OBJECTIVE: Gain an understanding of how an IPUMS USA dataset is structured and how it can be leveraged to explore your research interests. This exercise will use IPUMS USA to explore associations in household ownership, and trends in language spoken in the home.
Research Questions
What proportion of households in the US has a mortgage? Is the mother’s spoken language a consistent determinant of a child’s preferred language? How are utility costs changing over time, and are changes in cost different by urban status?

Objectives
- Analyze the data using sample code
- Validate data analysis work using answer key

IPUMS Variables
- MORTGAGE: Mortgage Status
- VALUEH: House Value
- LANGUAGE: Language spoken at home
- SEX: Sex
- AGE: Age
- METRO: Metropolitan status
- OWNERSHP: Ownership of dwelling
- COSTELEC: Annual electricity cost
- COSTGAS: Annual gas cost
- ROOMS: Number of rooms
- UNITSSTR: Units in structure

Stata Code to Review

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>generate</td>
<td>Creates a new variable, &quot;replace&quot; specifies a value according to cases</td>
</tr>
<tr>
<td>mean</td>
<td>Displays a simple tabulation and frequency of one variable</td>
</tr>
<tr>
<td>tabulate</td>
<td>Displays a cross-tabulation for up to 2 variables</td>
</tr>
<tr>
<td>!=</td>
<td>Not equal to</td>
</tr>
</tbody>
</table>

Answer Key (page 6)

Common Mistakes to Avoid
1 Not changing the working directory to the folder where your data is stored
2 Mixing up = and == ; To assign a value in generating a variable, use ".". Use ".==" to specify a case when a variable is a desired value using an if statement
3 Forgetting to put [weight=weightvar] into square brackets
Step 1
Make an Extract

Step 2
Request the Data

Registering with IPUMS
Go to http://usa.ipums.org, click LOG IN and create an IPUMS USA account. On login screen, enter email address and password and submit it!

- Similar to Exercise 1, create a data extract containing the following:

  - Samples: 2010 ACS (1-Yr)
  - Variables:
    - MORTGAGE: Mortgage Status
    - VALUEH: House value
    - LANGUAGE: Language spoken at home
  - Once the sample and variables are selected, click VIEW CART -> CREATE DATA EXTRACT
  - For this example we will attach to each person case the language spoken by their mother if she resides in the household. To accomplish this:
    - On the EXTRACT REQUEST page, click “ATTACH CHARACTERISTICS”. Check the box at the intersection of LANGUAGE and Mother, and SUBMIT

<table>
<thead>
<tr>
<th>Variable</th>
<th>Head</th>
<th>Father</th>
<th>Mother</th>
<th>Spouse</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENUM</td>
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<tr>
<td>PERWT</td>
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<td>AGE</td>
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<td>SEX</td>
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<tr>
<td>LANGUAGE</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>LANGUAGD</td>
<td></td>
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</tr>
</tbody>
</table>

- Review and provide a short description for the extract and click SUBMIT EXTRACT. You will receive an e-mail when the data is available for download

Create a second extract without attaching any additional characteristics

- Samples: 2005 through 2010 ACS (1-Yr) Samples
- Variables:
  - METRO: Metropolitan status
  - OWNERSHIP: Ownership of dwelling
  - COSTELEC: Annual electricity cost
  - COSTGAS: Annual gas cost
  - COSTWATR: Annual water cost
  - ROOMS: Number of rooms
  - UNITSSTR: Units in structure
  - CPI99: 1999 Consumer Price Index
Part 1: Analyze the Sample

Analyze the Sample – Part I Frequencies

Get a basic frequency of the MORTGAGE variable.

A) Find the codes page on the website for the MORTGAGE variable and write down the code value, and what category each code represents.

B) How many people in the sample had a mortgage or deed of trust on their home in 2010? What proportion of the sample had a mortgage?

C) Using weights, what proportion of the population had a mortgage in 2010?

Using household weights (HHWT)

Suppose you were interested not in the number of people with mortgages, but in the number of households that had mortgages. To get this statistic you would need to use the household weight (HHWT) and select only one person from each household to represent that household’s characteristics.

D) What proportion of households in the sample had a mortgage? What proportion of the sample owned their home? (Hint: don’t use the weight quite yet)

E) What proportion of households had a mortgage across the country in 2010?

F) What proportion of households owned their home? Does the sample over or under-represent households who own their home?

G) What is the average value of:

i. A home that is mortgaged?

ii. A home that is owned?

H) What could explain this difference?

Note: The missing value code for house value is excluded.

I) Under the description tab on the website for VALUEH, read the first user note. On the codes page, find the top codes by state for VALUEH, under 2010 ACS/PRCS topcodes by state. How could this complicate your data analysis? Check a histogram of your data to rule out any bias.
Part 2: Analyze the Sample

Analyze the Sample – Part II Frequencies

Investigate LANGUAGE variable frequencies.

A) What were the three most commonly spoken languages in the US in 2010?

Note: The sort option automatically organizes the table into descending frequency.

B) Using the code page on the website for LANGUAGE, find the codes for the three most commonly spoken languages.

C) What percent of individuals who speak English at home:
   i. Has a mother who speaks Spanish at home?
   ii. Has a mother who speaks Chinese at home?

D) What percent of men under the age of 30 speak Spanish at home?

Part 3: Analyze the Sample

Analyze the Sample – Part III Advanced Exercises

Now use the second extract into Stata.

A) On the website, what are the codes for METRO? What is the code for a single family house, detached in the variable UNITSSTR?

B) What is the proportion of households in the central city who owned their home in 2008? In 2010?

Create a graph for annual utility costs by metropolitan status

C) What is the approximate annual cost of water for:
   i. A household in the metro area in 2010?
   ii. A household not in the metro area?

D) What is the approximate annual cost of electricity for:
   i. A household in the metro area in 2010?
   ii. A household not in the metro area?
Analyze the Sample - Part III Advanced Exercises

E) Is there a simple correlation between the number of rooms and the annual cost of electricity?

Next, create a graph that will display the average cost of electricity and gas over time, controlling for the number of rooms and the units in structure. To control for these variables, look at the specific case of a single family house, detached with 5 rooms. Because the graph will also observe prices over time, inflation must be controlled for.

F) On the website, find the variable description for COSTELEC and note that electricity costs are expressed in contemporary dollars. To adjust costs for inflation a price index, CPI99, must be used. Go to the CPI99 variable description page. What year is the index year and how do you apply the inflation adjustment?

G) Has the annual cost of gas for a single family, 5-room home increased since 2005 in nominal terms? What about the annual cost of water?

H) Has the annual cost of gas for a single family, 5 room home increased since 2005 in real terms?

Note: The variable CPI99 assigns an inflation index value according to the year of the observation.
**ANSWERS: Analyze the Sample - Part I Frequencies**

*Get a basic frequency of the MORTGAGE variable.*

A) Find the codes page on the website for the MORTGAGE variable and write down the code value, and what category each code represents. 0 N/A; 1 No, owned free and clear; 2 Check mark on manuscript (probably yes); 3 Yes, mortgaged/ deed of trust or similar debt; 4 Yes, contract to purchase.

B) How many people in the sample lived in homes that were mortgaged or had a deed of trust in 2010? What proportion of people in the sample lived in mortgaged homes? 1,523,041 people; 49.75%

C) Using weights, what proportion of the population lived in mortgaged homes in 2010? 47.46%

*Using household weights (HHWT)*

Suppose you were interested not in the number of people with mortgages, but in the number of households that had mortgages. To get this statistic you would need to use the household weight.

In order to use household weight, you should be careful to select only one person from each household to represent that household’s characteristics. And you will need to apply the household weight (HHWT).

D) What proportion of households in the sample had a mortgage? What proportion of the sample owned their home? (Hint: don’t use the weight quite yet) 42.20% of households mortgaged; 23.98% of households owned.

E) What proportion of households had a mortgage across the country in 2010? 40.53% of households.

F) What proportion of households owned their home? Does the sample over or under-represent households who own their home? 20.07% of households, sample over-represents households that own their own home or have a mortgage.

G) What is the average value of:
   i. A home that is mortgaged? $267,941.30
   ii. A home that is owned? $219,110.30

H) What could explain this difference? Perhaps homes that have already been paid off are older and less expensive, or it takes less time to pay off a home that is worth less.

*Note: The missing value code for house value is excluded.*

I) Under the description tab on the website for VALUEH, reader the first user note. On the codes page, find the top codes by
state for VALUEH, under 2010 ACS/PRCS topcodes by state. How could this complicate your data analysis? Check a histogram of your data to rule out any bias. There doesn't seem to be a significant cluster around the topcodes, so the data sample may not be noticeably biased.

ANSWERS: Analyze the Sample - Part II Frequencies
Investigate LANGUAGE variable frequencies.
A) What were the three most commonly spoken languages in the US in 2010? English, Spanish, Chinese

Note: The sort option automatically organizes the table into descending frequency.

B) Using the code page on the website for LANGUAGE, find the codes for the three most commonly spoken languages. 01 English; 12 Spanish; 43 Chinese

C) What percent of individuals who speak English at home:
   i. Has a mother who speaks Spanish at home? 3.96%
   ii. Has a mother who speaks Chinese at home? 0.23%

D) What percent of men under the age of 30 speak Spanish at home? 13.4%

ANSWERS: Analyze the Sample - Part III Advanced Exercises
Revisit Step 3 to import the second extract into Stata.
A) On the website, what are the codes for METRO? What is the code for a single family house, detached in the variable UNITSSTR? UNITSSTR: 03 1-family house, detached; METRO: 0 Not identifiable; 1 Not in metro area; 2 Central city; 3 Outside central city; 4 Central city status unknown

B) What is the proportion of households in the central city who owned their home in 2008? 44.51% In 2010? 42.92%

Create a graph for annual utility costs by metropolitan status

C) What is the approximate annual cost of water for:
   i. A household in the metro area in 2010? ~$4500
   ii. A household not in the metro area? ~$2000

D) What is the approximate annual cost of electricity for:
   i. A household in the metro area in 2010? ~$3800
   ii. A household not in the metro area? ~$1700

ANSWERS: Analyze the Sample - Part III Advanced Exercises

E) Is there a simple correlation between the number of rooms and the annual cost of electricity? There seems to be a weak positive correlation between number of rooms and the cost of electricity. (0.11)

Next, create a graph that will display the average cost of electricity and gas over time, controlling for the number of rooms and the units in structure. To control for these variables, look at the specific case of a single family house, detached with 5 rooms. Because the graph will also observe prices over time, inflation must be controlled for (HINT: CPI99).
F) On the website, find the variable description for COSTELEC and note that electricity costs are expressed in contemporary dollars. To adjust costs for inflation a price index, CPI99, must be used. Go to the CPI99 variable description page. What year is the index year and how do you apply the inflation adjustment? 1999; real costs adjusted for inflation and indexed to the 1999 U.S. dollars are estimated by generating a new variable CPI99 * COSTELEC.

G) Has the annual cost of gas for a single family, 5-room home increased since 2005 in nominal terms? What about the annual cost of water? In nominal terms, the cost of gas is rising, but the cost of water seems not to change.

H) Has the annual cost of gas for a single family, 5 room home increased since 2005 in **real terms**? In real terms, the price is falling or staying about the same between 2005 and 2009.

*Note: The variable CPI99 assigns an inflation index value according to the year of the observation.*
**EXERCISE 2**

* Analyze the Sample – Part I Frequencies

* B) How many people in the sample had a mortgage or deed of trust on their home in 2010? What proportion of the sample had a mortgage?

```
tab mortgage
```

* C) Using weights, what proportion of the population had a mortgage in 2010?

```
gen perwt1 = round(perwt)
tab mortgage [fweight=perwt1]
```

```
svyset cluster [pweight=perwt], strata(strata)
svy: proportion mortgage
```

* D) What proportion of households in the sample had a mortgage?

```
tab mortgage if pernum == 1
```

* E) What proportion of households had a mortgage across the country in 2010?

* F) What proportion of households owned their home?

```
tab mortgage [fweight=hhwt] if pernum == 1
```

```
svyset cluster [pweight=hhwt], strata(strata)
*svy, subpop(if pernum==1): tab mortgage, format(%16.4fc)
*svy, subpop(if pernum==1): proportion mortgage
```

* G) What is the average value of:

* i. A home that is mortgaged?

```
mean valueh if valueh != 9999999 & valueh != 0 & pernum==1 [fweight=hhwt], over(mortgage)
```

```
svy, subpop(if valueh != 9999999 & valueh != 0 & pernum==1): mean valueh, over(mortgage)
```

* i) Under the description tab on the website for VALUEH, read the first user note.

* On the codes page, find the top codes by state for VALUEH, under 2010 ACS/PRCS topcodes

* by state. How could this complicate your data analysis? Check a histogram of your data
* to rule out any bias.

\[
\text{histogram valueh if (valueh!=0 & valueh!=9999999) & pernum==1} \\
[\text{fweight=hhwt}, \text{frequency}]
\]

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* ANSWERS: Analyze the Sample - Part II Frequencies

* A) What were the three most commonly spoken languages in the US in 2010?
  \text{tab language [fweight = perwt], sort}

\text{svyset cluster [pweight=perwt], strata(strata)}
\text{svy: tab language, count format(%16.0fc)}
*\text{svy: proportion language, sort}
*\text{svy: tab language, sort}

* C) What percent of individuals who speak English at home:
  * i. Has a mother who speaks Spanish at home? 3.96%
  * ii. Has a mother who speaks Chinese at home? 0.23%

\text{tab language language_mom [fweight = perwt] }\|\|\
  \text{if (language==01| language==12 | language==43) }\|\|
  \text{& (language_mom==01| language_mom==12 | language_mom==43), row}

\text{svy, subpop(if (language==01| language==12 | language==43) }\|\|
  \text{& (language_mom==01| language_mom==12 | language_mom==43)): }\|\|
  \text{proportion language language_mom, format(%0.4fc)}

* D) What percent of men under the age of 30 speak Spanish at home?
  \text{tab language sex if age < 30 [fweight=perwt], col for}
  \text{mat(%0.4fc)}

\text{svy, subpop(if age<30): proportion language sex, format(%0.4fc)}

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* ANSWERS: Analyze the Sample - Part III Advanced Exercises

* B) What is the proportion of households in the central city who owned their
  home in 2008? 2010?
  \text{tab metro ownership if pernum==1 & year==2008 [fweight=hhwt], row}
  \text{tab metro ownership if pernum==1 & year==2010 [fweight=hhwt], row}

\text{svyset cluster [pweight=hhwt], strata(strata)}

\text{svy, subpop(if pernum==1 & year==2008): tab metro ownership, row}
\text{format(%0.4fc)}
\text{svy, subpop(if pernum==1 & year==2010): tab metro ownership, row}
\text{format(%0.4fc)}

* Create a graph for annual utility costs by metropolitan status
*C) What is the approximate annual cost of water for:
*i. A household in the metro area in 2010? ~$4500
*ii. A household not in the metro area?

*D) What is the approximate annual cost of electricity for:
*i. A household in the metro area in 2010? ~$3800
*ii. A household not in the metro area? ~$1700

* E) Is there a simple correlation between the number of rooms and the annual
* cost of electricity?
cor costelec rooms

* F) On the website, find the variable description for COSTELEC and follow the
* link that discusses adjusting for inflation. What year is the index year? 1999

*G) Has the annual cost of gas for a single family, 5-room home increased
* in nominal terms? What about the annual cost of water?

graph bar (mean) costwatr costgas [pweight=hhwt] ///
if pernum==1 & unitsstr==03 & rooms==5 & costgas !=0 & costwatr !=0, cw over(year) cw

*H) Has the annual cost of gas for a single family, 5 room home increased
* 2005 in real terms?
gen costgas99 = costgas*cpi99
graph bar (mean) costgas99 [fweight=hhwt] ///
if pernum==1 & unitsstr==03 & rooms==5 & costgas99 !=0 & year != 2010, over(year) cw