Lecture 2: Input and Output

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- Work with .mat files
- Work with external files (.txt, .xls, etc.)
- Can import using wizard (not recommended)

Save and Load .mat Files:

- Save/load variables specified or in workspace

```
a = magic(3);
b = magic(4);
save data.mat
save data2.mat a
load data.mat a
```

- Note: load may overwrite old variables of the same name

cvs/xls Files:

- Read from .cvs files: a = csvread('fild_dir');
  - Return as matrix
- Write to .cvs files: cvswrite('file_name',A);
- xlsread/xlswrite for .xls files

More General Method:

- importdata('filename','delimiter',nheaderlines)
    - automatically converts unreadable to NaN
    - optionally reads first nheaderlines row as text column headers
    - return a struct

- Type help importdata and look at examples.

Most Rigorous/versatile Method:

- fprintf(fid,'format',variables);
- textscan(fid,'format')
- Usually combined with fopen and fclose

fprintf:

- fprintf(fid,'format',variables);
- Usually combined with fopen and fclose

fprintf:

- Example:

```
fid = fopen('filename',permit);
fprintf(fid,'%5.2f',a);
fclose(fid);
```

- Similar to fprintf:

```
sprintf('Today is %s\n',date);
sprintf('Variable a is assigned value %d\n',a);
```

- eval effectively execute the string:

```
eval('a=2;');
eval(sprintf('x(%d) = a(%d+1);',i,i);
eval(sprintf('x(i) = a(i+1);');
eval(sprintf('%s = a(i);',varname{i});
```

I/O in Functions:

- Workspace
- Global variables

- General form: [a, b] = f(c,d);
  - workspaces are isolated by f.

- Example:

```
function [x,y] = f(z,w)

    a = rand; b = rand;
    x = a * z; y = b + w;

end
```

- Oppress output:

```
[~,y] = f(z,w)
x = f(z,w)
```

- Oppress input

```
x = f([],w);
max(A,[],2);
```

I/O Arguments:

- number of arguments: `nargin`, `nargout`

```
if nargin==2

    x = z + w;

else

    x = z;

end
```

- Normally [a,b] = f(x,a);
- Sometimes you want to update a variable without placing it as arguments
  - Declare: Global a;
  - Declare global variables in each workspace where it is called

- sort(A): sort each column of A in ascending order
- sortrows(A): preserve grouping
- mean(A), median(A), prctile(A,p)
- var(A), std(A), hist(A), cov(A)

- Deal with empty obs
  - In stata: .
  - In matlab: NaN,
  - You have to specify it
  - Best practice: pre-specification.

Premier of Tex Table:

- Example of TEX table:

Table 1: Summary Statistics: MSA-level Statistics

MSA	Sample Size	Income Ratio	Child Present	College	Manufacture	Hispanic	Black
Orange County	122,362	82.112	0.431	0.336	0.137	0.211	0.015
Los Angeles-Long Beach	429,407	84.675	0.446	0.289	0.123	0.359	0.104
Oakland	102,428	84.116	0.439	0.394	0.091	0.121	0.126
Riverside-San Bernardino	115,615	77.834	0.544	0.220	0.081	0.251	0.062
Sacramento	70,946	77.428	0.468	0.328	0.055	0.100	0.062
San Diego	118,620	78.610	0.455	0.321	0.085	0.196	0.052
San Francisco	73,097	112.111	0.344	0.471	0.081	0.130	0.057
San Jose	74,928	82.717	0.425	0.394	0.211	0.182	0.032
Total	275,347	84.901	0.445	0.317	0.117	0.276	0.080

Note: The table is generated from the 1990 PUMS 5% dataset for California. I drop institutionized sample and keep only samples who live in MSAs with population density greater than 4%. About 76.7% of observations remain in the sample. The income ratio is calculated as the mean of income over monthly renter(owner) cost. The average level of child presence, college degree, welfare participation, and percentage of black sample are calcuated from the female subsamples between 20 years old and 55 years old.

- Example of TeX table:

```
\begin{table}[htbp]\centering\caption{title}\label{tab:j_stats}\small\begin{tabular}{llllllll}
\hline
\hline
Language&Sample Size&Child Present&College&No. Kid&Welfare&Single Mom \\
\hline
Italian&855&0.375&0.351&1.408&0.025&0.055 \\
French&1,653&0.347&0.503&1.238&0.026&0.068 \\
Spanish&60,889&0.542&0.121&2.155&0.057&0.129 \\
Chinese&7,992&0.462&0.428&1.380&0.041&0.046 \\
Thai&309&0.534&0.311&1.733&0.127&0.075 \\
Japanese&1,859&0.429&0.480&1.217&0.015&0.033 \\
Mon-Khmer&546&0.670&0.084&2.797&0.397&0.159 \\
Vietnamese&3,090&0.526&0.238&1.839&0.148&0.098 \\
Tagalog&7,367&0.512&0.593&1.657&0.012&0.068 \\
English&193,054&0.409&0.365&1.421&0.052&0.104 \\
\hline
Total Obs:&278,114&&&&& \\
\hline
\hline
\end{tabular}
\captionsetup{font=footnotesize, labelformat=empty, labelsep=none, margin={0in,0in}}\caption{this is caption}
\end{table}\addtocounter{table}{-1}
```

- Create a Tex table
- the function should be able to generate main body, and read prefix and suffix as inputs
- produce mean, std deviation, and significance star
- number or rows should be dependent variable