	1.836
MILLENIAL	454	86.34%	\$1,841.97	\$1,590.42	5.46%	392	\$29,109	1.366
	-----					-----		
	7456	89.7%		\$1,970.10		6687		

			Gasoline Consumption - UCC 470111 - All Households - June 2015					
Generation	Total Surveys	Gasoline User %	Ann. Avg. Exp. Gasoline of Users	Ann. Avg. Exp. Gasoline All HH	Percent of HH Spending Gasoline	Number of Gasoline Users	Average Income	Average Vehicles Per HH
GREATEST	274	67.52%	\$1,097.45	\$740.98	2.64%	185	\$28,050	0.956
SILENT	790	86.96%	\$1,644.12	\$1,429.76	3.17%	687	\$45,049	1.670
BABYBOOM	2245	89.35%	\$2,302.07	\$2,056.99	2.81%	2006	\$73,219	2.103
GENERAT X	1773	91.60%	\$2,728.59	\$2,499.28	2.83%	1624	\$88,275	1.966
MILLENIAI	1399	88.56%	\$2,273.56	\$2,013.54	3.47%	1239	\$57,957	1.486
	-----					-----		
	6481	88.6%		\$2,036.52		5741		

2019 Project:

Transportation Costs and Overall Household Consumption

- This paper looks to explore variations in household consumption on transportation services and the impact of these costs on other household consumption categories.
- As a major household expense – consuming roughly 17% of household income – transportation costs are particularly significant for low and moderate income households.
- We look to understand how changes in transportation costs by expense type impact the other components of household consumption for various types of households.

Crowding Out

- As a second case – we would like to understand how households who have high for hire vehicle use (taxi services and such) compare with other households in terms of other mobility and consumption categories.
- Finally, we would like to examine “crowding out” (or the indirect income effect) in general – the condition where an increase in a tax, fee, price or charge forces the households to alter their consumption basket and reduce costs in other areas to compensate for the higher costs in other areas.
- We believe that the radical shifts in the spending and usage in the transportation categories over the last 20 years will allow us to identify the impact of crowding out in various household spending categories.

The Income Effect

- The income effect can be both direct or indirect. When a consumer chooses to make changes to the way he or she spends because of a change in income, the income effect is said to be direct. For example, a consumer may choose to spend less on clothing because his income has dropped.
- An income effect becomes indirect when a consumer is faced with making buying choices because of factors not related to her income. For instance, food prices may go up leaving the consumer with less income to spend on other items. This may force her to cut back on dining out, resulting in an indirect income effect.

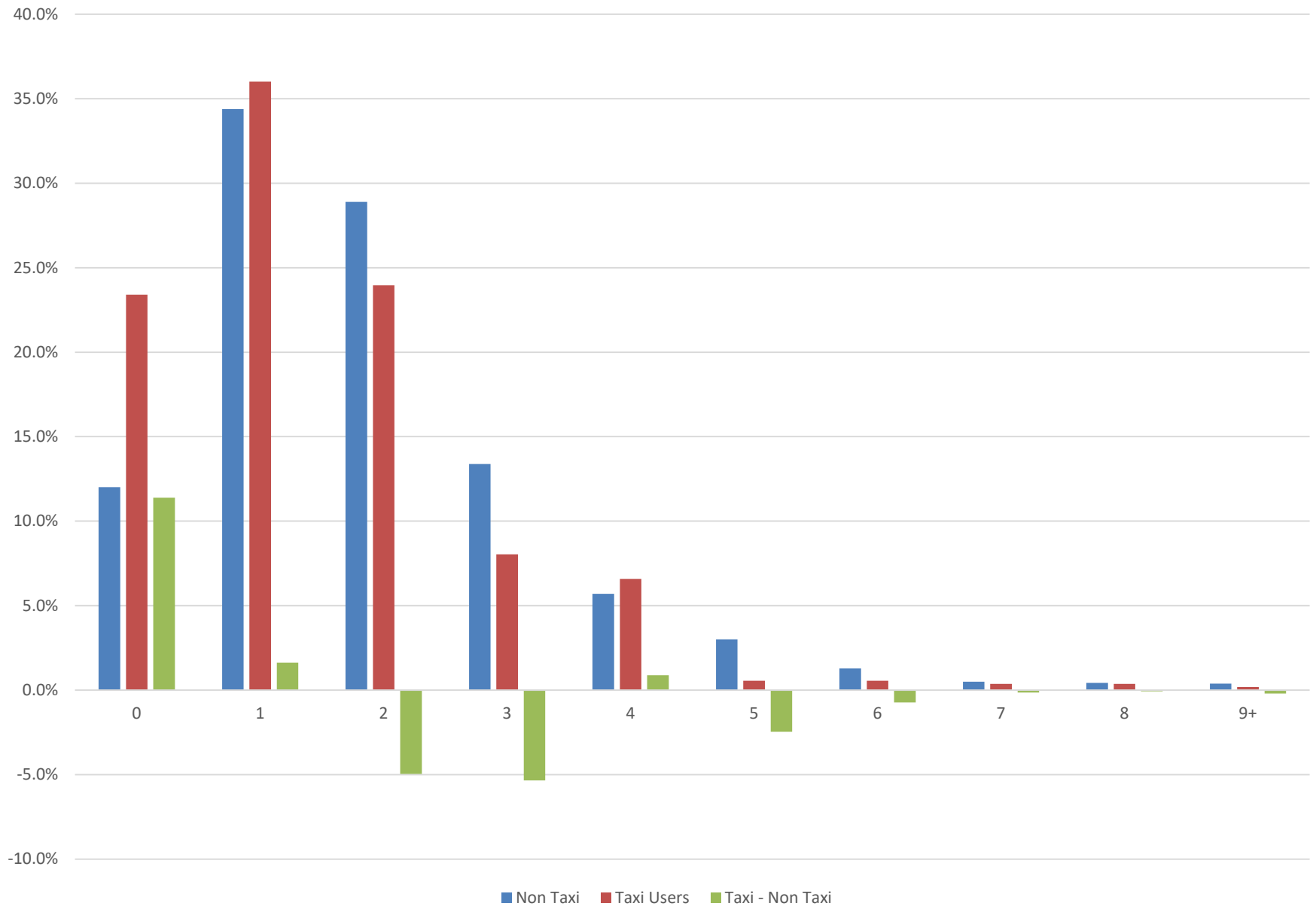
www.investopedia

Could We Examine this in the CEX?

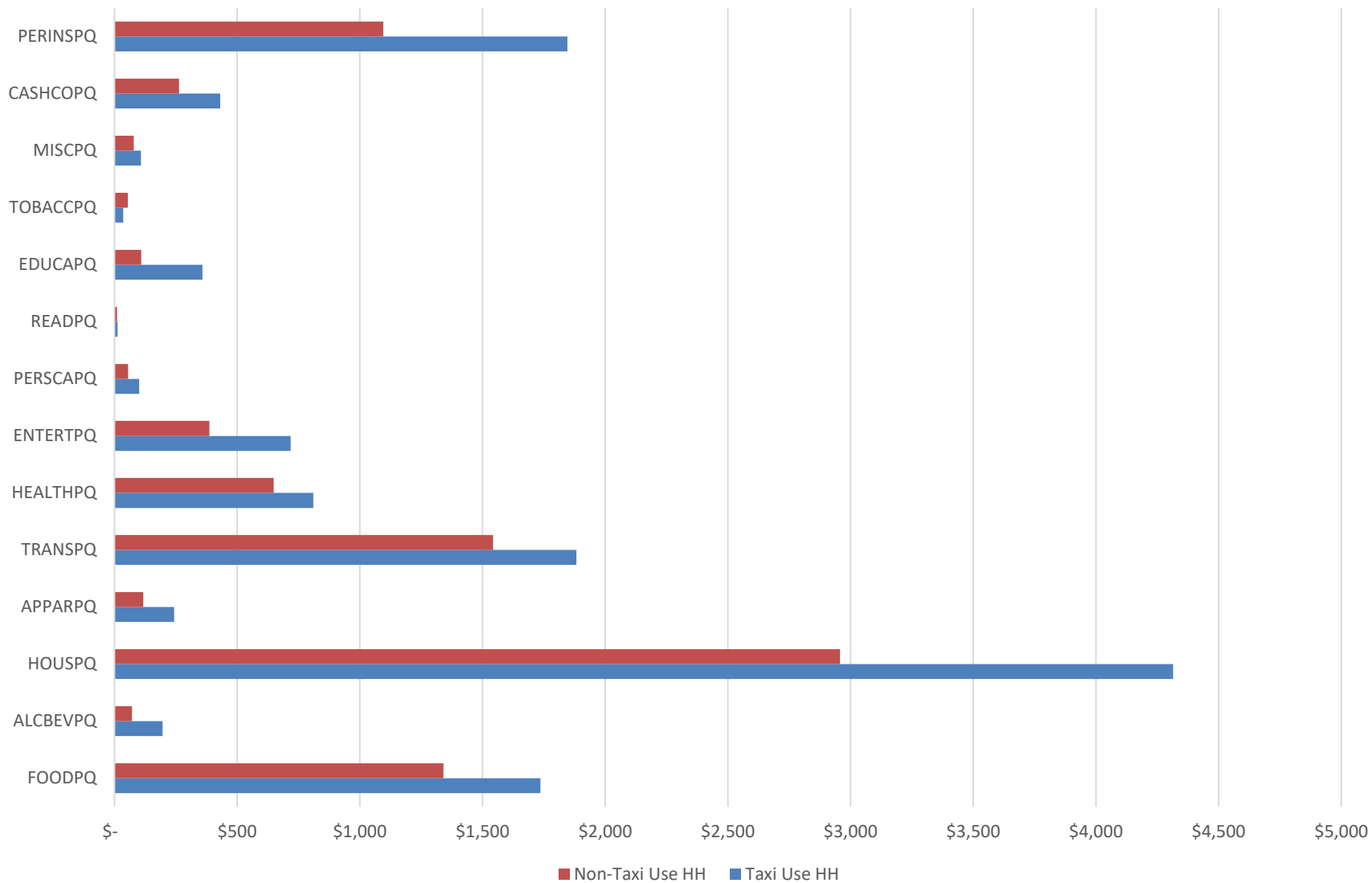
- We decided to look at household consumption expenditures for various types of user of different transportation services.
- We wanted to see if we could find variation in household consumption that would be reflective of transportation choices.
- So – we separated the data in the CEX using a particular type of consumption expenditures to separated households.

Local Taxi Use Summary			
Non-user	2007	2012	2017
Number of Households	6,469	6,429	5,543
HH Percentage	96.39%	96.11%	91.02%
User			
Number of Households	242	260	547
HH Percentage	3.61%	3.89%	8.98%
Non-user			
Number of Household Vehicles	12,132	11,841	10,465
Number of Household Vehicles Percentage	97.40%	97.11%	92.81%
User			
Number of Household Vehicles	324	353	811
Number of Household Vehicles Percentage	2.60%	2.89%	7.19%
Non-user			
Average Age of Head of Household	49.51	50.45	52.74
User			
Average Age of Head of Household	46.74	45.32	43.90
Average Age of Head of Household Difference	-2.77	-5.13	-8.84
Non-user			
Average Household Income	\$64,754	\$66,377	\$69,556
User			
Average Household Income	\$73,195	\$78,907	\$104,076
Average Income Difference (User – Nonusers)	\$8,441	\$12,530	\$34,520
Average Income Difference Percentage	13.04%	18.88%	49.63%

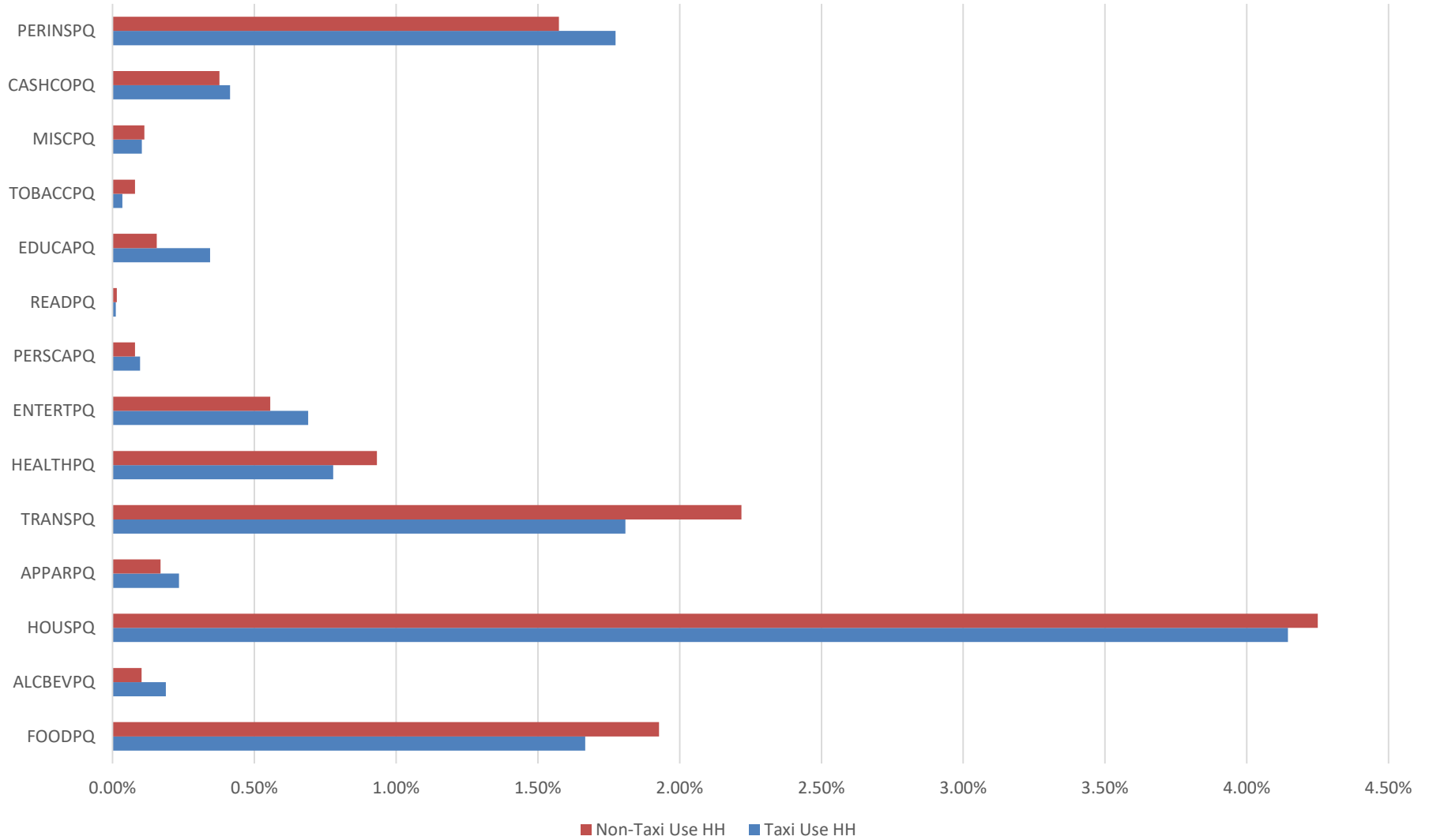
Vehicle Count - Taxi Users vs Non-Taxi HH



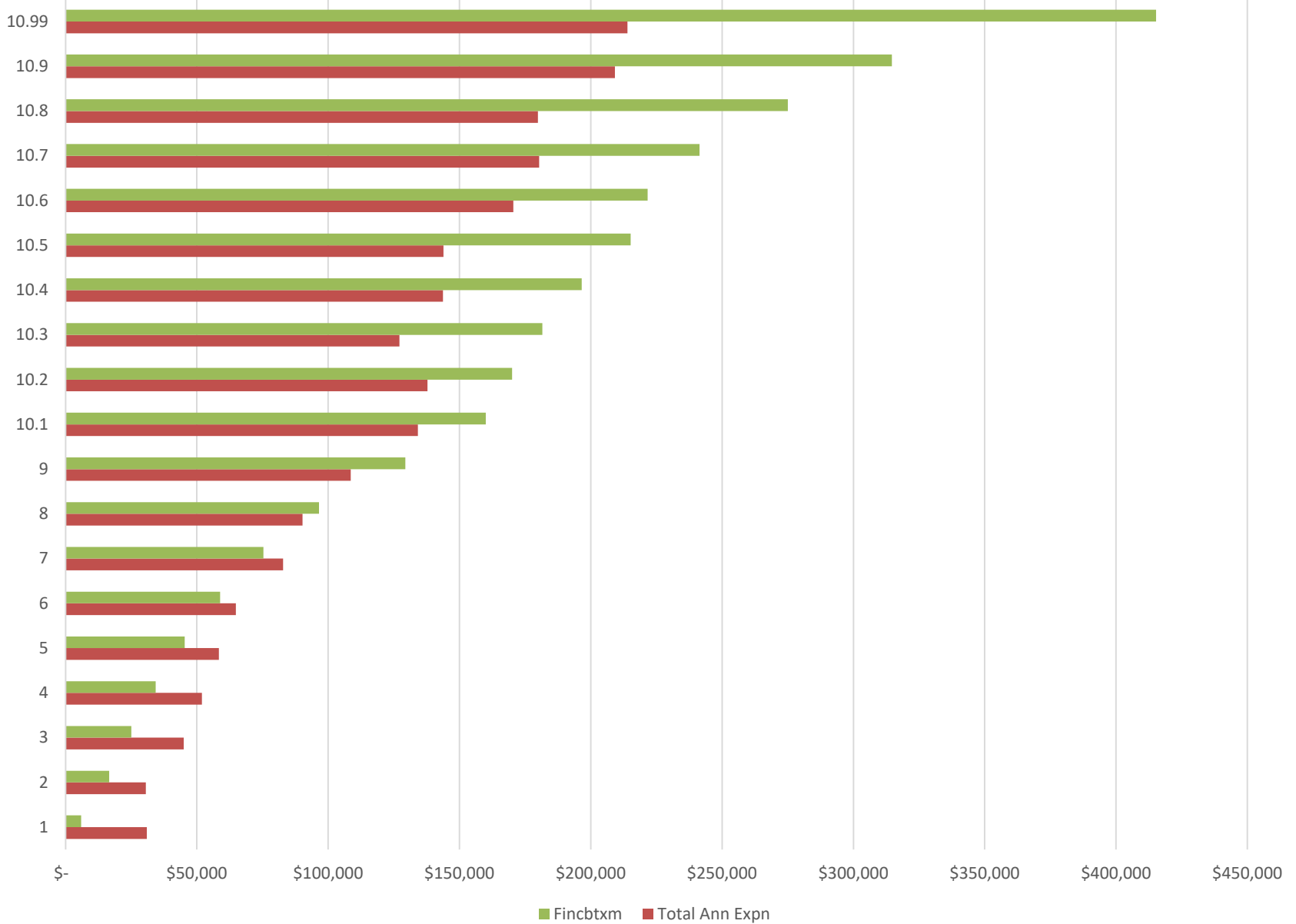
Taxi Use Comparison - 2017



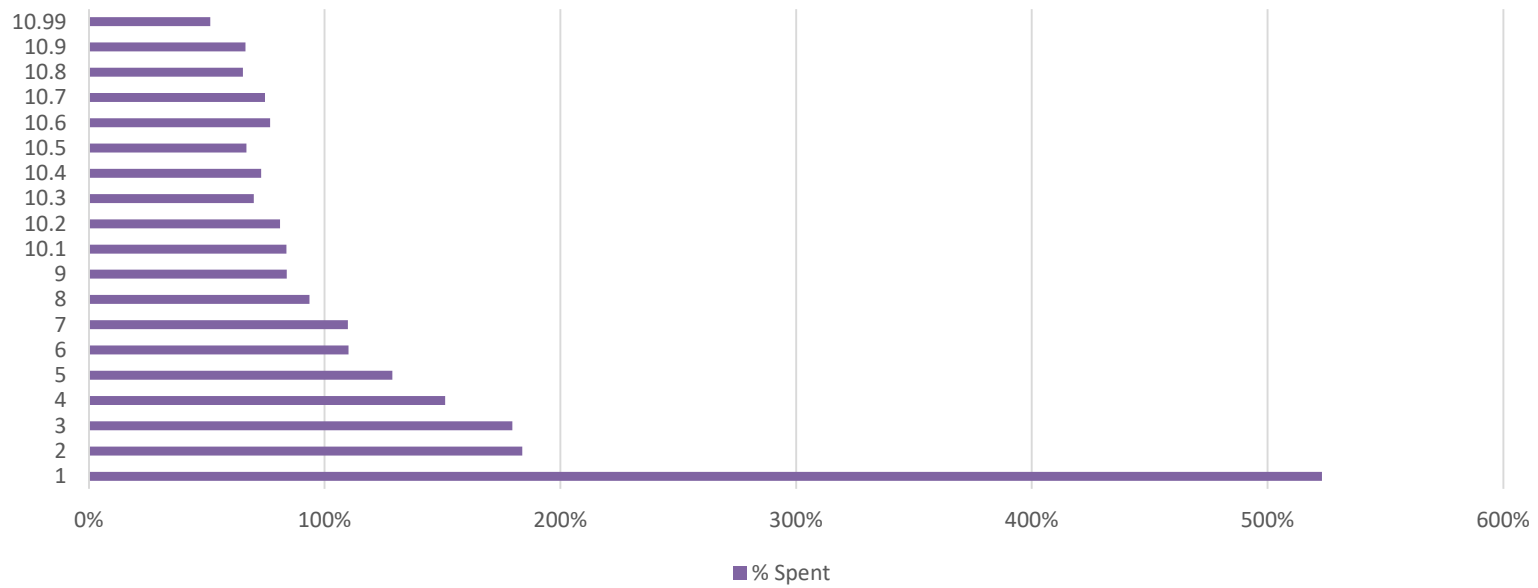
Taxi Use Comparison - 2017



Comparing Income and Spending by Income Group



Percent of Income Spent



Gasoline Summary			
	2007	2012	2017
Non-user			
Number of Households	733	747	690
HH Percentage	10.92%	11.17%	11.33%
User			
Number of Households	5978	5942	5400
HH Percentage	89.08%	88.83%	88.67%
Non-user			
Number of Household Vehicles	225	218	389
Number of Household Vehicles Percentage	1.81%	1.79%	3.45%
User			
Number of Household Vehicles	12,231	11,976	10,887
Number of Household Vehicles Percentage	98.19%	98.21%	96.55%
Non-user			
Average Age of Head of Household	53.54	52.30	54.52
User			
Average Age of Head of Household	48.90	49.99	51.62
Average Age of Head of Household Difference	(4.64)	(2.31)	(2.89)
Non-user			
Average Household Income	\$28,872	\$29,934	\$40,715
User			
Average Household Income	\$69,496	\$71,507	\$76,738
Average Household Income Difference	\$40,624	\$41,573	\$36,023
Average Household Income Difference Percentage	140.70%	138.88%	88.48%

Income Class	Number of HH With No Car	% of Non Car HH with Gasoline Use	Average Gasoline Spending by Non Car HH
--------------	-----------------------------	--------------------------------------	--

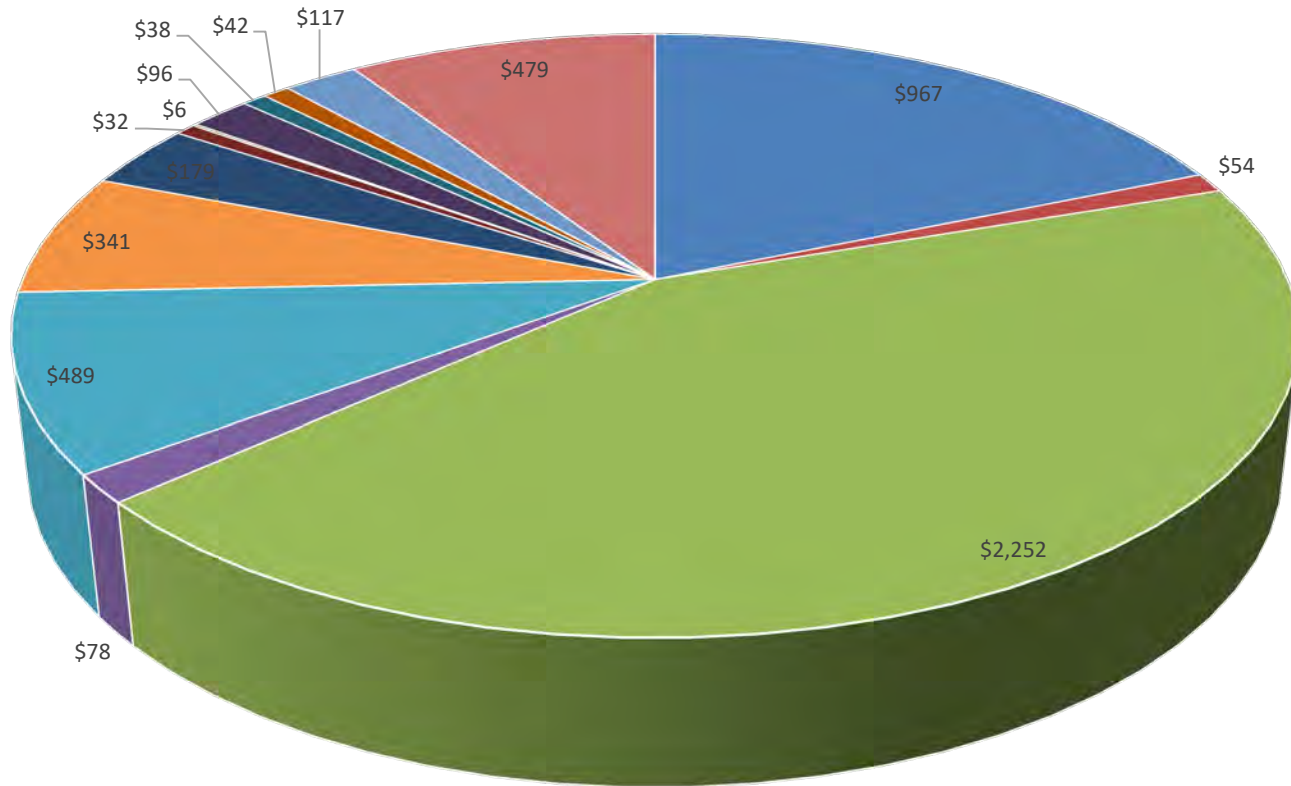
1	222	27.0%	\$761.20
2	177	24.3%	\$1,200.28
3	93	31.2%	\$1,430.90
4	63	46.0%	\$1,427.59
5	63	63.5%	\$1,543.50
6	43	55.8%	\$2,360.00
7	38	63.2%	\$1,367.50
8	25	64.0%	\$2,205.00
9	34	73.5%	\$1,621.44
10.1	5	40.0%	\$1,338.00
10.2	4	75.0%	\$2,900.00
10.3	4	50.0%	\$3,900.00
10.4	0		\$0.00
10.5	6	83.3%	\$2,592.00
10.6	6	50.0%	\$1,680.00
10.7	4	50.0%	\$1,440.00
10.8	1	100.0%	\$3,600.00
10.9	3	100.0%	\$2,240.00
10.99	3	33.3%	\$1,200.00

HH	794		
----	-----	--	--

Income Class	Number of HH with Car	% HH with Gas	Using HH - Avg Spending
1	387	94.1%	\$1,322.60
2	432	92.4%	\$1,160.03
3	516	95.7%	\$1,378.28
4	546	95.4%	\$1,551.20
5	546	96.5%	\$1,851.05
6	566	97.0%	\$1,973.88
7	571	96.3%	\$2,332.58
8	584	96.9%	\$2,446.45
9	575	97.4%	\$2,763.79
10.1	55	100.0%	\$2,202.33
10.2	57	100.0%	\$2,781.47
10.3	57	100.0%	\$2,860.00
10.4	61	98.4%	\$2,608.60
10.5	55	96.4%	\$2,807.09
10.6	55	100.0%	\$2,766.33
10.7	57	98.2%	\$3,341.36
10.8	60	95.0%	\$2,887.16
10.9	58	94.8%	\$2,717.24
10.99	58	91.4%	\$2,792.15

Non-Gasoline Households - 2017

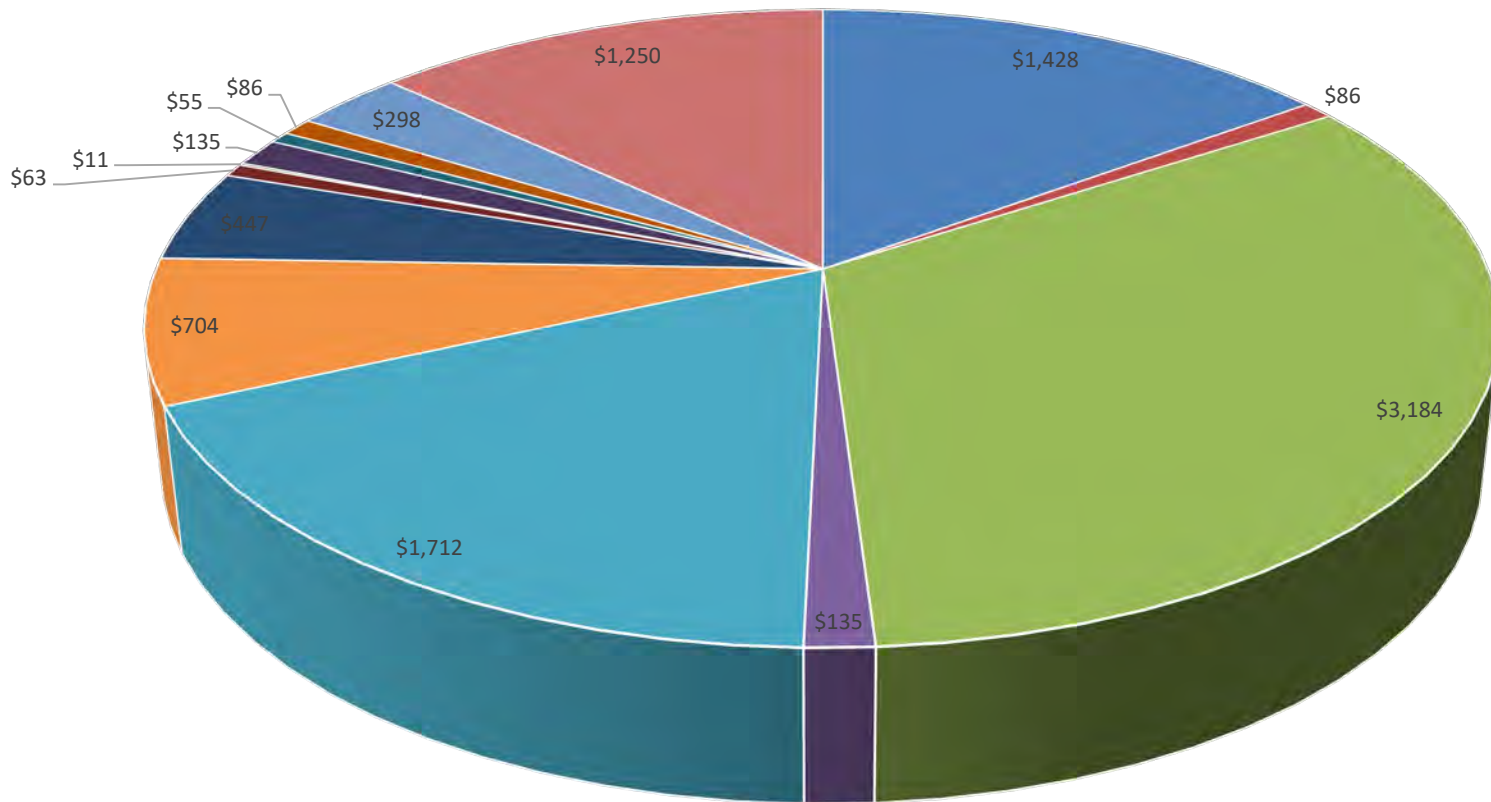
Total Spending = \$5,169.69



FOODPQ ALCBEVPQ HOUSPQ APPARPQ TRANSPQ HEALTHPQ ENTERTPQ
PERSCAPQ READPQ EDUCAPQ TOBACCPQ MISCAPQ CASHCOPQ PERINSPQ

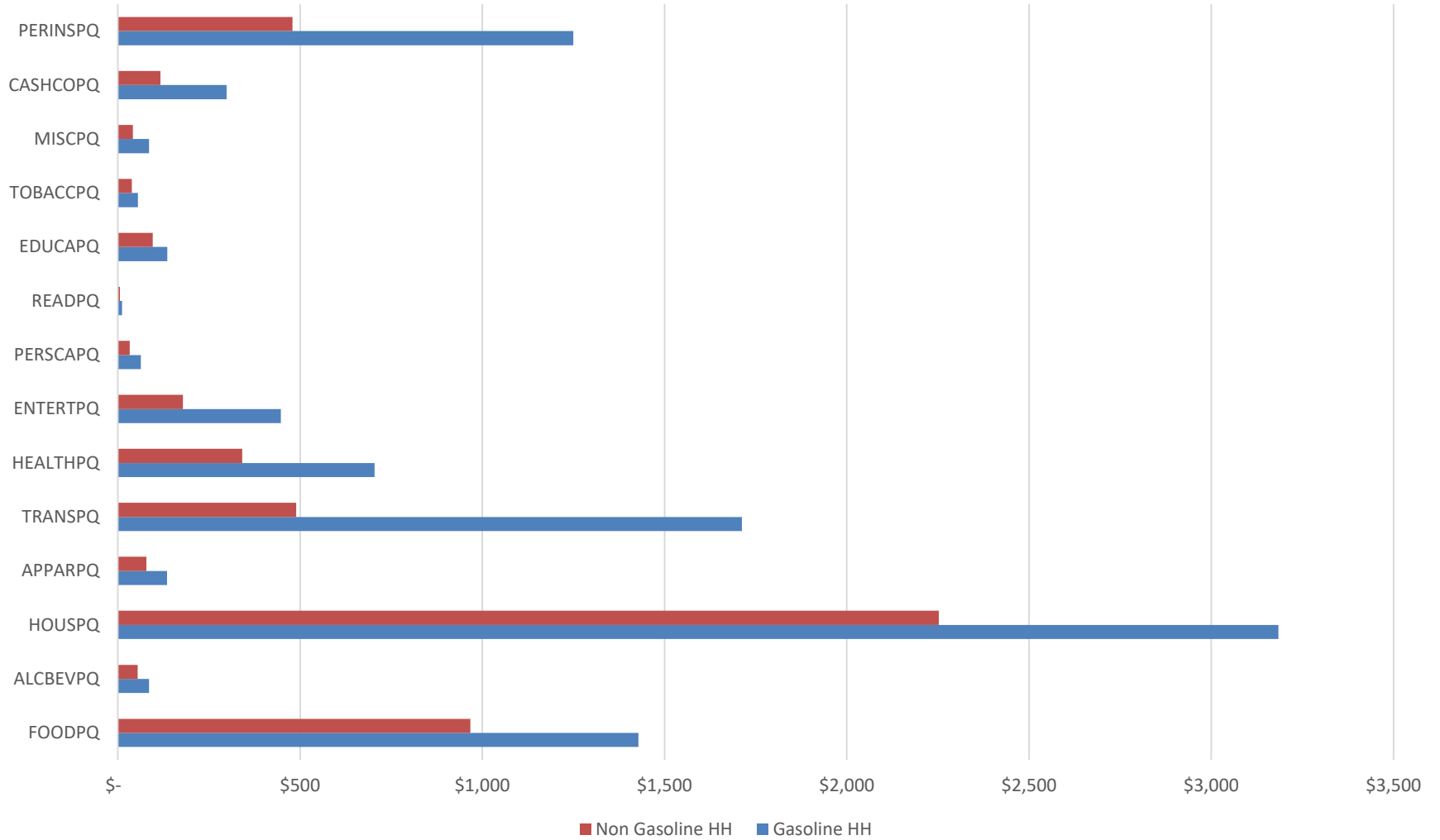
Gasoline Households 2017

Total Spending = \$9,594.36

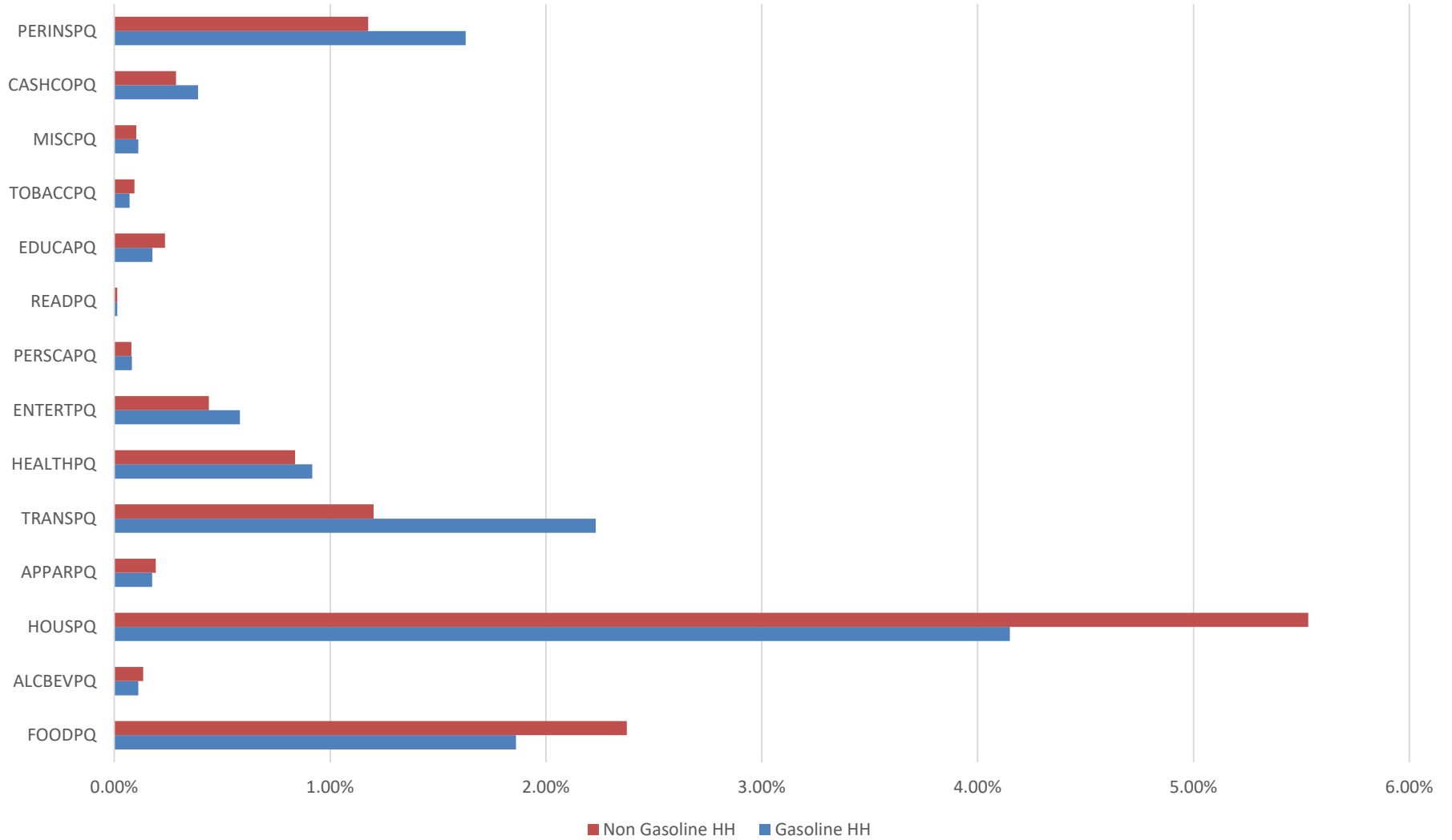


- FOODPQ
- ALCBEVPQ
- HOUSPQ
- APPARPQ
- TRANSPQ
- HEALTHPQ
- ENTERTPQ
- PERSCAPQ
- READPQ
- EDUCAPQ
- TOBACCPQ
- MISCPCQ
- CASHCOPQ
- PERINSPQ

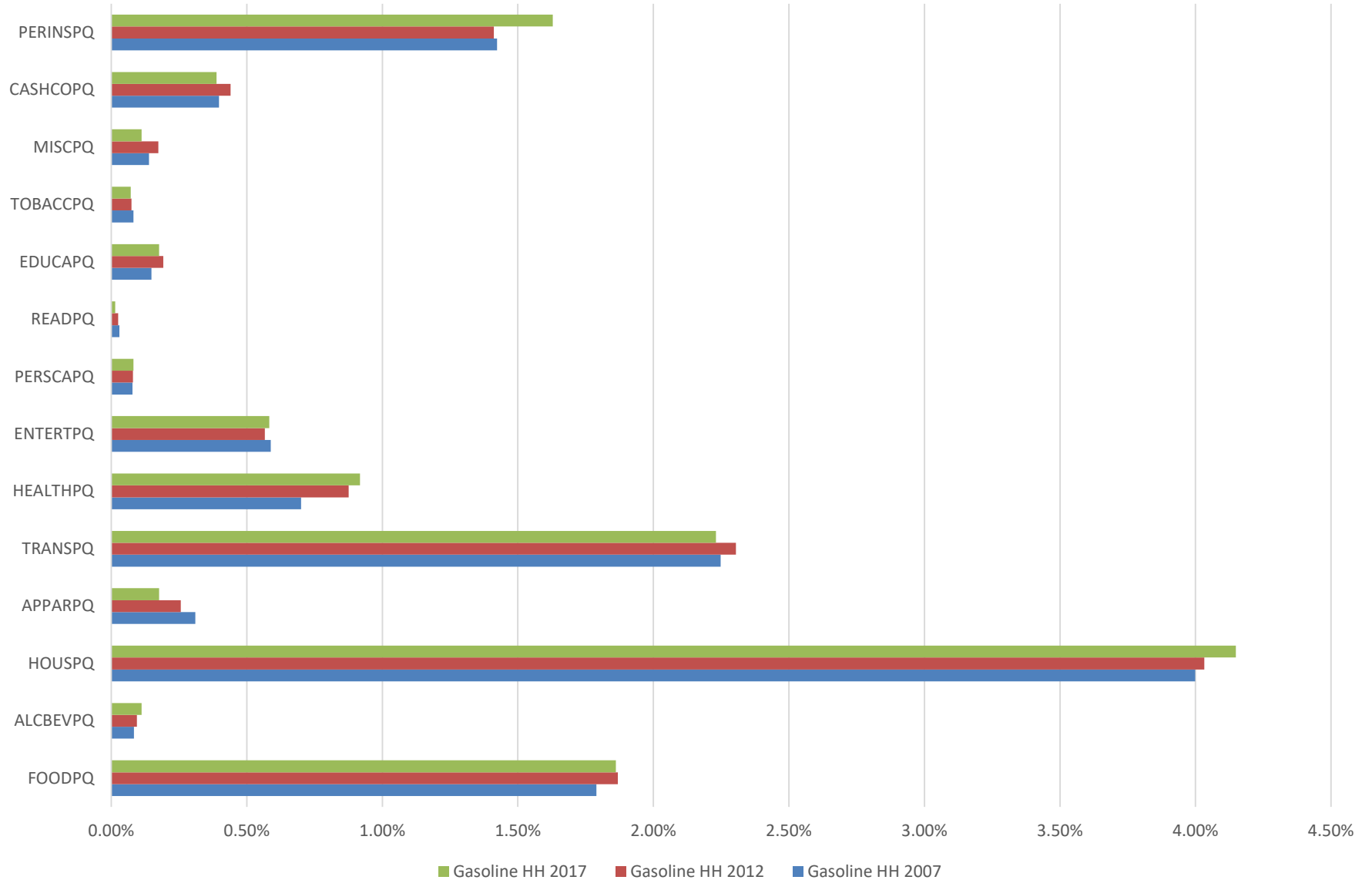
Gasoline Use Comparison



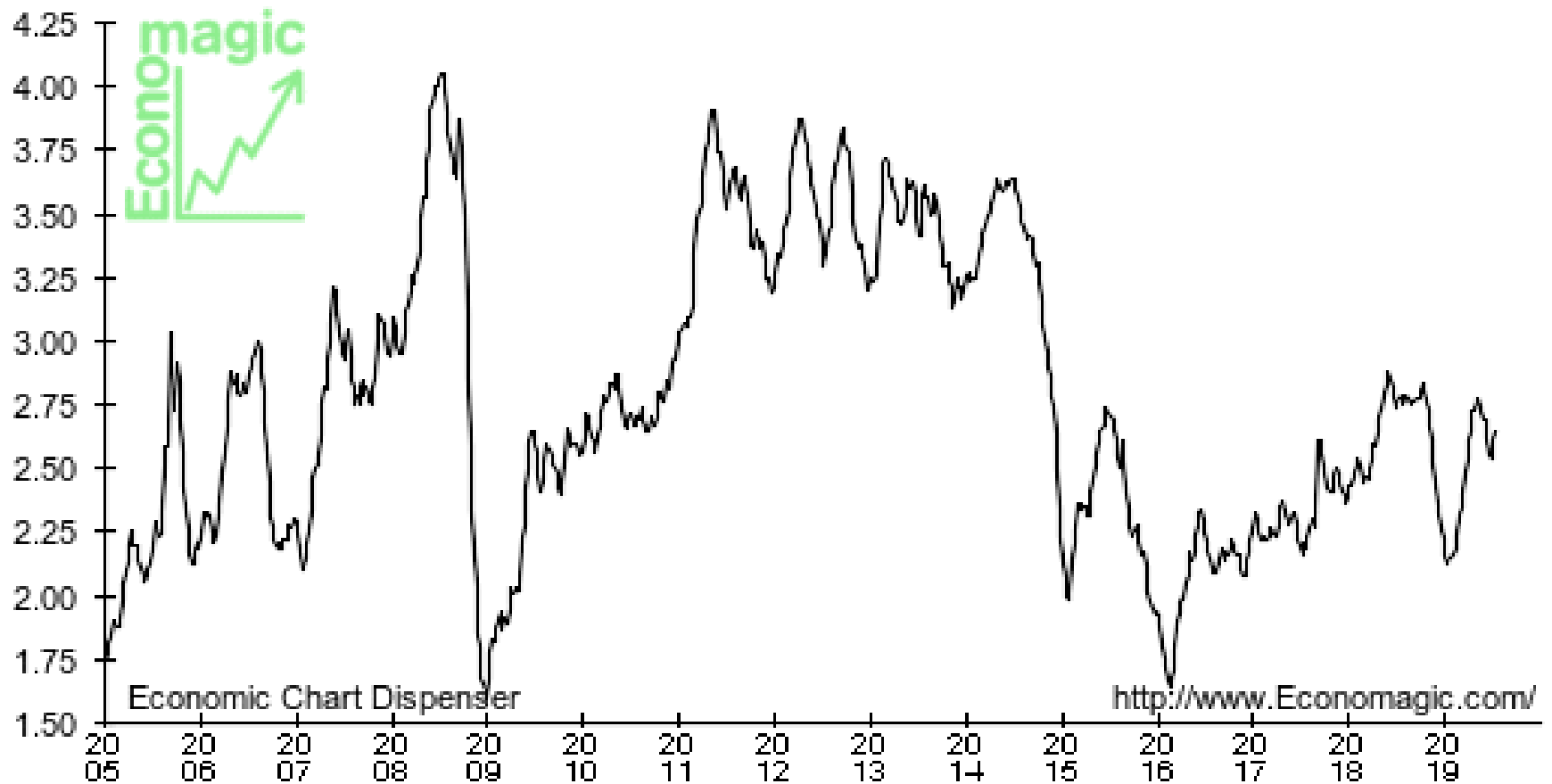
Gasoline Usage Comparison



Gasoline User Comparison

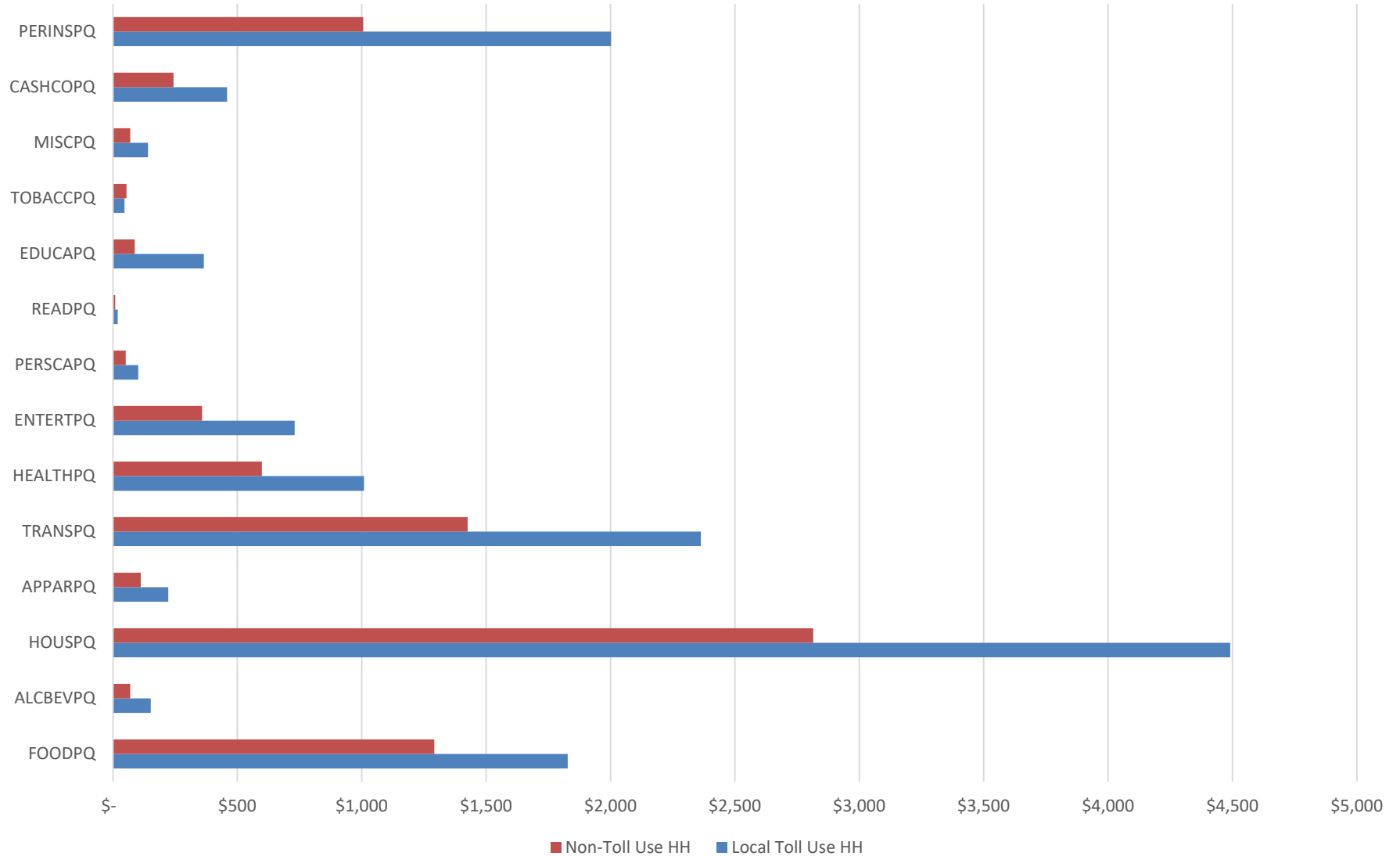


Weekly U.S. Regular Conventional Retail Gasoline Prices (Dollars per Ga

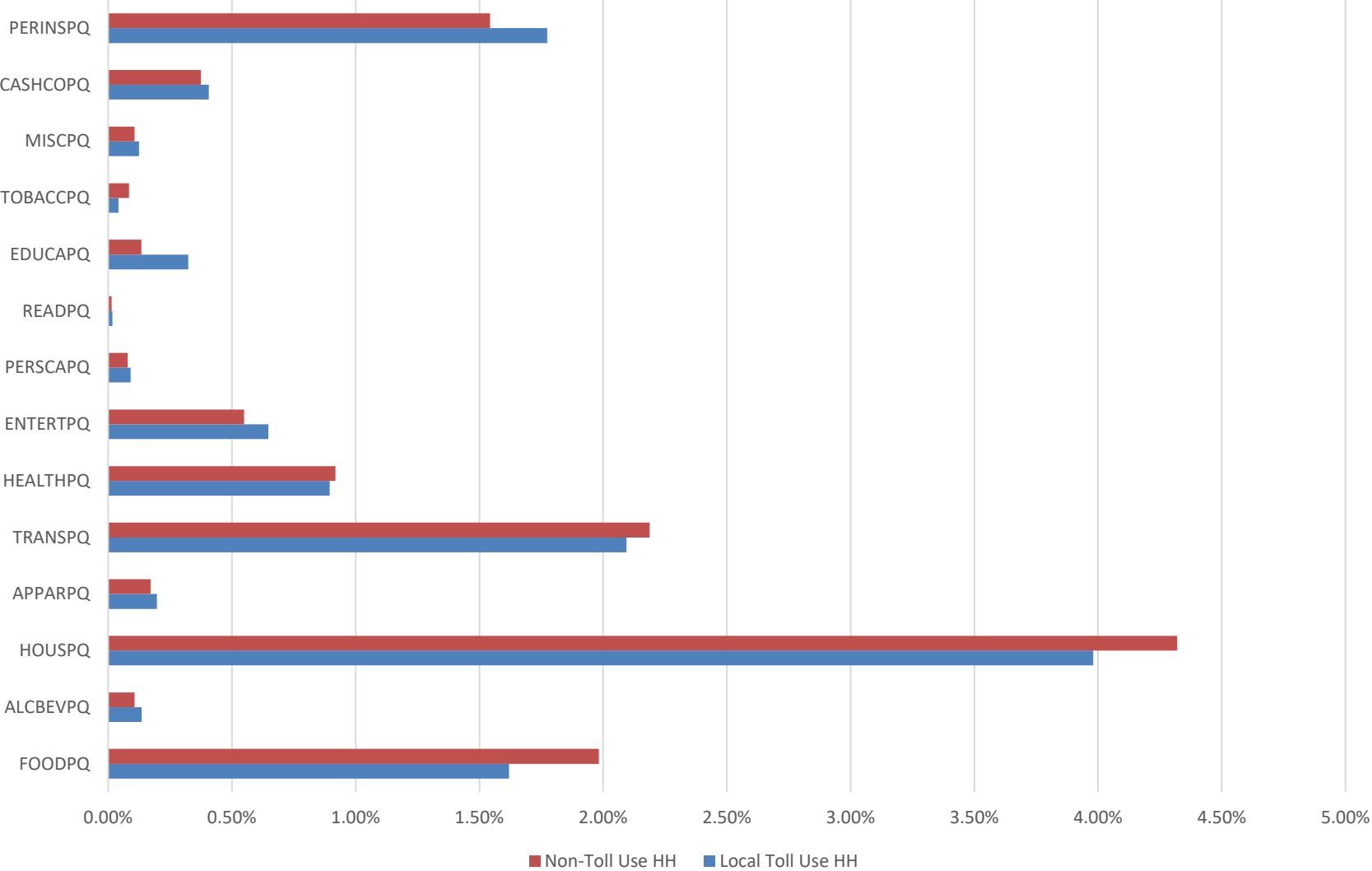


Local Toll Payers			
	2007	2012	2017
Non-user			
Number of Households	6053	5848	5131
HH Percentage	90.2%	87.4%	84.3%
User			
Number of Households	658	841	959
HH Percentage	9.8%	12.6%	15.7%
Non-user			
Number of Household Vehicles	11049	10335	9255
Number of Household Vehicles Percentage	88.7%	84.8%	82.1%
User			
Number of Household Vehicles	1407	1859	2021
Number of Household Vehicles Percentage	11.3%	15.2%	17.9%
Non-user			
Average Age of Head of Household	49.68	50.50	52.15
User			
Average Age of Head of Household	46.91	48.51	50.86
Average Age of Head of Household Difference	-2.77	-1.99	-1.29
Non-user			
Average Household Income	\$60,896	\$60,992	\$65,150
User			
Average Household Income	\$103,352	\$107,699	\$112,818
Average Household Income Difference (User – Nonuser)	\$42,456	\$46,707	\$47,668
Average Income Difference Percentage	69.7%	76.6%	73.2%

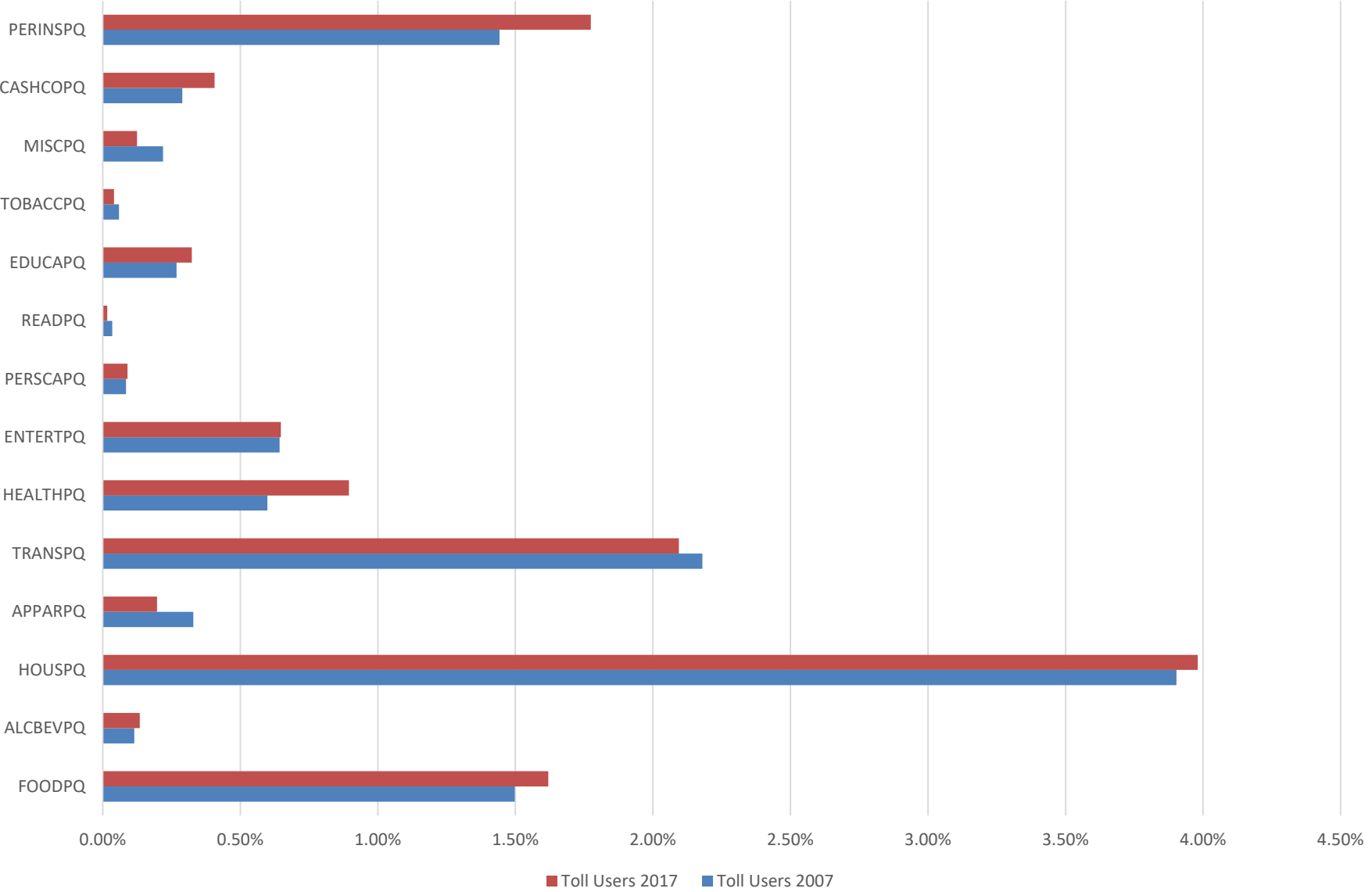
Local Toll Use Comparison - 2017



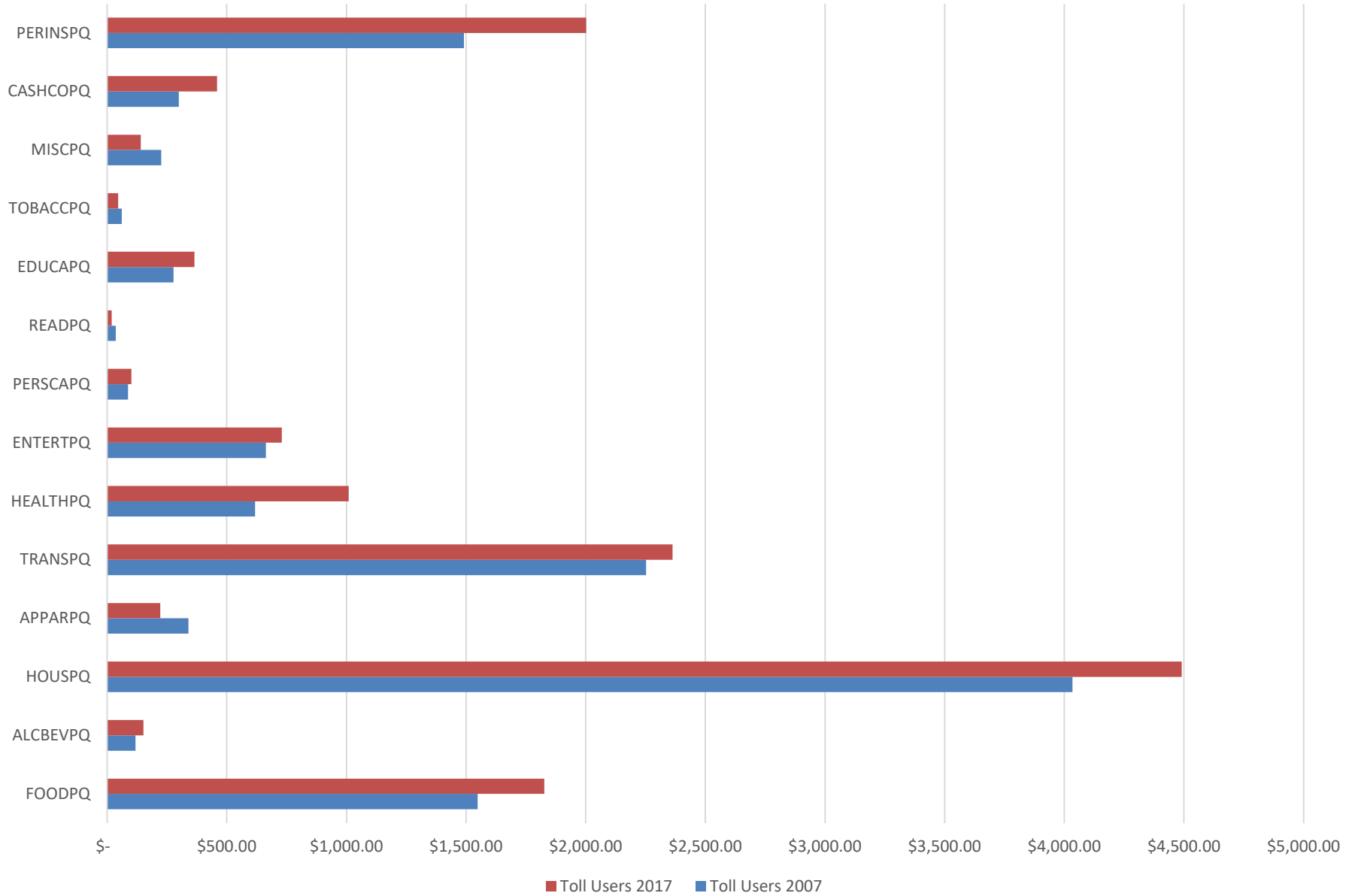
Local Toll Use Comparison - 2017



Toll Users Comparison - 2007 & 2017



Toll User Comparison - 2007 & 2017

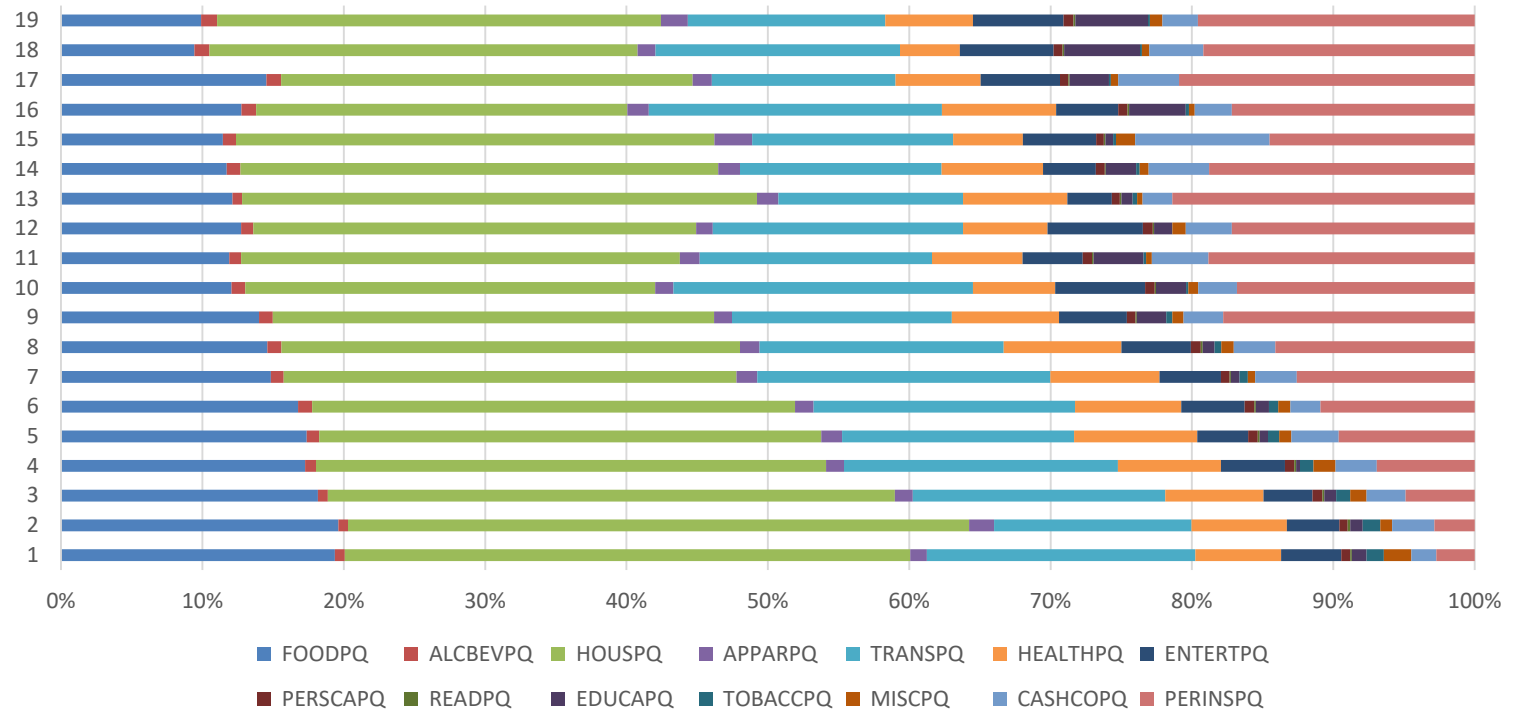


Mass Transit Summary			
	2007	2012	2017
Non-user			
Number of Households	6222	6155	5635
HH Percentage	90.7%	90.3%	92.5%
User			
Number of Households	640	663	455
HH Percentage	9.3%	9.7%	7.5%
Non-user			
Number of Household Vehicles	11955	11648	10827
Number of Household Vehicles Percentage	95.08%	94.81%	96.02%
User			
Number of Household Vehicles	619	637	449
Number of Household Vehicles Percentage	4.9%	5.2%	4.0%
Non-user			
Average Age of Head of Household	49.68	50.58	52.15
User			
Average Age of Head of Household	44.86	45.92	49.42
Average Age of Head of Household Difference	(4.81)	(4.66)	(2.73)
Non-user			
Average Household Income	\$64,626	\$66,688	\$72,267
User			
Average Household Income	\$70,752	\$64,994	\$77,486
Average Household Income Difference	\$6,126	(\$1,694)	\$5,219
Average Household Income Difference Percentage	9.5%	-2.5%	7.2%

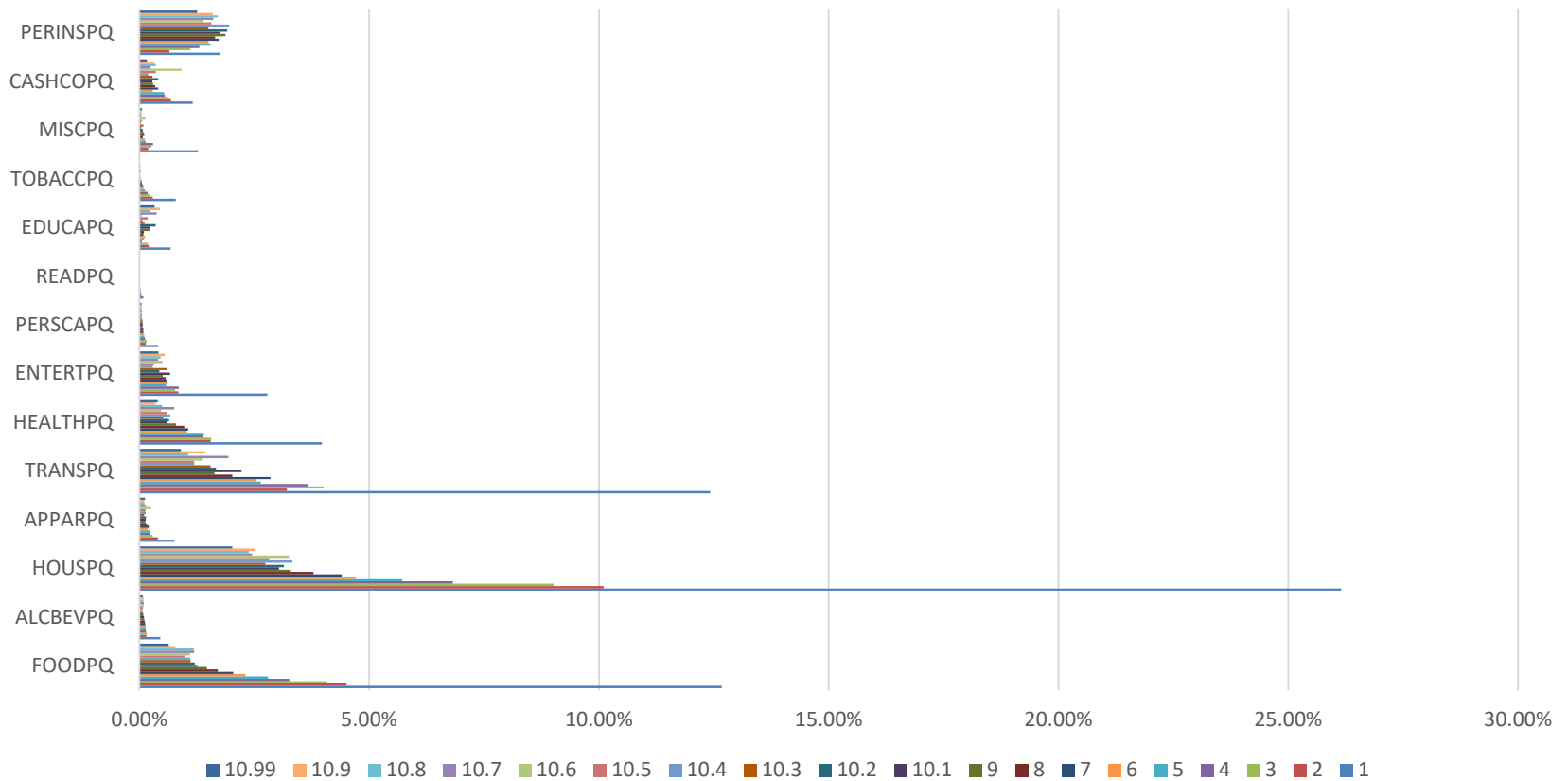
Variation in Spending by Income Group

1st to 9th Deciles and
10 Breaks – Top 10%

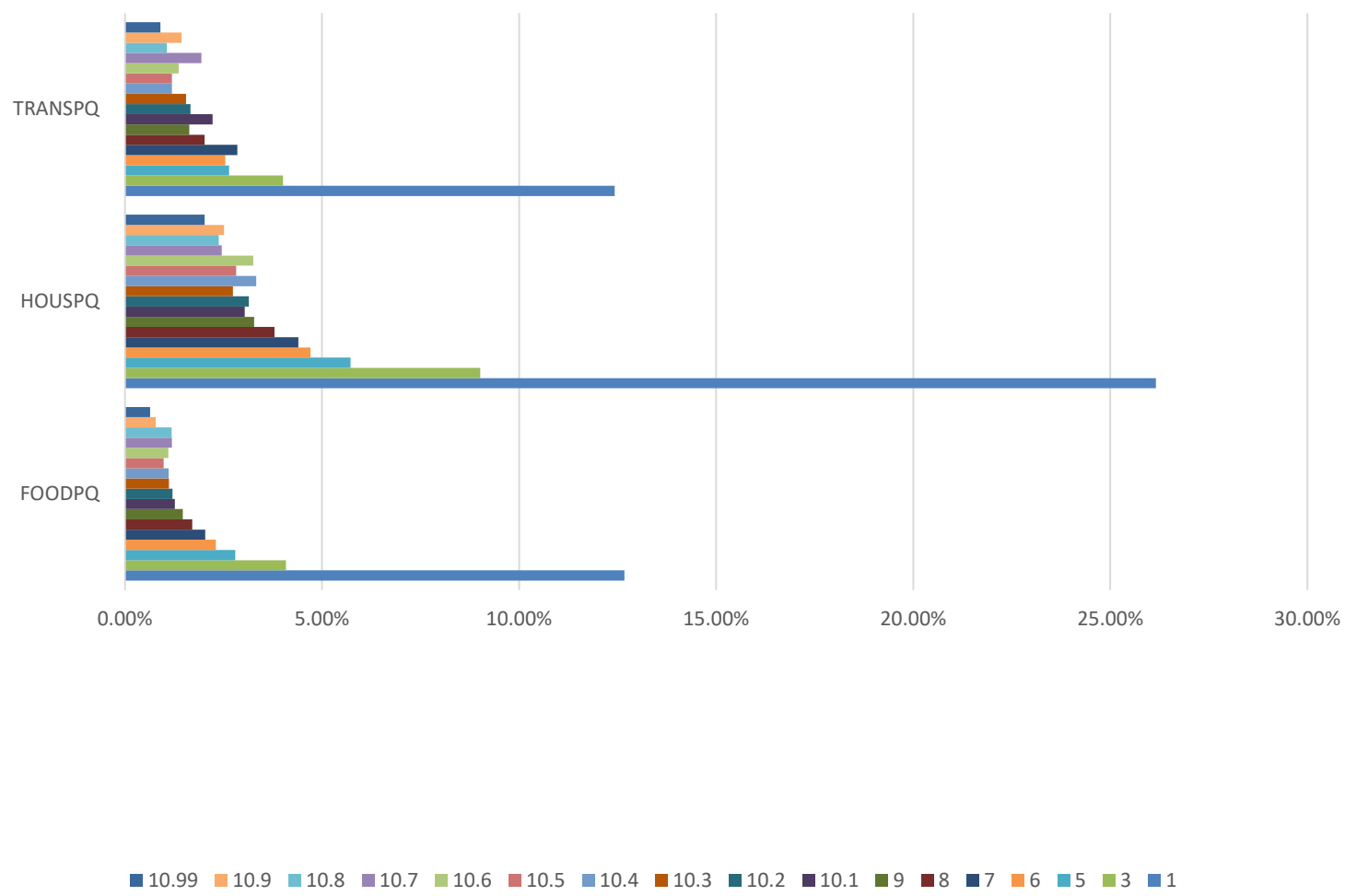
Household Spending by Income Category



Household Spending by Income Category



Household Spending by Income Class



Household Consumption

- Lots of interesting dynamics in the CEX in terms of household spending.
- Considerable variation in consumption patterns between various user and non-user groups.
- Considerable variation in consumption patterns over time in some cases inside same user group.
- Further detailed analysis needed to prove variation is statistically significant.

Questions?

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