Creating Multiyear ACS PUMS Estimates Using Single-Year Files

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How to **create** multiyear ACS PUMS estimates using single-year files?

How **accurate** are user-created multiyear ACS PUMS estimates?

Census-published multiyear PUMS files allow users to <u>more simply</u> produce <u>more accurate</u> estimates

PUMS Concatenation Process

Step 1

Step 2

Divide weight values
or estimate by M
(M = # of 1-year files)

2011 PUMS ReadMe Example Code

Current US File Concatenation

```
data USA;
set file1 file2;
run;
```

Proposed File Concatenation

```
data population3yr;
set file1 file2 file3;
run;
```

Current Population-Housing Merge

```
proc sort data=population;
by serialno;
run;
proc sort data=housing;
by serialno;
run;
data combined;
merge population (in=pop) housing;
by serialno;
if pop;
run;
```

Estimate Differences Between Census-Published Multiyear Files and User-Created Multiyear Files

Population Totals for Nation and States

3-Year Files: 2005-2007, 2006-2008, 2007-2009, 2008-2010, 2009-2011

5-Year Files: 2005-2009, 2006-2010, 2007-2011

Geographies: US, California, Kentucky, Wyoming

ACS User Verification File Characteristics		
Total population	Age 20-24	Owner occupied units
Housing unit population	Age 25-34	Renter occupied units
GQ population	Age 35-44	Owned with a mortgage
GQ institutional population	Age 45-54	Owned free and clear
GQ noninstitutional population	Age 55-59	Rented for cash
Total males	Age 60-64	No cash rent
Total females	Age 65-74	Total vacant units
Age 0-4	Age 75-84	For rent
Age 5-9	Age 85 and over	For sale only
Age 10-14	Total housing units	All Other Vacant
Age 15-19	Total occupied units	

3-Year File Population Totals: Kentucky, 2009-2011

State	Characteristic	Census-Published	Concatenated	% Difference
Kentucky	Total population	4,344,553	4,342,989	0.04%
Kentucky	Housing unit population	4,218,755	4,217,910	0.02%
Kentucky	GQ population	125,798	125,079	0.58%
Kentucky	GQ institutional population	70,619	69,395	1.76%
Kentucky	GQ noninstitutional population	55,179	55,684	0.91%
Kentucky	Total males	2,136,267	2,132,320	0.19%
Kentucky	Total females	2,208,286	2,210,669	0.11%
Kentucky	Age 0-4	280,519	282,400	0.67%
Kentucky	Age 5-9	284,560	281,331	1.15%
Kentucky	Age 10-14	286,060	283,840	0.78%
Kentucky	Age 15-19	295,552	296,909	0.46%
Kentucky	Age 20-24	293,965	296,603	0.89%
Kentucky	Age 25-34	563,028	567,636	0.81%
Kentucky	Age 35-44	577,051	575,839	0.21%
Kentucky	Age 45-54	640,333	638,770	0.24%

3-Year File Percent Estimate Differences: United States, California, Kentucky, Wyoming
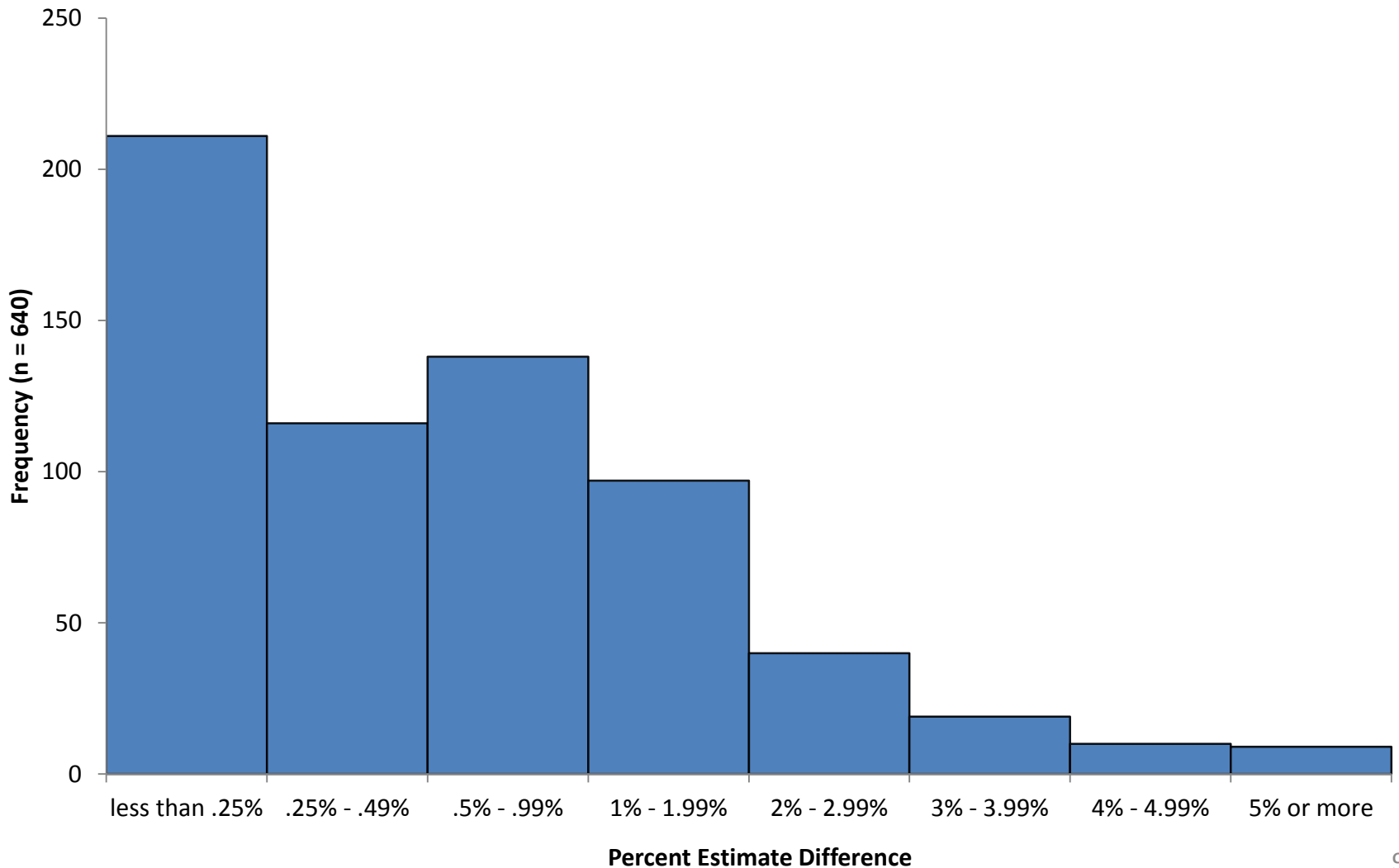
Average Estimate Differences: 3-Year PUMS Files

5-Year Population Totals: Kentucky, 2007-2011

State	Characteristic	Census-Published	Concatenated	% Difference
Kentucky	Total population	4,316,043	4,307,788	0.19%
Kentucky	Housing unit population	4,190,755	4,186,736	0.10%
Kentucky	GQ population	125,288	125,713	0.34%
Kentucky	GQ institutional population	70,185	66,482	5.57%
Kentucky	GQ noninstitutional population	55,103	54,571	0.98%
Kentucky	Total males	2,119,386	2,111,759	0.36%
Kentucky	Total females	2,196,657	2,196,030	0.03%
Kentucky	Age 0-4	279,966	284,305	1.53%
Kentucky	Age 5-9	282,683	278,178	1.62%
Kentucky	Age 10-14	282,711	279,005	1.33%
Kentucky	Age 15-19	296,912	297,197	0.10%
Kentucky	Age 20-24	291,385	285,779	1.96%
Kentucky	Age 25-34	561,384	568,805	1.30%

5-Year File Percent Estimate Differences: United States, California, Kentucky, Wyoming
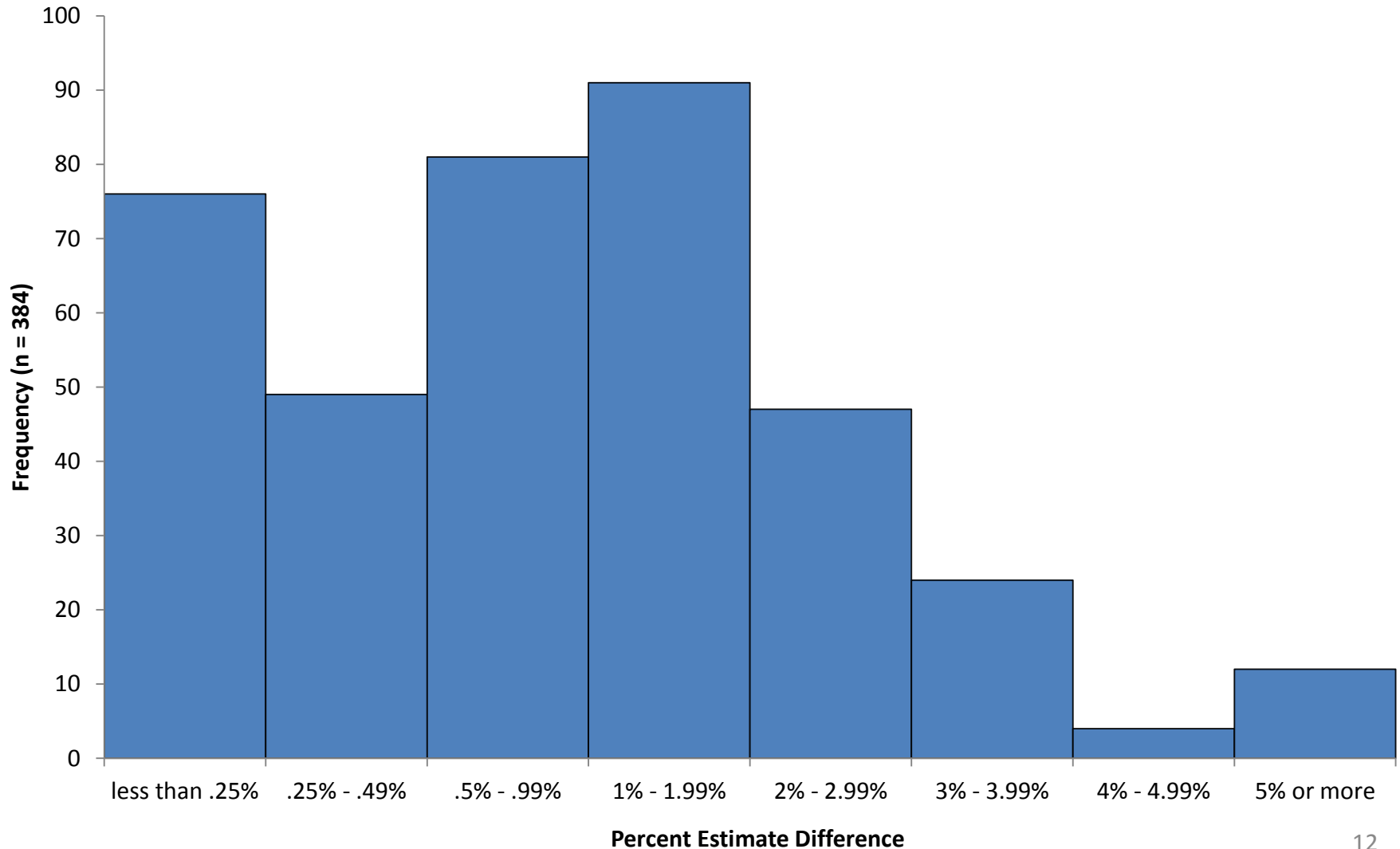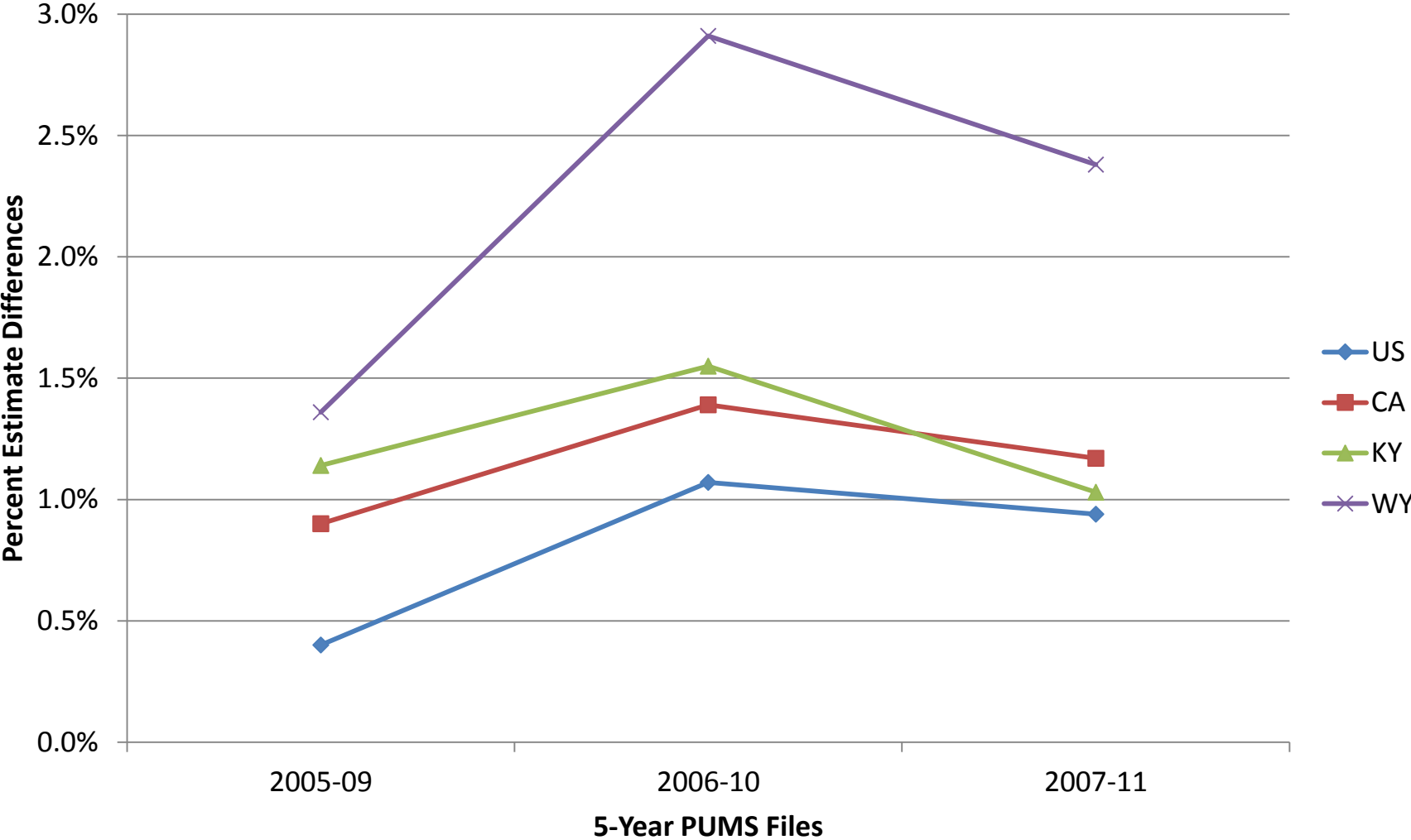
Average Estimate Differences: 5-Year PUMS Files

Derived Estimates and Population Totals for PUMAs

3-Year Files: 2009-2011

Geographies: 54 Selected Public Use Microdata Areas (PUMAs)

Social Characteristics
Population in households with a relationship of spouse
Female population 15 years and over that are divorced
Population 3 years and over enrolled in college or graduate school
Population 25 years and over with a graduate or professional degree
Civilian population 18 years and over that are civilian veterans
Population 1 year and over with a residence 1 year ago of a different house in US
Population that are foreign born
Population 5 years and over that speak a language other than English at home
Economic Characteristics
Civilian labor force that is unemployed
Workers 16 years and over commuting to work by car, truck or van-carpooled
Civilian employed population 16 years and over in service occupations
Occupied housing units with income and benefits between $15,000-$24,999
Occupied housing units with Food Stamp/SNAP benefits in past 12 months
Housing Characteristics
Housing units built 1939 or earlier
Housing units with 1 bedroom
Occupied housing units with house heating fuel from electricity
Owner-occupied housing units with a property value of less than $50,000

Derived Estimates and Population Totals for PUMAs

Census-Published and Concatenated Multiyear Estimates for Bend, OR						
	Derived Estimates (%)			Population Totals		
Characteristic	Census	Concat.	Difference	Census	Concat.	Difference
Relationship of spouse	22.15%	22.08%	0.07%	35,113	35,095	0.05%
Females that are divorced	13.35%	13.56%	0.21%	8,706	8,944	2.66%
Enrolled in college/grad school	23.45%	24.27%	0.82%	8,765	9,011	2.73%
Graduate or professional degree	10.8%	10.82%	0.02%	11,882	12,009	1.05%
Civilian veterans	12.45%	12.46%	0.01%	15,447	15,629	1.16%
Residence 1yr ago different house	17.21%	17.41%	0.2%	27,015	27,415	1.46%
Foreign born	4.57%	4.45%	0.12%	7,235	7,074	2.28%
Speak non-English language	6.16%	6.17%	0.01%	9,182	9,241	0.63%
Civilian labor force unemployed	9.33%	9.37%	0.04%	11,797	11,977	1.50%
Commuters by car, truck or van	10.38%	10.13%	0.25%	6,136	6,025	1.84%
Employed in service occupations	21.23%	21.33%	0.1%	14,735	14,911	1.18%
Income/benefits $15,000-$24,999	11.13%	11.46%	0.33%	7,183	7,361	2.42%
Food Stamp/SNAP benefits	16.41%	16.33%	0.08%	10,585	10,485	0.96%
Housing units built 1939 or earlier	3.61%	3.48%	0.13%	2,895	2,772	4.43%
1 bedroom households	5.77%	5.71%	0.06%	4,631	4,554	1.69%
House heating fuel from electricity	45.51%	45.31%	0.2%	29,359	29,098	0.90%
Property value less than $50,000	4.2%	4.22%	0.02%	1,765	1,768	0.16%
Average difference			**0.16%**			**1.60%**

Derived Estimates and Population Totals for PUMAs

Summary Statistics from Comparisons for the Fifty-Four Selected PUMAs				
	Derived Estimates (%)		Population Totals	
Characteristic	Average Difference	Max Difference	Average Difference	Max Difference
Relationship of spouse	0.23%	0.69%	1.37%	6.50%
Females that are divorced	0.17%	0.62%	1.46%	5.11%
Enrolled in college/graduate school	0.36%	1.58%	1.73%	4.82%
Graduate or professional degree	0.07%	0.35%	1.10%	4.29%
Civilian veterans	0.09%	0.44%	0.97%	4.55%
Residence 1yr ago of a different house	0.13%	0.63%	1.11%	3.46%
Foreign born	0.18%	0.6%	4.30%	26.24%
Speak non-English language at home	0.21%	0.8%	2.71%	11.91%
Civilian labor force that is unemployed	0.08%	0.23%	1.63%	4.92%
Commuters to work -carpooled	0.15%	0.43%	1.76%	4.58%
Employed in service occupations	0.18%	0.73%	1.21%	3.78%
Income and benefits $15,000-$24,999	0.31%	1.02%	2.35%	7.08%
Food Stamp/SNAP benefits	0.16%	0.57%	1.27%	4.52%
Housing units built 1939 or earlier	0.08%	0.34%	1.16%	4.43%
1 bedroom households	0.11%	0.4%	1.40%	5.22%
House heating fuel from electricity	0.16%	0.38%	1.29%	6.02%
Property value of less than $50,000	0.10%	0.41%	1.29%	4.47%
Overall	0.16% (avg)	1.58% (max)	1.65% (avg)	26.24% (max)

Conclusions

- Concatenation process is straightforward
  - Rely on data dictionaries to account for changes
- Population total estimate differences generally range between 0.5% and 1.5%
  - Smaller populations can reduce accuracy
  - More combined years can reduce accuracy
  - Population totals (versus derived estimates) can reduce accuracy