

SESUG Paper 165-2020

SAS GRAPH Animation Examples used in Data Visualization of Analytical Procedures with Public Federal Data

Martha D. Pohl¹

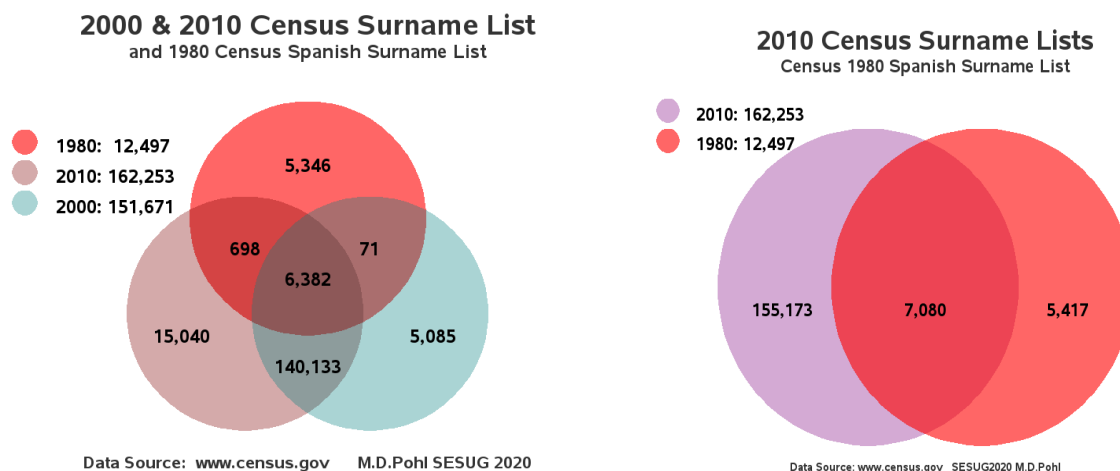
ABSTRACT:

Examples of SAS GRAPH Animation² used in data visualization analytical procedures will be presented. The source of the data will be from public Federal sources such as Bureau of the Census, Bureau of Labor Statistics, Federal Financial Institutions Examination Council, and the Federal Reserve Board. The presentation explores geographic changes over time, Venn Diagrams, data from the American Community Survey (ACS), Home Mortgage Disclosure Act (HMDA), Community Reinvestment Act (CRA), PUMA and dual PUMAs changes and more. A method to explore probability distributions will be presented as well as others, all using SAS GRAPH animation.

INTRODUCTION:

Data visualization using animation is newer tool to enhance the capability of analyzing data. This can be done by dynamic graphs to visualize changes. This presentation explores this method using SAS/GRAPH animation and Census data and other public Federal data such as but not limited to as the ACS, HMDA, CRA. The SAS code for these procedures is included.

Venn Diagrams: Frequently Occurring Surnames from the 2010 & 2000 Census; and Census; Spanish Surname List www.census.gov



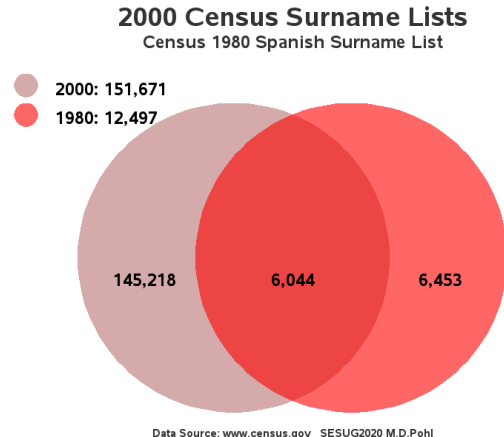
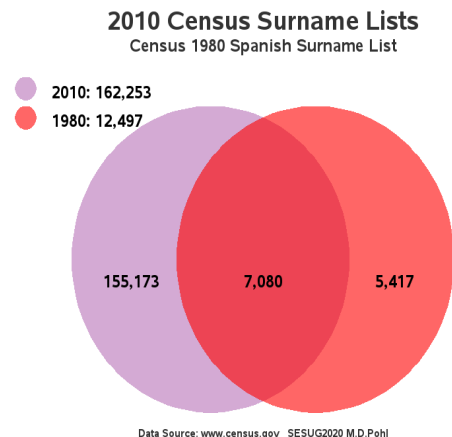
¹ U.S. Department of Justice, retired. Disclaimer: Any opinions expressed in this paper are those of the author and do not constitute policy or opinion of the U.S. Department of Justice or any of its subcomponents.

² SAS 9.4 TS Level 1M4 X64_7 PRO platform.

³ Frequently Occurring Surnames from the 2010 Census: FILE B: 162,253 surnames
https://www.census.gov/topics/population/genealogy/data/2010_surnames.html

⁴ Frequently Occurring Surnames from the Census 2000: FILE B: 151,671 surnames
https://www.census.gov/topics/population/genealogy/data/2000_surnames.html

⁵ Jeffrey Passel and David Word produced a list of common Hispanic surnames for the 1980 Decennial Census. This resulted in 12,497 Hispanic surnames called the "Passel-Word (PW) Spanish surname list".



Venn Diagrams: SAS CODE for 3 sets

```
%let text1=1980: 12,497;
%let text2=2010: 162,253;
%let text3=2000: 151,671;

%let label1=5,346;
%let label2=15,040;
%let label3=5,085;
%let label1_2=698;
%let label2_3=140,133;
%let label1_3=71;
%let label1_2_3=6,382;

data anno;
length text $20 style $12 function $5 color $12;
retain xsys '5' ysys '5' hsys '3';
function='pie'; size=25; rotate=360; position='5'; line=0;

/* Draw the 3 intersection circles */
x=50; y=60; color="&color1"; style='psolid';output;
x=40; y=35; color="&color2"; style='psolid';output;
x=60; y=35; color="&color3"; style='psolid';output;

/* Put the labels on the pieces of the circles */
function='label'; position='5'; style='';size=4; color='black';
/* cbox='grayfe'; */
x=50; y=75; text="&label1"; output;
x=30; y=30; text="&label2"; output;
x=70; y=30; text="&label3"; output;
x=40; y=53; text="&label1_2"; output;
x=50; y=22; text="&label2_3"; output;
x=60; y=53; text="&label1_3"; output;
x=50; y=45; text="&label1_2_3"; output;
run;

data legend;
length text $20 style $35 function $5 color $12;
retain xsys '5' ysys '5' hsys '3';

function='label'; text="&text1";
position='6'; style='';size=4;x=10;y=80; color='black';output;

function='pie'; x=5; size=2.75; color="&color1"; line=0;
position='5'; style='psolid';rotate=360;output;

function='label'; text="&text2";
position='6'; style='';size=4;x=10;y=72; color='black';output;
```

```

function='pie'; x=5; size=2.75; color="&color2"; line=0;
position='5'; style='psolid';rotate=360;output;

function='label'; text="&text3";
position='6'; style='';size=4;x=10;y=64; color='black';output;

function='pie'; x=5; size=2.75; color="&color3"; line=0;
position='5'; style='psolid';rotate=360;output;

run;

data anno_legend; set anno legend;
run;

data label;
length text $20 style $35 function $5 color $12;
xsys='5'; ysys='5'; hsys='3';
function='label'; style=''; color='black'; size=4;
text="&text1"; position='4'; x=30;y=75; output;
text="&text2"; position='4'; x=20;y=25; output;
text="&text3"; position='6'; x=80;y=25; output;
run;

data anno_label; set anno label;
if substr(style,1,1) eq 'P' then style="pempty";
run;

goptions device=png;
goptions border;

ODS LISTING CLOSE;
ODS HTML path=odsout body="&name..htm"
(title="Data Source: www.census.gov")
style=htmlblue;

goptions htitle=6pct htext=4pct ftitle="tahoma amt/bold" ftext="tahoma amt/bold";
goptions ctext=gray33;

title1 ls=0.5 '2000 & 2010 Census Surname List';
title2 'and 1980 Census Spanish Surname List';

footnotel h=3.5pct 'Data Source: www.census.gov M.D.Pohl SESUG 2020';

proc gslide annotate=anno_legend
des='' name="&name";
run;

quit;
ODS HTML CLOSE;
ODS LISTING;

```

Venn Diagrams: SAS CODE for 2 sets

```

%let name=transparent_venn;
filename odsout '.';

%let color2=/*a90000055*/ /*a80000055*/ a0000ff99;
%let color3=/*a80806055*/ /*a00808055*/ aff000099;
%let text2=2010: 162,253;
%let text3=2000: 151,671;

%let label2=15,738;
%let label3=5,156;
%let label2_3=146,515;

data anno;
length text $20 style $12 function $5 color $12;
retain xsys '5' ysys '5' hsys '3';
function='pie'; size=35; rotate=360; position='5'; line=0;

x=40; y=45; color="&color2"; style='psolid';output;

```

```

x=60; y=45; color="&color3"; style='psolid';output;

/* Put the labels on the pieces of the circles */
function='label'; position='5'; style='';size=4; color='black';
/* cbox='grayfe'; */
x=30; y=40; text="&label2"; output;
x=70; y=40; text="&label3"; output;
x=50; y=40; text="&label2_3"; output;

run;

data legend;
length text $20 style $35 function $5 color $12;
retain xsys '5' ysys '5' hsys '3';

function='label'; text="&text2";
position='6'; style='';size=4;x=10;y=92; color='black';output;

function='pie'; x=5; size=2.75; color="&color2"; line=0;
position='5'; style='psolid';rotate=360;output;

function='label'; text="&text3";
position='6'; style='';size=4;x=10;y=84; color='black';output;

function='pie'; x=5; size=2.75; color="&color3"; line=0;
position='5'; style='psolid';rotate=360;output;

run;

data anno_legend; set anno legend;
run;

data label;
length text $20 style $35 function $5 color $12;
xsys='5'; ysys='5'; hsys='3';
function='label'; style=''; color='black'; size=4;
text="&text2"; position='4'; x=20;y=25; output;
text="&text3"; position='6'; x=80;y=25; output;
run;

data anno_label; set anno label;
if substr(style,1,1) eq 'P' then style="pempty";
run;

goptions device=png;
goptions border;

ODS LISTING CLOSE;
ODS HTML path=odsout body="&name..htm"
(title="Data Source: www.census.gov")
style=htmlblue;

goptions htitle=6pct htext=4pct ftitle="tahoma amt/bold" ftext="tahoma amt/bold";
goptions ctext=gray33;

title1 ls=0.5 '2010 & 2000 Census Surname Lists';
footnotel h=2.5pct 'Data Source: www.census.gov SESUG2020 M.D.Pohl';

proc gslide annotate=anno_legend
des='' name="&name";
run;
quit;

```

SAS CODE TO GENERATE ANIMATED GIFS PROC GSLIDE:

```

data my_anno1x;
length function $8 imgpath $100;
xsys='3'; ysys='3'; when='a';
x=0; y=0; function='move'; output;
x=100; y=100; function='image'; style='fit';
imgpath="Z:\Documents\transparent_venn3.png"; output;

```

```

run;

data my_anno2x;
  length function $8 imgpath $100;
  xsys='3'; ysys='3'; when='a';
  x=0; y=0; function='move'; output;
  x=100; y=100; function='image'; style='fit';
  imgpath="Z:\Documents\transparent_venn3.png"; output;
run;

data my_anno3x;
  length function $8 imgpath $100;
  xsys='3'; ysys='3'; when='a';
  x=0; y=0; function='move'; output;
  x=100; y=100; function='image'; style='fit';
  imgpath="Z:\Documents\transparent_venn2.png"; output;
run;

data my_anno4x;
  length function $8 imgpath $100;
  xsys='3'; ysys='3'; when='a';
  x=0; y=0; function='move'; output;
  x=100; y=100; function='image'; style='fit';
  imgpath="Z:\Documents\transparent_venn2a.png"; output;
run;

data my_anno5x;
  length function $8 imgpath $100;
  xsys='3'; ysys='3'; when='a';
  x=0; y=0; function='move'; output;
  x=100; y=100; function='image'; style='fit';
  imgpath="Z:\Documents\transparent_venn2b.png"; output;
run;

data my_anno6x;
  length function $8 imgpath $100;
  xsys='3'; ysys='3'; when='a';
  x=0; y=0; function='move'; output;
  x=100; y=100; function='image'; style='fit';
  imgpath="Z:\Documents\transparent_venn2b.png"; output;
run;

options reset=all device=PNG xpixels=800 ypixels=600 nodisplay;
goptions reset=all device=GIF;
goptions xpixels=800 ypixels=600;
goptions cback=white gunit=pct;
goptions noborder;

/* Set up the appropriate GOPTIONS */
/*goptions reset=all device=gif;
goptions xpixels=1700 ypixels=1700;
goptions cback=white gunit=pct;
goptions noborder;*/

/* Set the options for GIF animation */
options nodate nonumber /*orientation=landscape*/ /*papersize=("11in" "8.5in")*/ /*;*/
/*options*/ /* dev=sasprtc printerpath=gif */ animduration=.4 animloop=/*0*/ /*1
*/ 0
    animoverlay=no animate=start center;

run;
/* output to disk. */
ods _all_ close;

ods html gpath='Z:\Documents\' (url=None)
      file="Z:\Documents\cum.html"
      style=htmlblue;

/* Use multiple PROC GSLIDE steps to read the PNG graphs */
/* on disk into SAS */
goptions gsfmode=replace; /* For the first graph, gsfmode=replace */

```

```
proc gslide anno=my_anno1x des=''; run; quit;
goptions gsfmode=append; /* For the rest of the images */
proc gslide anno=my_anno2x des=''; run; quit;
proc gslide anno=my_anno3x des=''; run; quit;
proc gslide anno=my_anno4x des=''; run; quit;
proc gslide anno=my_anno5x des=''; run; quit;
proc gslide anno=my_anno6x des=''; run; quit;

ods html close;
ods listing;
```

Community Reinvestment Act (CRA):

The CRA was enacted by Congress in 1977 (12 U.S.C. 2901). It is implemented by Regulations 12 CFR parts 25, 228, 345, and 195. (See the Regulation at <https://www.ffiec.gov/cra/regulation.htm>). The site below has the reporting criteria by year: Who Is Required to Report CRA Data? <https://www.ffiec.gov/cra/reporter.htm> Where can you get the data? <https://www.ffiec.gov/cra/>

718 financial institutions nationwide filed the 2017 CRA Small Business Loans. I focused on the State of Illinois where there were 235 institutions reporting Small Business Loans under \$1,000,000 in the 2017 CRA. The total number of observations in the State of Illinois is: 30,845. 4,137 of the 30,845 are summary level observations as reporting "LEVEL"s defined below. The other 26,708 observations are not summary level.

Report Levels:

4= Total Inside & Outside Assessment Area (AA) (across all states)
6= Total Inside AA(across all states)
8= Total Outside AA(across all states)
10= State Total
20= Total Inside AA in State
30= Total Outside AA in State
40= County Total
50= Total Inside AA in County
60= Total Outside AA in County Right justified with leading zeros
or blank if not a total

Number of Records	Number of Loans	Loan Amount \$ (000)	
26,708	237,488	10,997,898	NOT SUMMARY LEVEL
4,137	693,226	30,943,180	SUMMARY LEVEL
30,845	930,714	41,941,078	TOTAL

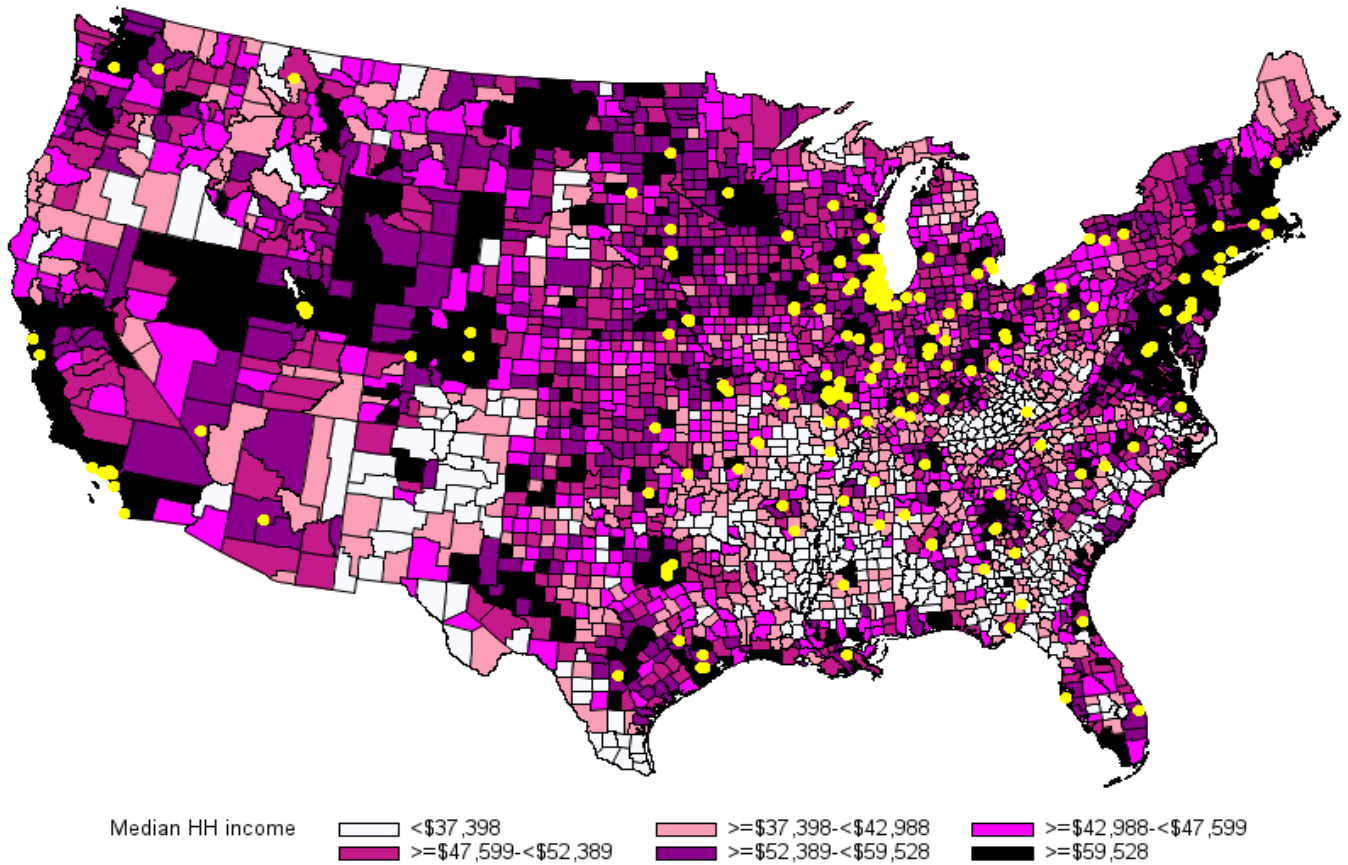
The 2017 CRA reports 227,869 Small Business loans for a total amount of \$9,972,641 (in thousands of dollars) by 235 institutions. 188 of the 235 lent to Small Business with Gross Annual Revenues <= to \$1Million. 47 of the 235 institutions did not lend to Small Businesses with Gross Annual Revenues Less Than or equal to \$1 Million dollars.

2017 CRA Small Business Loans <=\$1,000,000: State of Illinois

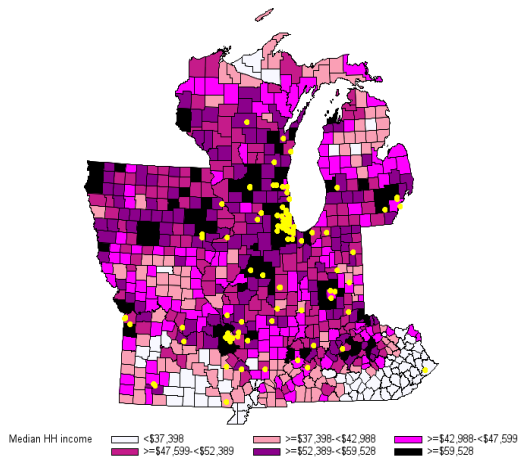
N=Number of Loans; A= Loan Amount at Origination (\$000); N=N1+N2+N3; A=A1+A2+A3

# of Insti- tutions	Total		<=\$1,000,000		>\$100,000 & <=\$250,000		>\$250,000 & <=\$1,000,000		Small Businesses With Gross Annual Revenues <= \$1 million		Loans Originated Reported as Affiliate Loans	
	# of Loans	Amount (\$000)	# of Loans	Amount (\$000)	# of Loans	Amount (\$000)	# of Loans	Amount (\$000)	# of Loans	Amount (\$000)	# of Loans	Amount (\$000)
	N	A	N1	A1	N2	A2	N3	A3	N4	A4	N5	A5
235	227869	9972641	208841	2809911	8815	1542380	10213	5620350	114652	3158100	114	25750
188	221491	9844504	202667	2753925	8707	1523857	10117	5566722	114652	3158100	97	24911
47	6378	128137	6174	55986	108	18523	96	53628	0	0	17	839

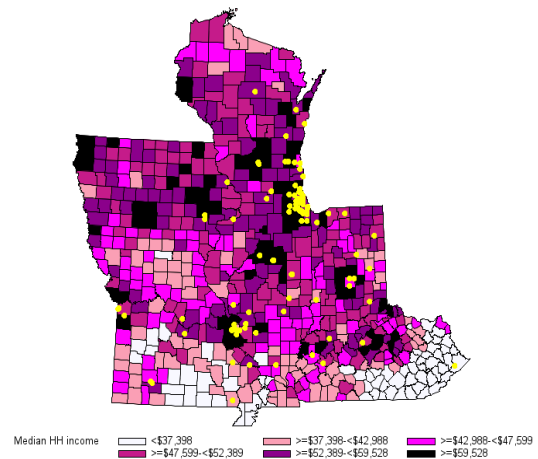
Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
 B19013 2013-2017 ACS 5-Year Estimates: Median Household Income, Sources: www.census.gov; www.ffiec.gov



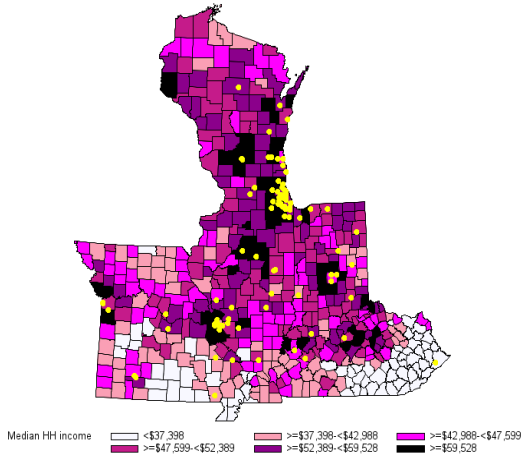
Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
 B19013 2013-2017 ACS 5-Year Estimates: Median Household Income, Sources: www.census.gov; www.ffiec.gov



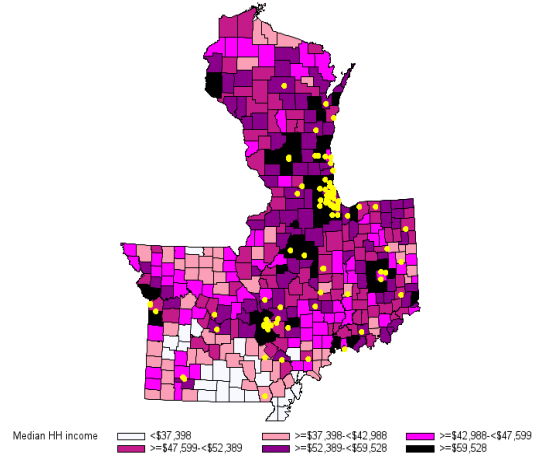
Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
 B19013 2013-2017 ACS 5-Year Estimates: Median Household Income, Sources: www.census.gov; www.ffiec.gov



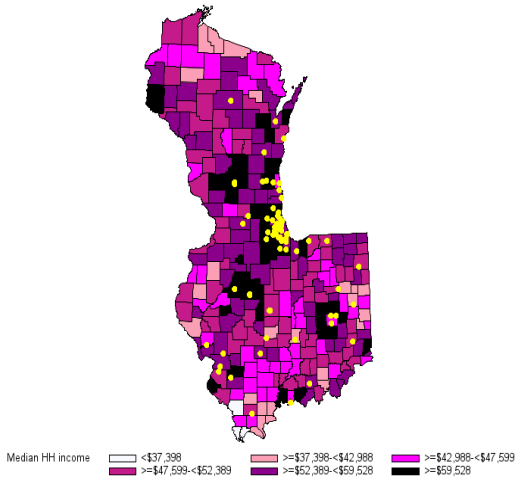
Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
B19013 2013-2017 ACS 5-Year Estimates: Median Household Income, Sources: www.census.gov; www.ffiec.gov



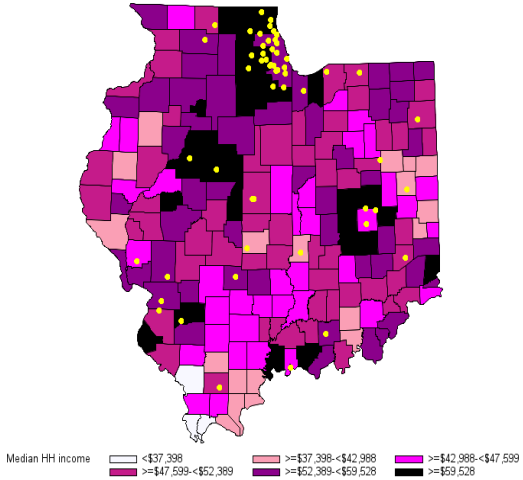
Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
B19013 2013-2017 ACS 5-Year Estimates: Median Household Income, Sources: www.census.gov; www.ffiec.gov



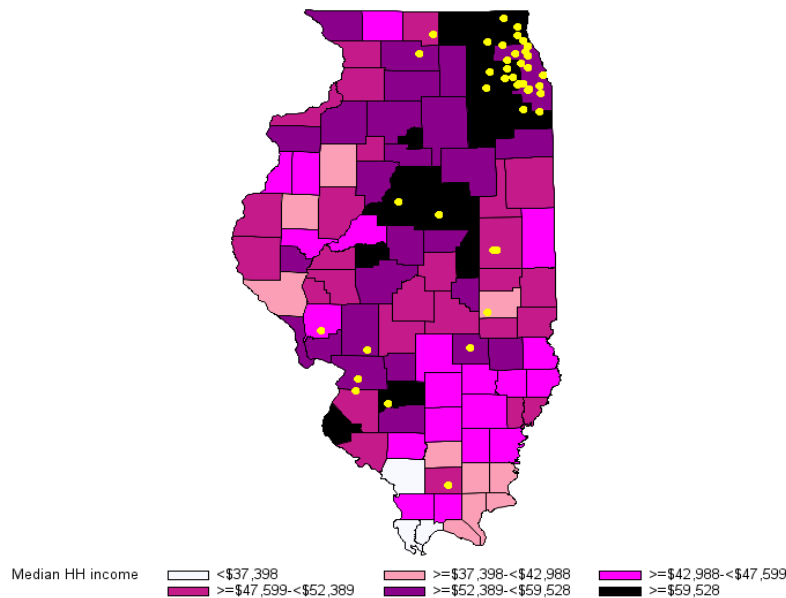
Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
B19013 2013-2017 ACS 5-Year Estimates: Median Household Income, Sources: www.census.gov; www.ffiec.gov



Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
B19013 2013-2017 ACS 5-Year Estimates: Median Household Income, Sources: www.census.gov; www.ffiec.gov



Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
B19013 2013-2017 ACS 5-Year Estimates: Median Household Income, Sources: www.census.gov; www.ffiec.gov



SAS CODE TEMPLATE TO GENERATE CRA PNGs BY ACS 5-YEAR ESTIMATES: Median Household Income: data sources: www.census.gov and www.ffiec.gov

```
goptions reset=all border cback=white htitle=12pt htext=10pt;
PROC FORMAT;

VALUE pct 1= '<$37,398'
          2= '>= $37,398-<$42,988'
          3= '>= $42,988-<$47,599'
          4= '>= $47,599-<$52,389'
          5= '>= $52,389-<$59,528'
          6= '>= $59,528';

run;

data hello;
input @10 st $2.0 @12 ct $3.0 @30 MHHINC;
cards;
05000000US01001          55317
05000000US01003          52562
...
05000000US72151          15586
05000000US72153          14451
;
proc sort data=hello out=sorte; by MHHINC;
title1 "Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans";
title2 "in the State of Illinois: B19013 2013-2017 ACS 5-Year Estimates: Median Household Income";
title3 "Data Sources: www.census.gov; www.ffiec.gov M.D.Pohl SESUG 2020";

data hi; set hello;
STATE=(ST*10)/10; COUNTY=(CT*10)/10;
IF MHHINC LT 37398 THEN PERCENT=1;
IF MHHINC GE 37398 AND MHHINC Lt 42988 THEN PERCENT=2;
IF MHHINC GE 42988 AND MHHINC Lt 47599 THEN PERCENT=3;
IF MHHINC GE 47599 AND MHHINC Lt 52389 THEN PERCENT=4;
IF MHHINC GE 52389 AND MHHINC Lt 59528 THEN PERCENT=5;
IF MHHINC GE 59528 THEN PERCENT=6;

PATTERN1 V=S C= ghostwhite;
PATTERN2 V=S C= CXfa9fb5;
PATTERN3 V=S C= magenta;
PATTERN4 V=S C= CXc51b8a;
PATTERN5 V=S C= CX8B008B;
PATTERN6 V=S C= BLACK;

data myzip;
input zip;
datalines;
94105
43240
... etc.

15219
94111
;
run;

proc sort data=myzip; by zip; run;
data longlat; merge work.myzip(in=mine) sashelp.zipcode(rename=(x=long y=lat));
by zip;
if mine;
x=atan(1)/45*long;
y=atan(1)/45*lat;
x=-x;
keep zip x y state county; run;
data anno;
set longlat;
retain xsys ysys '2' function 'label' size 2.0 flag 1 when 'a';
style='special';
text='J';
```

```

color='yellow';
output;
run;

data all;
  set maps.counties(where=(state not in(15,72))) anno;
run;

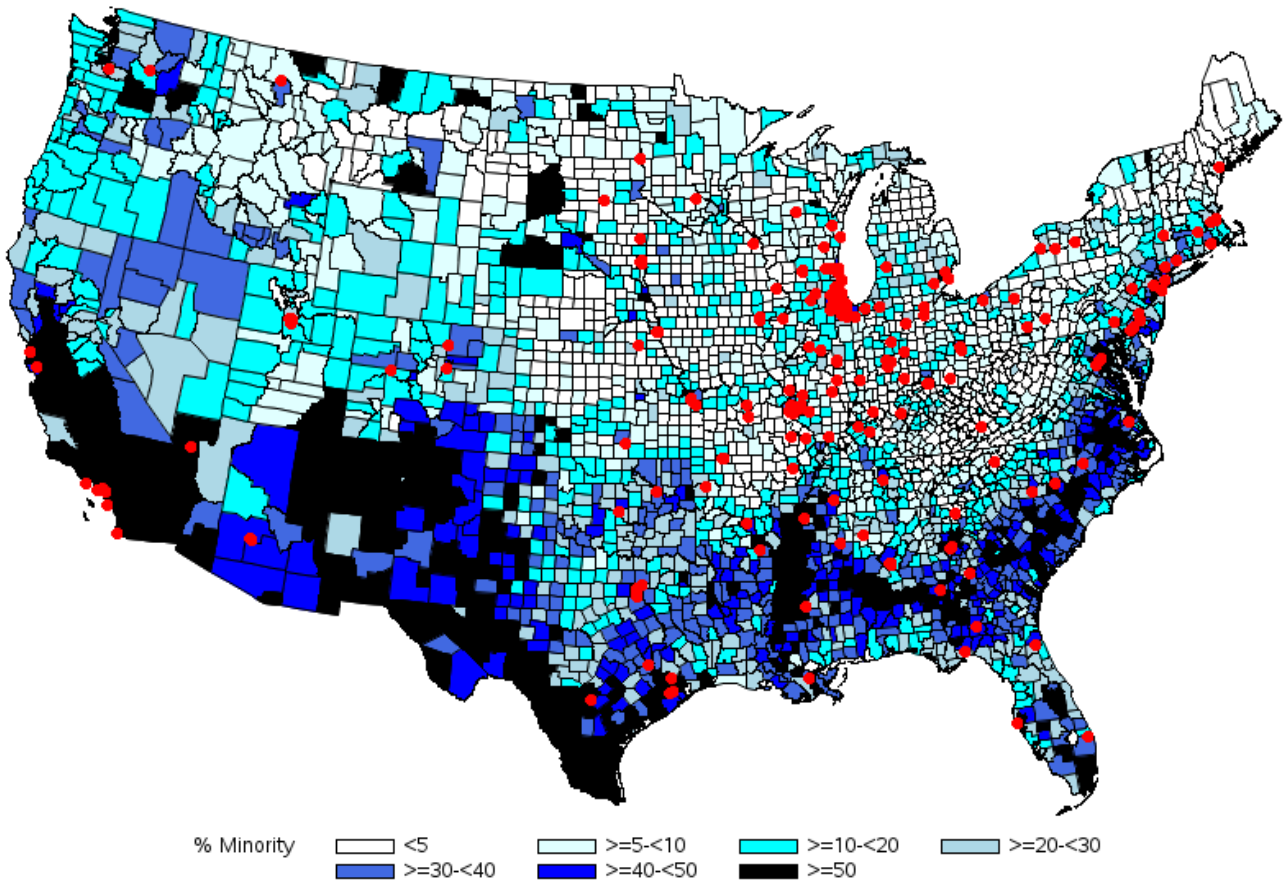
PROC GPROJECT DATA=all OUT=allp dupok; where STATE in /* NOT IN (15,02,72)*/ (17) ;
ID STATE COUNTY;
RUN;

data newmap annozips;
  set allp;
  if when='a' then output annozips;
  else output newmap;
run;

PROC GMAP DATA=HI MAP=NEWMAP ALL;
ID STATE COUNTY;
CHORO PERCENT / DISCRETE anno=annozips;
FORMAT PERCENT pct.;
LABEL PERCENT='Median HH income';
run; quit;

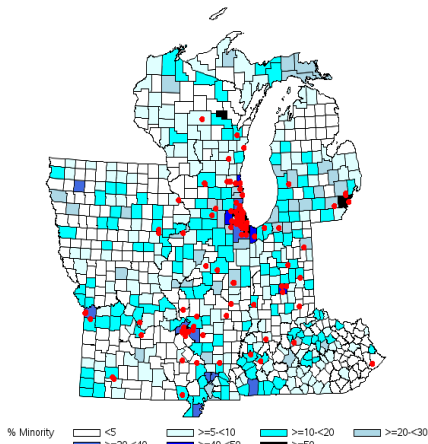
```

Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
2010 Census SF 1: %MINORITY (Total minus White, Not Hispanic) by County
Sources: www.census.gov; www.ffiec.gov M.D.Pohl SESUG 2020

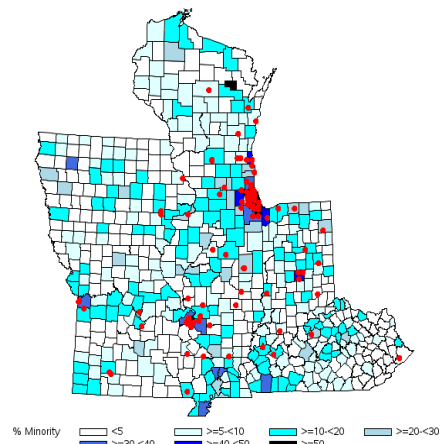


⁶ Minority is Total minus White, Not Hispanic; %Minority = (Minority/Total)*100. www.census.gov 2010 Census FS 1.

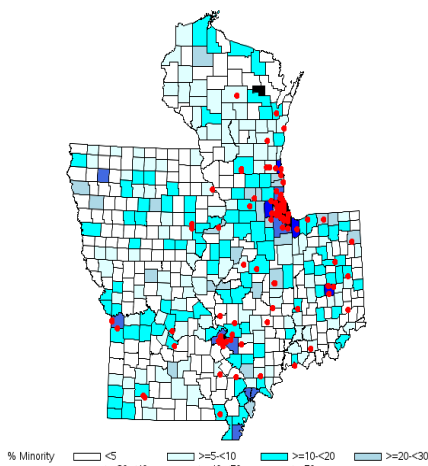
Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
 2010 Census SF 1: %MINORITY (Total minus White, Not Hispanic) by County
 Sources: www.census.gov; www.ffiec.gov M.D.Pohl SESUG 2020



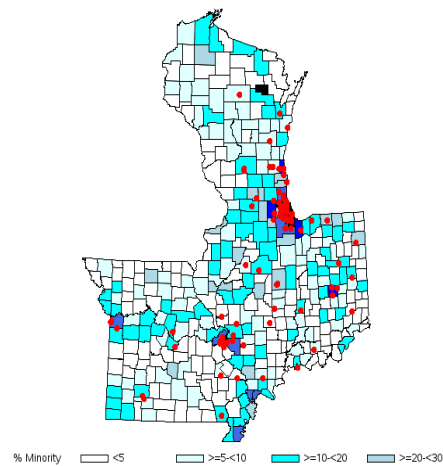
Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
 2010 Census SF 1: %MINORITY (Total minus White, Not Hispanic) by County
 Sources: www.census.gov; www.ffiec.gov M.D.Pohl SESUG 2020



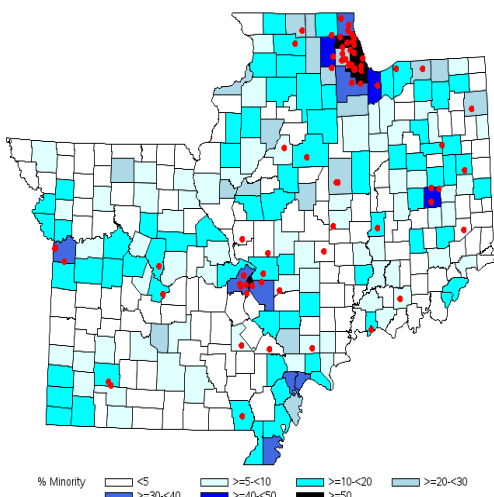
Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
 2010 Census SF 1: %MINORITY (Total minus White, Not Hispanic) by County
 Sources: www.census.gov; www.ffiec.gov M.D.Pohl SESUG 2020



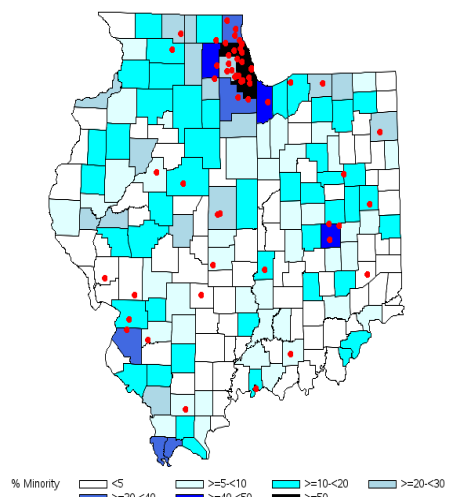
Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
 2010 Census SF 1: %MINORITY (Total minus White, Not Hispanic) by County
 Sources: www.census.gov; www.ffiec.gov M.D.Pohl SESUG 2020



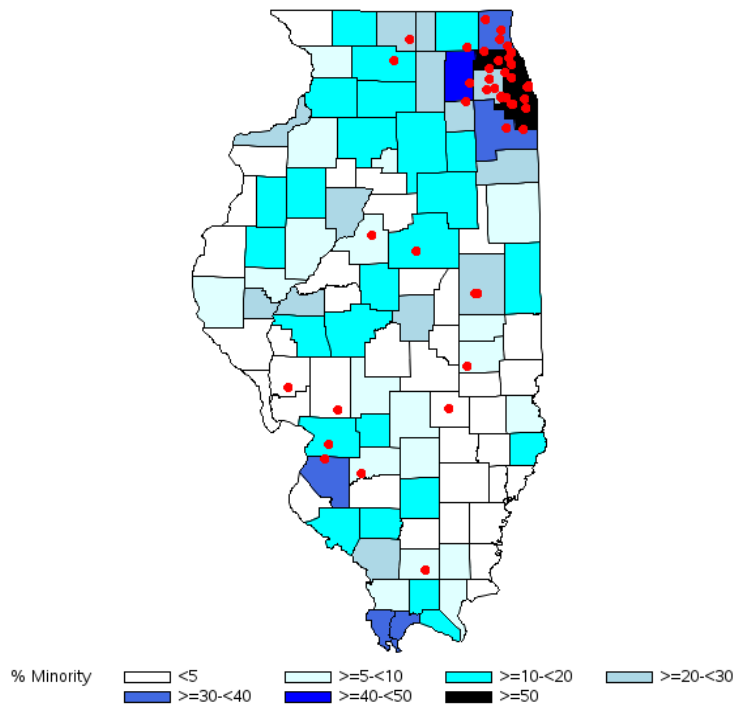
Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
 2010 Census SF 1: %MINORITY (Total minus White, Not Hispanic) by County
 Sources: www.census.gov; www.ffiec.gov M.D.Pohl SESUG 2020



Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
 2010 Census SF 1: %MINORITY (Total minus White, Not Hispanic) by County
 Sources: www.census.gov; www.ffiec.gov M.D.Pohl SESUG 2020



Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois
2010 Census SF 1: %MINORITY (Total minus White, Not Hispanic) by County
Sources: www.census.gov; www.ffiec.gov M.D.Pohl SESUG 2020



SAS CODE TEMPLATE TO GENERATE CRA PNGs BY 2010 Census SF 1: % MINORITY (Total minus White, Not Hispanic): data sources: www.census.gov and www.ffiec.gov

```
OPTIONS NODATE ORIENTATION=LANDSCAPE NONUMBER;
```

```
goptions reset=all border cback=white htitle=12pt htext=10pt;
```

```
PROC FORMAT;
VALUE pct 1= ' <5 '
          2= '>=5-<10'
          3= '>=10-<20'
          4= '>=20-<30'
          5= '>=30-<40'
          6= '>=40-<50'
          7= '>=50 ' ;    run;
```

```
data hello;
```

```
input @10 st $2.0 @12 ct $3.0    wp    bp    hp /*minp */  pct  bhp;
cards;
05000000US01001    77.2    17.6    2.4    22.8    20.0
05000000US01003    83.5    9.3    4.4    16.5    13.7
05000000US01005    46.8    46.7    5.1    53.2    51.7
05000000US01007    75.0    21.9    1.8    25.0    23.7
05000000US01009    88.9    1.3    8.1    11.1    9.3
05000000US01011    21.9    70.0    7.1    78.1    77.1
```

```
ETC ....
```

```
05000000US72145    0.6    0.1    99.3    99.4    99.3
05000000US72147    4.8    0.6    94.3    95.2    95.0
05000000US72149    0.3    0.0    99.7    99.7    99.7
05000000US72151    0.4    0.1    99.3    99.6    99.5
05000000US72153    0.4    0.0    99.5    99.6    99.5
;
```

title1 "Office Locations of 235 Institutions Reporting 2017 CRA Small Business Loans in the State of Illinois";
 title2 "2010 Census SF 1: %MINORITY (Total minus White, Not Hispanic) by County";
 title3 "Sources: www.census.gov; www.ffiec.gov M.D.Pohl SESUG 2020";

```
data hi; set hello;
STATE=(ST*10)/10; COUNTY=(CT*10)/10;
IF pct Lt 5 THEN PERCENT=1;
IF pct GE 5 AND pct Lt 10 THEN PERCENT=2;
IF pct GE 10 AND pct Lt 20 THEN PERCENT=3;
IF pct GE 20 AND pct Lt 30 THEN PERCENT=4;
IF pct GE 30 AND pct Lt 40 THEN PERCENT=5;
IF pct GE 40 AND pct Lt 50 THEN PERCENT=6;
IF pct GE 50 THEN PERCENT=7;
```

```
PATTERN1 V=S C= white;
PATTERN2 V=S C= lightcyan;
PATTERN3 V=S C= cyan;
PATTERN4 V=S C= lightblue;
PATTERN5 V=S C= royalblue;
PATTERN6 V=S C= blue;
PATTERN7 V=S C= black;
```

```
data myzip;
input zip;
datalines;
94105
43240
```

ETC

```
31210
90017
35209
15219
94111
```

```
;
```

```
run;
proc sort data=myzip; by zip; run;
data longlat; merge work.myzip(in=mine) sashelp.zipcode(rename=(x=long y=lat));
by zip;
if mine;
x=atan(1)/45*long;
y=atan(1)/45*lat;
x=-x;
keep zip x y state county; run;
data anno;
set longlat;
retain xsys ysys '2' function 'label' size 2.0 flag 1 when 'a';
style='special';
text='J';
color='red';
output;
run;
```

```
data all;
set maps.counties(where=(state not in(2 15 72))) anno;
run;
```

```
PROC GPROJECT DATA=all OUT=allp dupok; where STATE /*in*/ NOT IN (2,15,72) /* (17,18) */
;
ID STATE COUNTY;
RUN;
```

```
data newmap annozips;
set allp;
if when='a' then output annozips;
else output newmap;
run;
```

```
PROC GMAP DATA=HI MAP=NEWMAP ALL;
ID STATE COUNTY;
```

```
CHORO PERCENT / DISCRETE anno=annozip;
FORMAT PERCENT pct.;
LABEL PERCENT='% Minority';
run; quit;
```

The Home Mortgage Disclosure Act (HMDA):

HMDA was enacted by Congress in 1975 and was implemented by the Federal Reserve Board's Regulation C. On July 21, 2011, the rule-writing authority of Regulation C was transferred to the Consumer Financial Protection Bureau (CFPB). This regulation provides the public loan data and applies to certain financial institutions, including banks, savings associations, credit unions, and other mortgage lending institutions.

<https://www.ffiec.gov/hmda/history.htm>

HMDA data contains public loan data available from the Federal Financial Institutions Examination Council (FFIEC) at www.ffiec.gov. The latest three years (2016, 2015 and 2014) can be found for download as flat files at the following location: www.ffiec.gov/hmda/hmdaflat.htm. Earlier data for 1981 to 2013 are available through National Archives at the following site: <https://www.archives.gov/research/catalog>.

Who Must Report HMDA: "There are three categories of loans that must be reported: home purchase, home improvement, and refinancing. Every loan application, origination, and purchase that falls into one or more of the three categories must be reported. With some exceptions, for each transaction the lender reports data about:

- the loan, such as its type and amount;
- the property, such as its location and type;
- the disposition of the application, such as whether it was denied or resulted in an origination; and
- the applicant (namely, ethnicity, race, sex, and income).

That information must be recorded on a form known as the HMDA loan/application register (variously known as the HMDA-LAR, the LAR, or the register)."

<https://www.ffiec.gov/hmda/pdf/2013guide.pdf>

The Total HMDA LARS (Loan Application Register System) by Action Taken: 2004 to 2016.

HMDA YEAR	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
	TOTAL	LOAN	APPROVED			CLOSED		==PREAPPROVAL==	APPROVED
	LARS	ORIGI	BUT NOT			FOR		PURCHASED	BUT NOT
		NATED	ACCEPTED	DENIED	WITH- DRAWN	INCOMP- LETENESS	BY INSTI- TUTION	DENIED	ACCEPTED
2016	16332987	8377907	436074	2683178	1748355	680288	2231990	115484	59711
2015	14374184	7404258	404755	2274913	1475218	535339	2102036	114318	63347
2014	11875464	5979766	418739	2042477	1108367	383909	1752016	125786	64404
2013	17016159	8706657	740856	2649931	1345371	544355	2794414	162963	71612
2012	18691551	9783966	710706	2761964	1529647	524369	3167577	148733	64589
2011	14873415	7095262	636467	2354846	1225751	430484	2944662	130894	55049
2010	16348557	7863337	650594	2556789	1448330	435825	3229010	112881	51791
2009	14138136	6990047	673750	2233153	1354645	330394	2433659	76755	45733
2008	17391570	7177262	1105492	3944602	1552895	413690	2921821	176544	99264
2007	26605695	10441545	1945380	5952530	2331997	719921	4781414	235434	197474
2006	34105441	13970183	2404581	6575779	3562933	944531	6236238	222064	189132
2005	36439157	15621943	2366037	6693251	4292509	1194284	5874447	231190	165496
2004	33607736	15028550	2387464	6035717	3612831	1064503	5146617	165186	166868
TOTAL	271800052	124440683	14880895	48759130	26588849	8201892	45615901	2018232	1294470

Data Source: www.ffiec.gov (a = b+c+d+e+f+g+h+i)

2004 to 2016 HMDA: HMDA LARs Originations by Loan Type and by Purpose

				(c)	(d)	(e)	(f)	(g)	(h)	(i)
PURPOSE=		=ORIGINATIONS BY								
	(a)	(b)	==ORIGINATIONS: BY LOAN TYPE==			HOME				
HMDA	TOTAL	TOTAL	CONVEN-	FHA	VA	FSA/	HOME	IMPROVE-		
YEAR	LARS	ORIGINATIONS	TIONAL			RHS	PURCHASE	MENT		
REFINANCE										
2016	16332987	8377907	6131444	1322426	806140	117897	4064585	541589	3771733	
2015	14374184	7404258	5441153	1232830	612641	117634	3679900	478559	3245799	
2014	11875464	5979766	4561433	789958	492610	135765	3250147	412532	2317087	
2013	17016159	8706657	6922128	1107275	538609	138645	3126385	428829	5151443	
2012	18691551	9783966	7764449	1305118	581746	132653	2741602	383729	6658635	
2011	14873415	7095262	5523501	1074237	383323	114201	2424934	342145	4328183	
2010	16348557	7863337	6020648	1437916	316272	88501	2548478	342526	4972333	
2009	14138136	6990047	5116543	1506939	278460	88105	2206219	299962	4483866	
2008	17391570	7177262	5662283	1269237	188101	57641	3130160	571294	3475808	
2007	26605695	10441545	9811278	474285	126923	29059	4669762	961839	4809944	
2006	34105441	13970183	13426098	394485	129647	19953	6745824	1141843	6082516	
2005	36439157	15621943	15015271	436585	149608	20479	7404202	1096286	7121455	
2004	33607736	15028550	14132381	652287	221608	22274	6452860	969479	7606211	
TOTAL	271800052	124440683	105528610	13003578	4825688	1082807	52445058	7970612	64025013	

[(b)=c+d+e+f]; [(b)=g+h+i]

Action Taken:

- 1 -- Loan originated
- 2 -- Application approved but not accepted
- 3 -- Application denied by financial institution
- 4 -- Application withdrawn by applicant
- 5 -- File closed for incompleteness
- 6 -- Loan purchased by the institution
- 7 -- Preapproval request denied by financial institution
- 8 -- Preapproval request approved but not accepted (optional reporting)

Loan Type:

- 1 -- Conventional (any loan other than FHA, VA, FSA, or RHS loans)
- 2 -- FHA-insured (Federal Housing Administration)
- 3 -- VA-guaranteed (Veterans Administration)
- 4 -- FSA/RHS (Farm Service Agency or Rural Housing Service)

Loan Purpose:

- 1 -- Home purchase
- 2 -- Home improvement
- 3 -- Refinancing

Property Type:

- 1 -- One to four-family (other than manufactured housing)
- 2 -- Manufactured housing
- 3 -- Multifamily

2004 to 2016 Originations: 1-4 Family Originations: Home Purchase + Refinance: CONVENTIONAL+FHA+VA

HMDA YEAR	TOTAL (a)	=====CONVENTIONAL=====		=====FHA+VA=====		=====CONV+FHA+VA=====		=====LOAN TYPE=====		=====PERCENTAGES=====	
		TOTAL (b)	HOME PURCHASE (c)	RE- FINANCE (d)	TOTAL (e)	HOME PURCH (f)	REFINANCE (g)	PUR- CHASE (h)	RE- FINANCE (i)	(e) / (a) (j)	(d) / (b) (k)
2016	7555097	5496277	2610870	2885407	2058820	1229269	829551	3840139	3714958	27.2507	52.4975
2015	6652206	4860408	2344521	2515887	1791798	1116661	675137	3461182	3191024	26.9354	51.7629
2014	5291583	4048711	2156480	1892231	1242872	868860	374012	3025340	2266243	23.4877	46.7366
2013	7979848	6372150	2043002	4329148	1607698	865279	742419	2908281	5071567	20.1470	67.9386
2012	9121419	7271986	1632146	5639840	1849433	907695	941738	2539841	6581578	20.2757	77.5557
2011	6513019	5097734	1341790	3755944	1415285	902897	512388	2244687	4268332	21.7301	73.6787
2010	7304796	5589779	1321039	4268740	1715017	1065758	649259	2386797	4917999	23.4780	76.3669
2009	6470962	4728773	1097162	3631611	1742189	957971	784218	2055133	4415829	26.9232	76.7982
2008	6338953	4943957	2063409	2880548	1394996	891980	503016	2955389	3383564	22.0067	58.2640
2007	9194790	8648056	4121734	4526322	546734	366300	180434	4488034	4706756	5.9461	52.3392
2006	12538334	12062819	6191714	5871105	475515	364958	110557	6556672	5981662	3.7925	48.6711
2005	14229116	13682487	6822420	6860067	546629	393135	153494	7215555	7013561	3.8416	50.1376
2004	13750555	12913418	5728508	7184910	837137	532239	304898	6260747	7489808	6.0880	55.6391
TOTAL	112940678	95716555	39474795	56241760	17224123	10463002	6761121	49937797	63002881	15.2506	58.7587

Please note: (a)=b+e; (b)=c+d; (e)=f+g; (h)=c+f; (i)=d+g; (j)=(e/a)*100; (k)=(d/b)*100.

Please note: 1-4 Family Originations: Home Purchase + Refinance: CONVENTIONAL+FHA+VA

Excludes: Multifamily, Manufactured Housing; Home Improvement; and FSA+RHS (Farm Service Agency or Rural Housing Service).

SAS CODE TO READ IN HMDA FILE:

```

OPTIONS NODATE CHARCODE;
LIBNAME HMDA 'F:\';
DATA HMDA2016;
INFILE 'F:\2016HMDALAR -National.CSV'DLM=',' DSD TRUNCOVER;
INPUT YEAR : 4. RESID : $10.0 ACODE : $1.0 LTYPE : 1.0 proptyp : $1.0 PURPOSE : 1.0 OCCUP : 1.0
LAMOUNT : 5.0 preapp : $1.0 ACTION : 1.0 MSA : $5.0 STATE : $2.0 COUNTY : $3.0
TRACT : 7.0 ethnic : $1.0 coethnic : $1.0 race1 : $1.0 race2 : $1.0 race3 : $1.0
race4 : $1.0 race5 : $1.0 corace1 : $1.0 corace2 : $1.0 corace3 : $1.0 corace4 : $1.0
corace5 : $1.0 sex : 1.0 cosex : 1.0 income : $4.0 purch : $1.0 den1 : $1.0 den2 : $1.0
den3 : $1.0 spread : $5.0 hoepa :$1.0 lien : $1.0; RUN;

```

As you can see, each HMDA record has a Respondent ID and Agency Code. These two variables (in this example, RESID and ACODE) define an institution under HMDA and can be concatenated to create one variable (ID) using the following two statements:

```

OPTIONS NODATE PS=9000 CHARCODE LS=112 PS=32000;
ID=ACODE ?/?/ RESID;

```

The second statement is used in the SAS data step. Similarly, the STATE and COUNTY variable can be created using the following statement:

```

STCT=STATE ?/?/ COUNTY;

```

SAS CODE TO CREATE HMDA SAS DATA SET:

```
DATA NEW;
SET HMDA2016;
IF ACTION =1 ; /*ORIGINATIONS*/
IF PROPTYP ='1'; /*1-4 FAMILY OTHER THAN MANF HOUSING**/
IF LTYPE =4 THEN DELETE; /*EXCLUDE FSA/RHS*/
IF PURPOSE=2 THEN DELETE; /*EXCLUDE HOME IMPROVEMENT*/
IF LTYPE=1 AND PURPOSE=1 THEN TYPPURP=1; /*CONV HOME PURCHASE*/
IF LTYPE=1 AND PURPOSE=3 THEN TYPPURP=2; /*CONV REFINANCE*/
IF (LTYPE=2 OR LTYPE=3) AND PURPOSE=1 THEN TYPPURP=3; /*FHAVA HOME PURCHASE*/
IF (LTYPE=2 OR LTYPE=3) AND PURPOSE=3 THEN TYPPURP=4; /*FHAVA REFINANCE*/
PROC FREQ DATA=NEW; TABLES TYPPURP / MISSING; RUN;
/****1-4 FAMILY (OTHER THAN MANUFACTURED HOUSING****/

/*** Action Taken:
1 --Loan originated
2 --Application approved but not accepted
3 --Application denied by financial institution
4 --Application withdrawn by applicant
5 --File closed for incompleteness
6 --Loan purchased by the institution
7 --Preapproval request denied by financial institution
8 --Preapproval request approved but not accepted (optional reporting) */
```

SAS CODE TO CREATE HMDA PNGs: (e.g., %Refinance):

```
OPTIONS NODATE ORIENTATION=LANDSCAPE NONUMBER;
goptions reset=all border cback=white htitle=12pt htext=10pt;
PROC FORMAT;
VALUE REFI 1= ' <50 '
            2= '>=50-<60'
            3= '>=60-<70'
            4= '>=70-<80'
            5= '>=80-<90'
            6= ' >=90 ' ;

data hello;
input stct $ typ1 typ2 typ3 typ4 tot;
cards;
1001      367      366      395      318      1446
1003      3047     1955      1213     725      6940
1005      44       83       43       38       208
... etc.
;
title1 "2016 HMDA Conventional 1-4 Family: Home Purchase+Refinance: %Refinance";
title2 "Source: www.ffiec.gov      M.D.Pohl SESUG2020";
data hi; set hello;
ct=(stct/1000);
ct1=(stct/10)*10;
ct2=round(ct);
ct3=ct2*1000;
if ct ne . then state=round(ct);
if ct eq . then state=.;
if ct eq . then county=.;
if ct ne . then county=ct1-ct3;

CONV=typ1+typ2;
*FHAVA=TYP3+TYP4;;
IF CT NE . THEN refip=(typ2/CONV)*100;
IF CT EQ . THEN refip=.;
drop ct ct1 ct2 ct3;
DATA HEHE; SET HI;
IF refip LT 50 THEN REFI=1;
IF refip GE 50 AND refip LT 60 THEN REFI=2;
IF refip GE 60 AND refip LT 70 THEN REFI=3;
IF refip GE 70 AND refip LT 80 THEN REFI=4;
IF refip GE 80 AND refip LT 90 THEN REFI=5;
IF refip GT 90 THEN REFI=6;
```

```
PATTERN1 V=S C= /*CXB2309E;*/ /*CXFFFF00*/ ghostwhite /*YELLOW*/;  
PATTERN2 V=S C= /*CXFFFAA00;*/ /*CXfa9fb5*/ /*ORANGE*/ YELLOW;  
PATTERN3 V=S C= /*CX00BFFF;*/ /*CXf768a1*/ /*magenta*/ /*RED*/ ORANGE;  
PATTERN4 V=S C= /*CXB2309E;*/ /*CXFF0000;*/ /*CXc51b8a*/ /*CX99293D*/ RED /*purple*/;  
PATTERN5 V=S C= /*CXFFA500*/ /*CX8B0000;*/ /*CX7a0177*/ /*CX8B008B*/ MAROON;  
PATTERN6 V=S C= /*CXFFA500*/ /*CX8B0000;*/ BLACK;
```

```
PROC GPROJECT DATA=MAPS.COUNTIES OUT=NEWMAP;  
WHERE STATE NOT IN (2,15,72);  
ID STATE COUNTY;  
RUN;  
PROC GMAP DATA=HEHE MAP=NEWMAP ALL;  
ID STATE COUNTY;  
CHORO REFI / DISCRETE;  
FORMAT REFI REFI.;  
LABEL REFI='%REFINANCE';
```

```
*proc print data=hi; run;  
*PROC MEANS DATA=HI; *VAR FHAVAP CONV FHAVA TOT;  
  
quit;
```

HOME MORTGAGE DISCLOSURE ACT (HMDA) DATA: TOTAL LARS FROM 2004 TO 2016 BY ACTION TAKEN

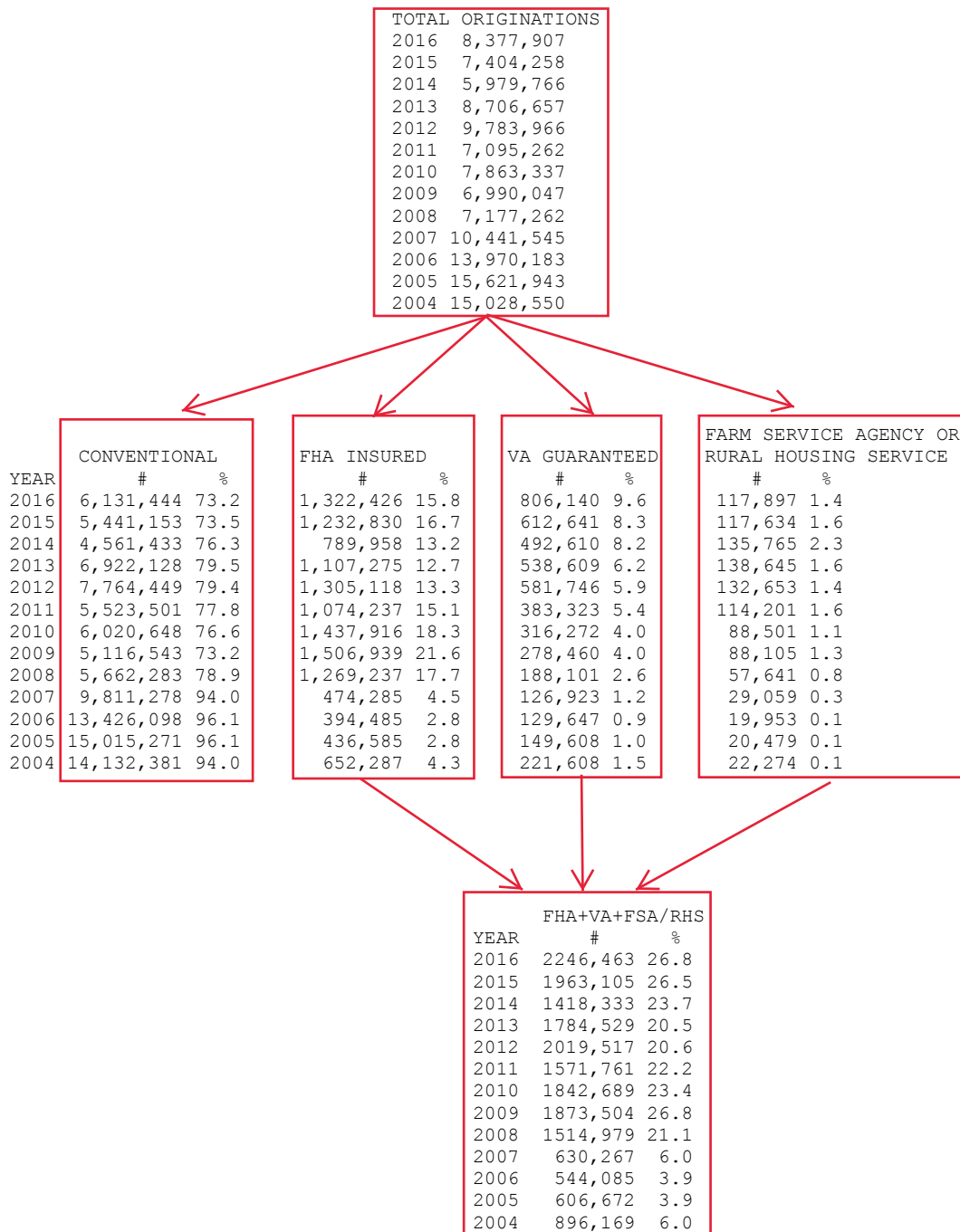
TOTAL LARS		
2016	16,332,987	
2015	14,374,184	
2014	11,875,464	
2013	17,016,159	
2012	18,691,551	
2011	14,873,415	
2010	16,348,557	
2009	14,138,136	
2008	17,391,570	
2007	26,605,695	
2006	34,105,441	
2005	36,439,157	
2004	33,607,736	

HMDA YEAR	ORIGINATED			APPROVED BUT NOT ACCEPTED			DENIED			WITHDRAWN			CLOSED FOR INCOMPLETENESS			LOAN PURCHASED			PREAPPROVAL REQUEST DENIED			PREAPPROVAL REQUEST APPROVED BUT NOT ACCEPTED		
	#	%		#	%		#	%		#	%		#	%		#	%		#	%		#	%	
2016	8,377,907	51.3		436,074	2.7		2,683,178	16.4		1,748,355	10.7		680,288	4.2		2,231,990	13.7		115,484	0.7		59,711	0.4	
2015	7,404,258	51.5		404,755	2.8		2,274,913	15.8		1,475,218	10.3		535,339	3.7		2,102,036	14.6		114,318	0.8		63,347	0.4	
2014	5,979,766	50.4		418,739	3.5		2,042,477	17.2		1,108,367	9.3		383,909	3.2		1,752,016	14.8		125,786	1.1		64,404	0.5	
2013	8,706,657	51.2		740,856	4.4		2,649,931	15.6		1,345,371	7.9		544,355	3.2		2,794,414	16.4		162,963	1.0		71,612	0.4	
2012	9,783,966	52.3		710,706	3.8		2,761,964	14.8		1,529,647	8.2		524,369	2.8		3,167,577	16.9		148,733	0.8		64,589	0.3	
2011	7,095,262	47.7		636,467	4.3		2,354,846	15.8		1,225,751	8.2		430,484	2.9		2,944,662	19.8		130,894	0.9		55,049	0.4	
2010	7,863,337	48.1		650,594	4.0		2,556,789	15.6		1,448,330	8.9		435,825	2.7		3,229,010	19.8		112,881	0.7		51,791	0.3	
2009	6,990,047	49.4		673,750	4.8		2,233,153	15.8		1,354,645	9.6		330,394	2.3		2,433,659	17.2		76,755	0.5		45,733	0.3	
2008	7,177,262	41.3		1,105,492	6.4		3,944,602	22.7		1,552,895	8.9		413,690	2.4		2,921,821	16.8		176,544	1.0		99,264	0.6	
2007	10,441,545	39.2		1,945,380	7.3		5,952,530	22.4		2,331,997	8.8		719,921	2.7		4,781,414	18.0		235,434	0.9		197,474	0.7	
2006	13,970,183	41.0		2,404,581	7.1		6,575,779	19.3		3,562,933	10.4		944,531	2.8		6,236,238	18.3		222,064	0.7		189,132	0.6	
2005	15,621,943	42.9		2,366,037	6.5		6,693,251	18.4		4,292,509	11.8		1,194,284	3.3		5,874,447	16.1		231,190	0.6		165,496	0.5	
2004	15,028,550	44.7		2,387,464	7.1		6,035,717	18.0		3,612,831	10.7		1,064,503	3.2		5,146,617	15.3		165,186	0.5		166,868	0.5	

Action Taken:

- 1 -- Loan originated
- 2 -- Application approved but not accepted
- 3 -- Application denied by financial institution
- 4 -- Application withdrawn by applicant
- 5 -- File closed for incompleteness
- 6 -- Loan purchased by the institution
- 7 -- Preapproval request denied by financial institution
- 8 -- Preapproval request approved but not accepted (optional reporting)

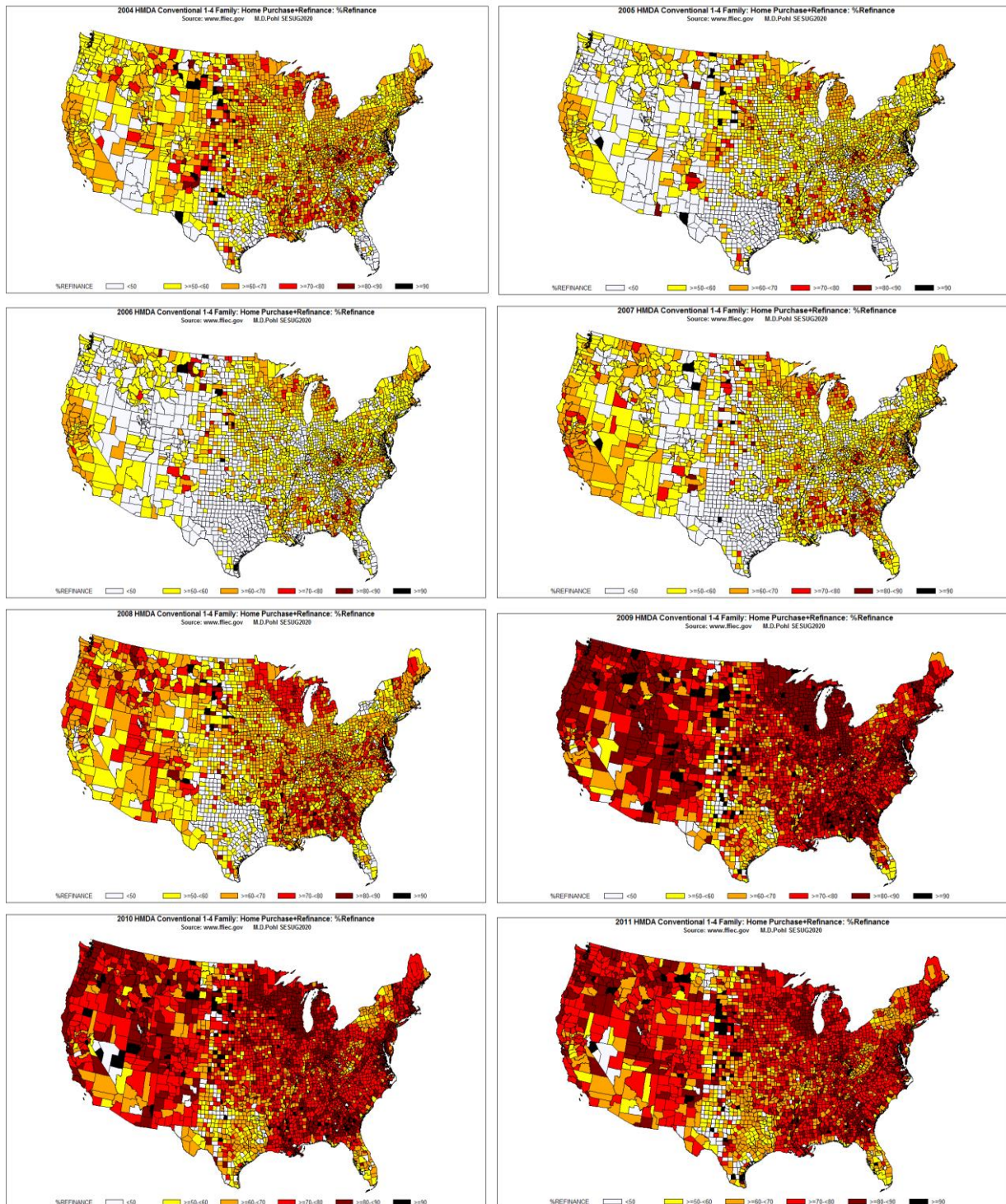
HOME MORTGAGE DISCLOSURE ACT (HMDA) DATA: TOTAL ORIGINATIONS FROM 2004 TO 2016 BY LOAN TYPE

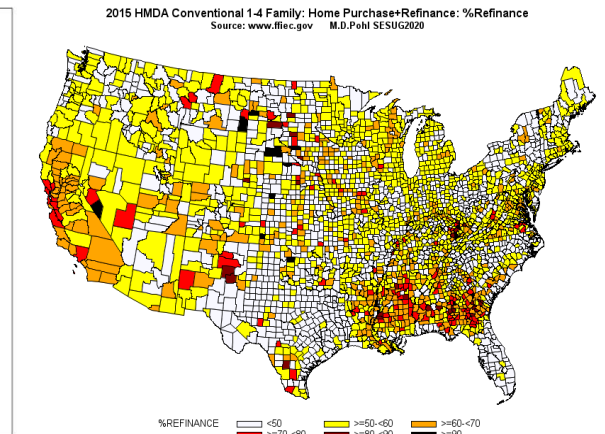
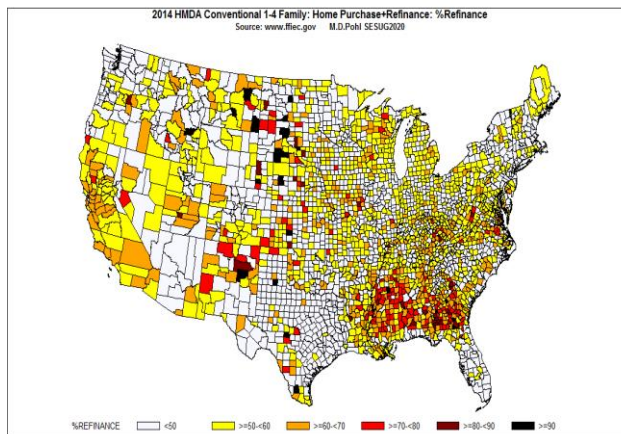
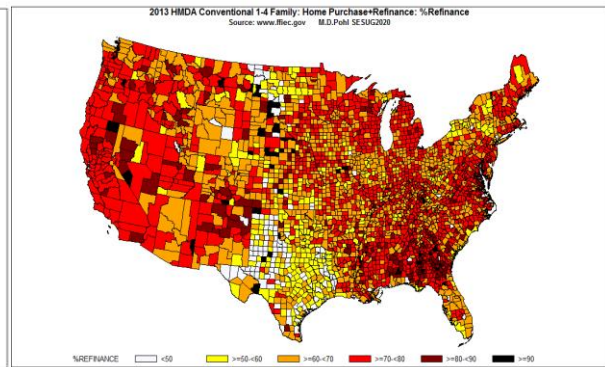
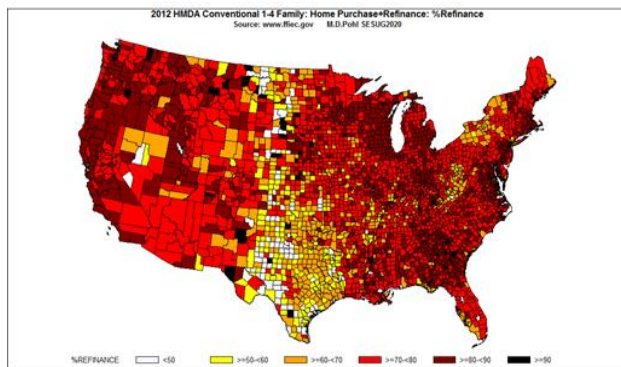


Loan Type:

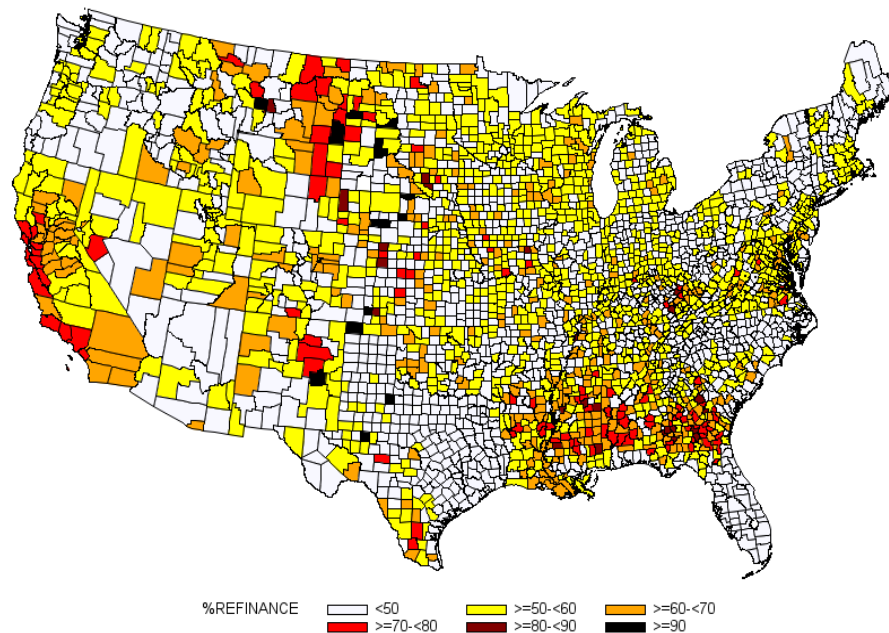
- 1 -- Conventional (any loan other than FHA,VA,FSA,or RHS loans)
- 2 -- FHA-insured (Federal Housing Administration)
- 3 -- VA-guaranteed (Veterans Administration)
- 4 -- FSA/RHS (Farm Service Agency or Rural Housing Service)

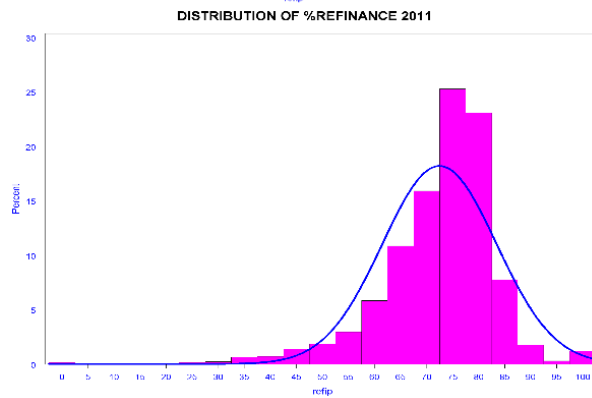
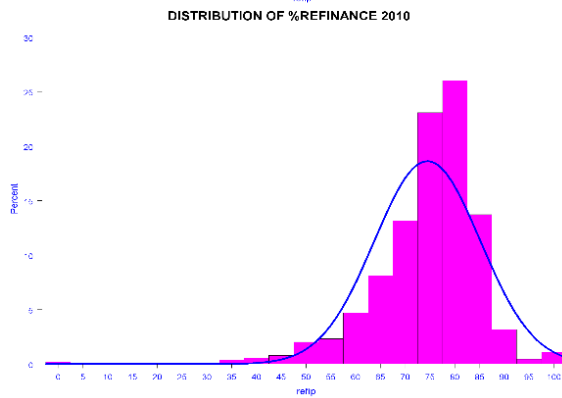
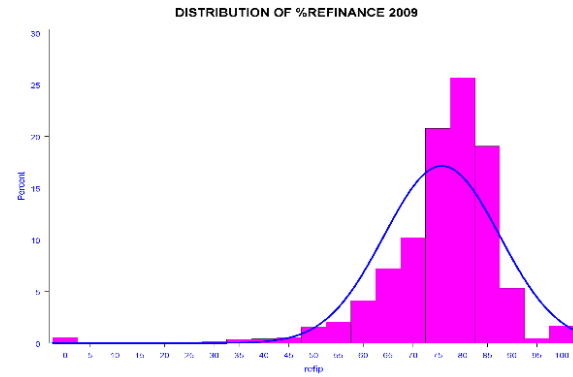
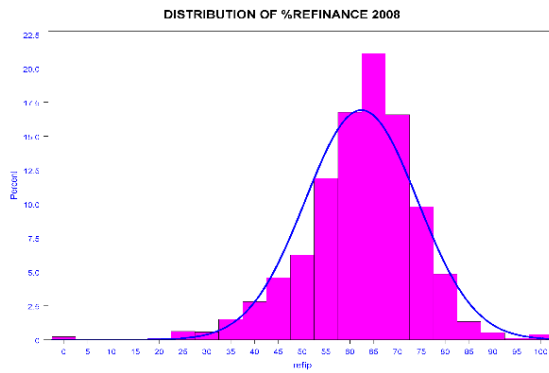
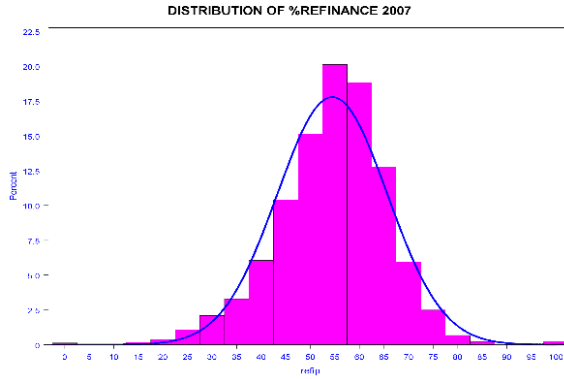
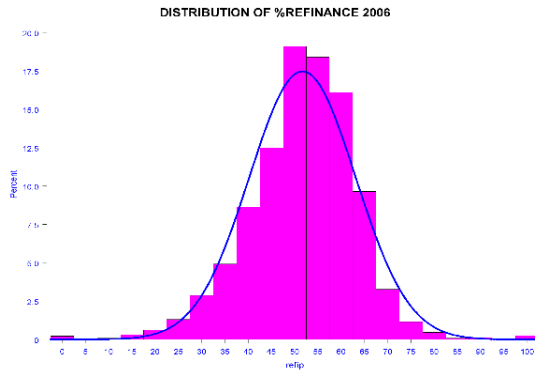
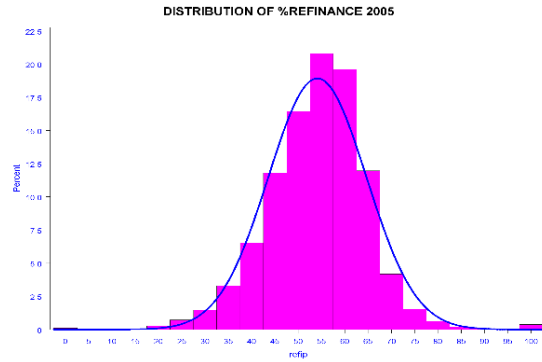
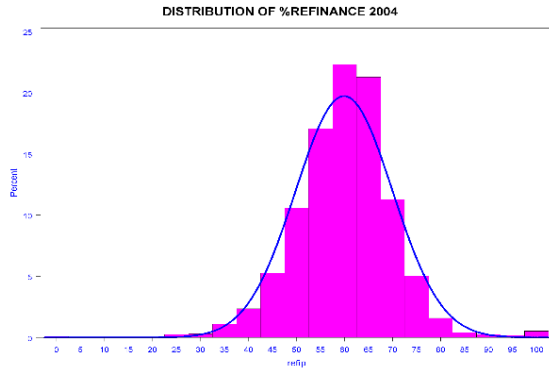
2004 to 2006 HMDA Conventional 1-4 Family Home Purchase & Refinance: % Refinance

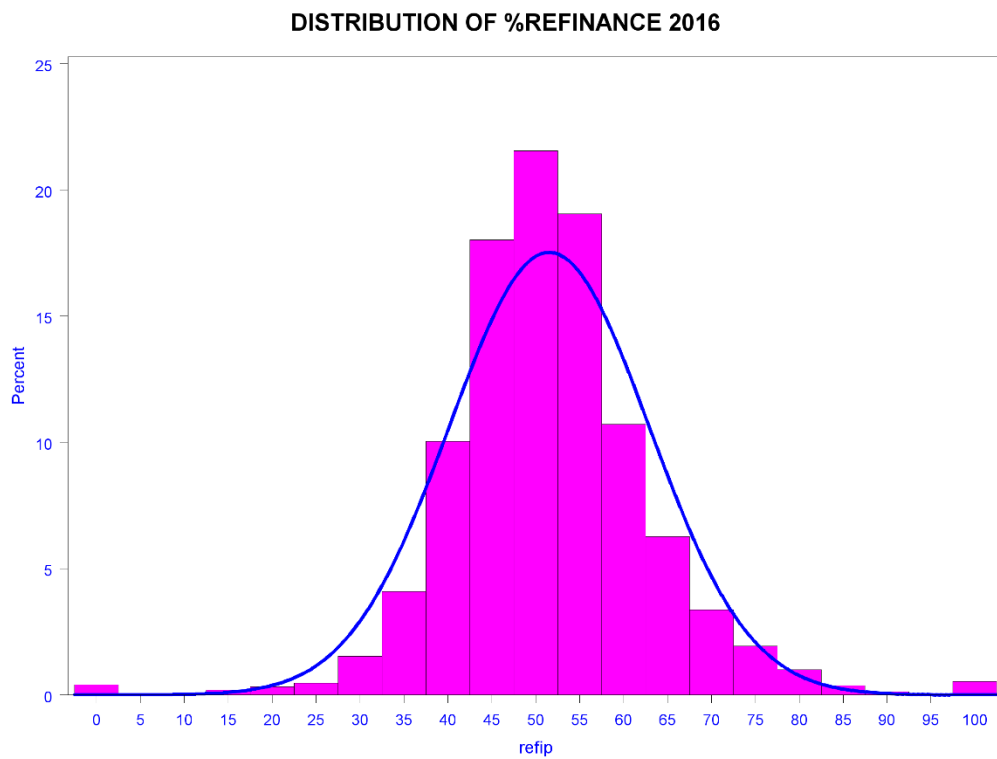
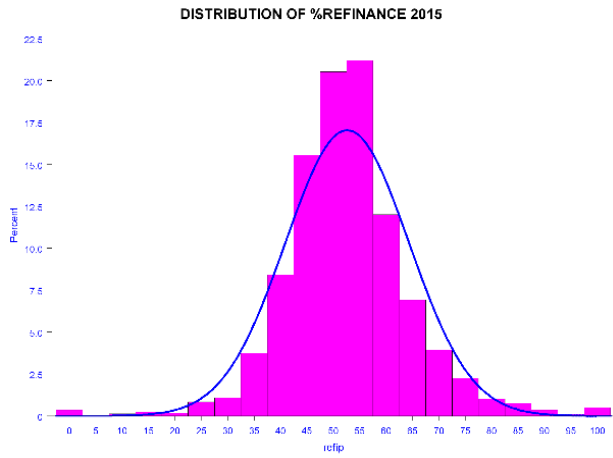
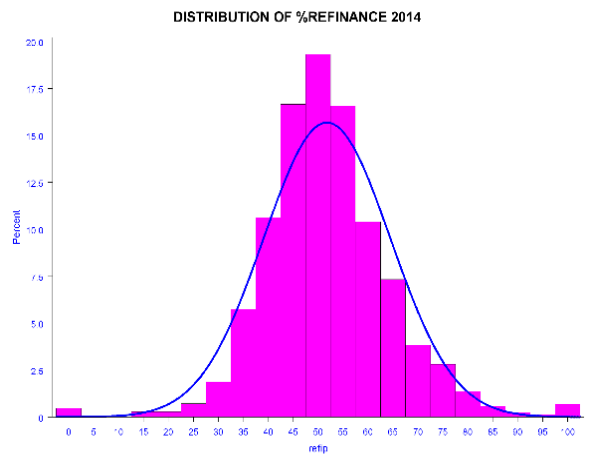
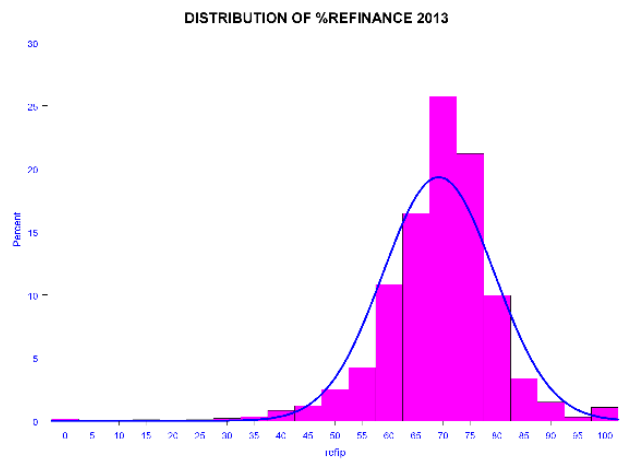
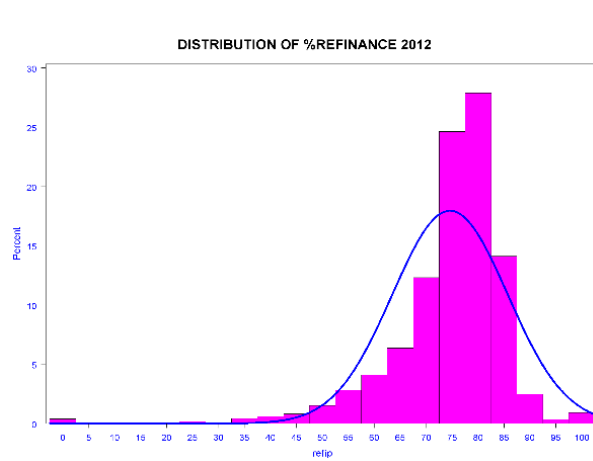




2016 HMDA Conventional 1-4 Family: Home Purchase+Refinance: %Refinance
Source: www.ffiec.gov M.D.Pohl SESUG2020







DISTRIBUTION OF %REFINANCE:

YEAR	100% Max	99%	95%	90%	75% Q3	50% Median	25% Q1	10%	5%	1%	0% Min
2004	100.0000	86.6667	75.0000	71.2230	65.8985	60.1729	54.1619	47.7477	43.3333	34.1463	0.0000
2005	100.0000	80.0000	69.5082	65.7824	60.7083	54.7544	47.7762	40.9060	36.5140	26.6667	0.0000
2006	100.0000	77.3196	67.7419	64.5202	59.2358	52.4083	45.0652	37.2662	32.0996	21.0843	0.0000
2007	100.0000	78.5714	70.9055	67.3522	61.7678	55.2801	48.1319	40.0000	34.4262	25.0000	0.0000
2008	100.0000	87.2340	79.0506	75.7353	69.8997	63.5135	56.2500	47.1698	40.9046	27.7778	0.0000
2009	100.0000	100.0000	88.6978	86.4865	82.8996	77.9221	71.4869	62.5000	56.0712	33.3333	0.0000
2010	100.0000	100.0000	87.1294	84.7222	81.0157	76.4493	70.0000	61.5385	55.5556	40.6250	0.0000
2011	100.0000	100.0000	85.2860	82.8405	79.3121	74.4361	67.7419	59.4431	52.0000	35.0000	0.0000
2012	100.0000	95.4545	86.4629	84.5938	81.2690	76.7606	70.9548	61.2903	54.5455	35.2941	0.0000
2013	100.0000	100.0000	83.3333	79.8561	75.0480	70.0787	64.2437	57.7778	52.1429	38.4615	0.0000
2014	100.0000	87.8788	74.0260	67.1875	58.4507	50.8475	44.2609	37.7049	33.9457	20.0000	0.0000
2015	100.0000	86.6667	72.2222	66.6667	58.3333	52.1958	46.0359	40.0000	35.5856	23.3333	0.0000
2016	100.0000	83.3333	71.1854	65.1515	57.1937	51.0138	44.8740	39.2157	35.4167	24.1935	0.0000

EXAMPLE OF SAS CODE TO GENERATE PROBABILITY DISTRIBUTIONS:

```
OPTIONS NODATE ORIENTATION=LANDSCAPE NONUMBER;
goptions reset=all /*border*/ cback=white htitle= 12 pt htext= 10 pt;
PROC FORMAT
VALUE FHA
1 = ' <10
2 = ' >=10 --<
3 = ' >=20 --<30'
4 = ' >=30 --<
5 = ' >=40 --<
6 = ' >=50 '
data
hello;
input stct $ typ1 typ2 typ3 typ4 tot;
cards;
1001 171 577 310 271 1329
1003 1341 2458 625 37
6 4800
....
56NA 1 5 5 2 13
72NA 0 2 0 13 15
NANA 8515 17166 3730 3624 33035
;
*Total 1321039 4268740 1065758 649259 7304796;
*proc print data=hello;
*sum typ1 typ2 typ3 typ4 tot;
*run;
data hi; set hello;
```

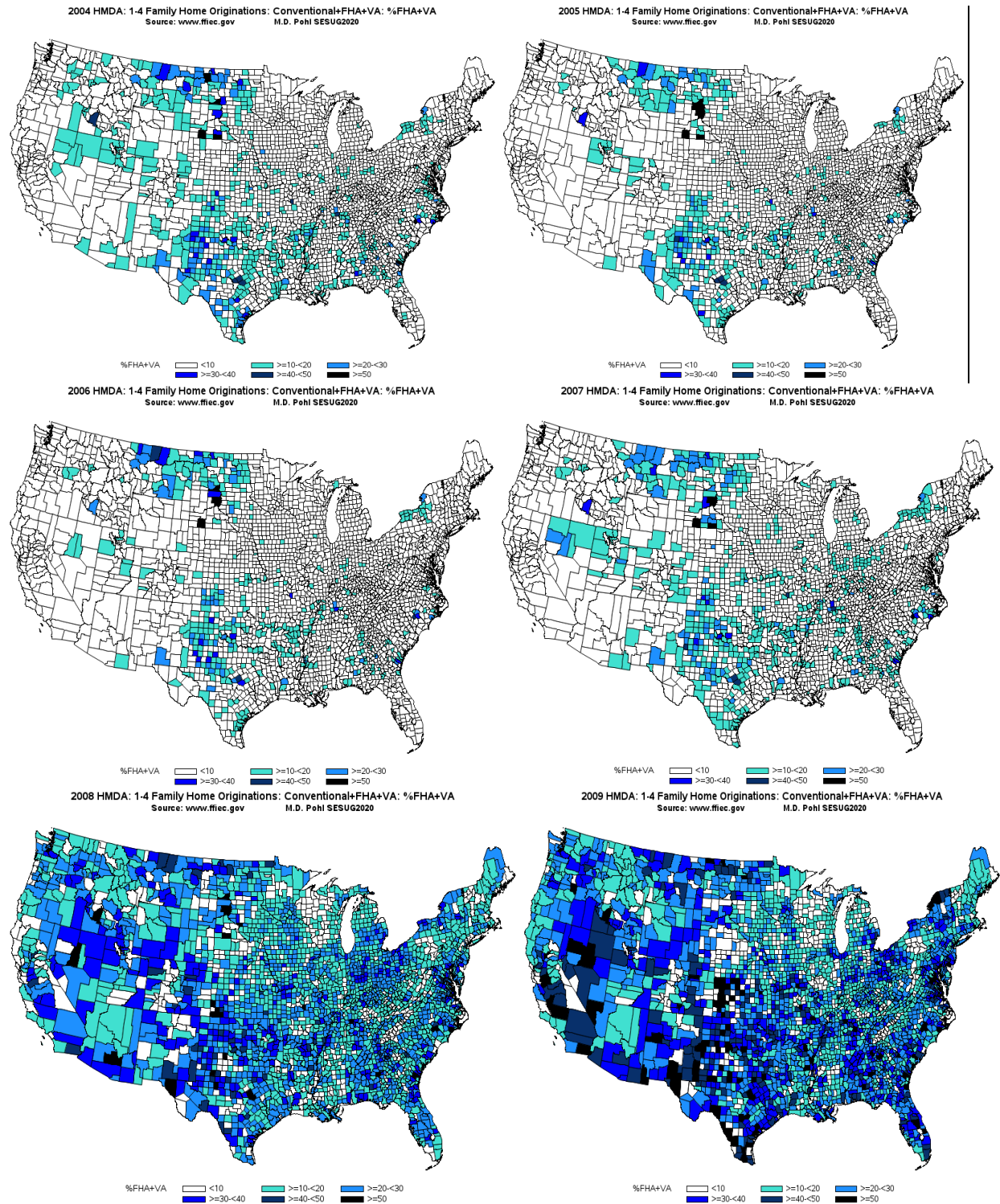
```

ct=(stct/1000); ct1=(stct/10)*10; ct2=round(ct)
ct); ct3=ct2*
if ct ne . then state=round(ct);
if ct eq . then state=.; if ct eq . then county=.;
if ct ne . then county=ct1
ct3;
CONV =typ1+typ2; FHAVA=TYP3+TYP4;
CONV =typ1+typ2; FHAVA=TYP3+TYP4;
IF CT NE . THEN FHAVAP=(FHAVA/(TOT))*100;
IF CT NE . THEN FHAVAP=(FHAVA/(TOT))*100;
IF CT EQ . THEN FHAVAP=.;
IF CT EQ . THEN FHAVAP=.;
drop ct ct1 ct2 ct3
drop ct ct1 ct2 ct3;;
DATA HEHE; SET HI;
DATA HEHE; SET HI;
IF FHAVAP LT 10 THEN FHA=1;
IF FHAVAP LT 10 THEN FHA=1;
IF FHAVAP GE 10 AND FHAVAP LT 20 THEN FHA=2;
IF FHAVAP GE 10 AND FHAVAP LT 20 THEN FHA=2;
IF FHAVAP GE 20 AND FHAVAP LT 30 THEN FHA=3;
IF FHAVAP GE 20 AND FHAVAP LT 30 THEN FHA=3;
IF FHAVAP GE 30 AND FHAVAP LT 40 THEN FHA=4;
IF FHAVAP GE 30 AND FHAVAP LT 40 THEN FHA=4;
IF FHAVAP GT 40 AND FHAVAP LT 50 THEN FHA=5;
IF FHAVAP GT 40 AND FHAVAP LT 50 THEN FHA=5;
IF FHAVAP
IF FHAVAP GT 50 THEN FHA=6;GT 50 THEN FHA=6;
PROC UNIVARIATE DATA=HEHE; VAR FHAVAP; RUN;
PROC UNIVARIATE DATA=HEHE; VAR FHAVAP; RUN;
PROC MEANS DATA=HI N MEAN MEDIAN STD MIN MAX RANGE; VAR FHAVAP ;
PROC MEANS DATA=HI N MEAN MEDIAN STD MIN MAX RANGE; VAR FHAVAP ;
RUN; QUIT;
RUN; QUIT;
ods graphics off;
ods graphics off;
ods _ALL_ close;
ods _ALL_ close;
ods listing;
ods listing;
filename grafout "F:
filename grafout "F:\\univariate.png"; univariate.png";
goptions
goptions reset=goptions device=PNG300
gsfname=grafout gsfname=replace; reset=goptions device=PNG300 gsfname=grafout gsfname=replace;

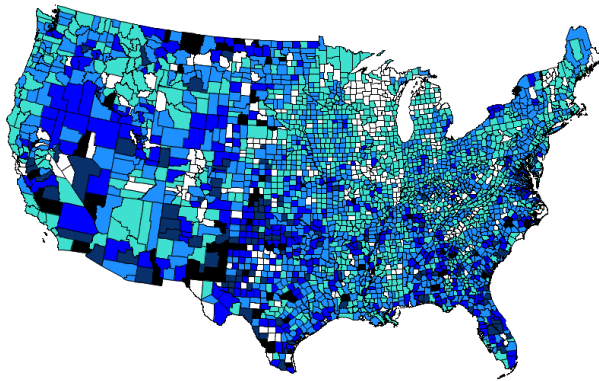
TITLE1 "DISTRIBUTION OF %FHAVA 2010";
TITLE1 "DISTRIBUTION OF %FHAVA 2010";
PROC UNIVARIATE NORMAL PLOT DATA=HEHE; VAR FHAVAP;
PROC UNIVARIATE NORMAL PLOT DATA=HEHE; VAR FHAVAP;
HISTOGRAM FHAVAP/NORMAL (COLOR=blue W=7) CFILL=red CTEXT=BLUE; RUN; QUIT;
HISTOGRAM FHAVAP/NORMAL (COLOR=blue W=7) CFILL=red CTEXT=BLUE; RUN; QUIT

```

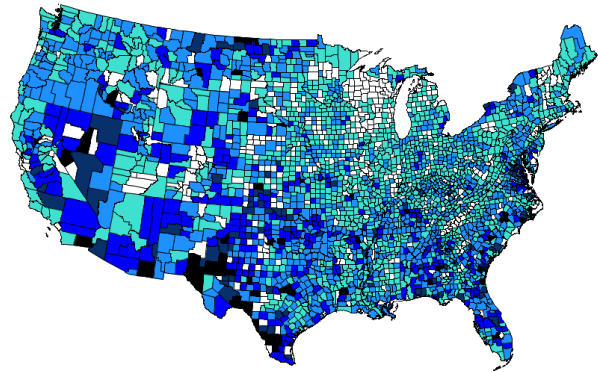
2004 to 2006 HMDA 1-4 Family Conventional+FHA+VA: %FHA+VA



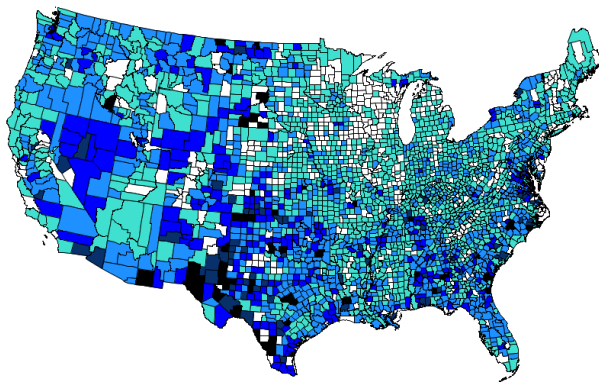
2010 HMDA: 1-4 Family Home Originations: Conventional+FHA+VA: %FHA+VA
Source: www.fiec.gov
M.D. Pohl SESUG2020



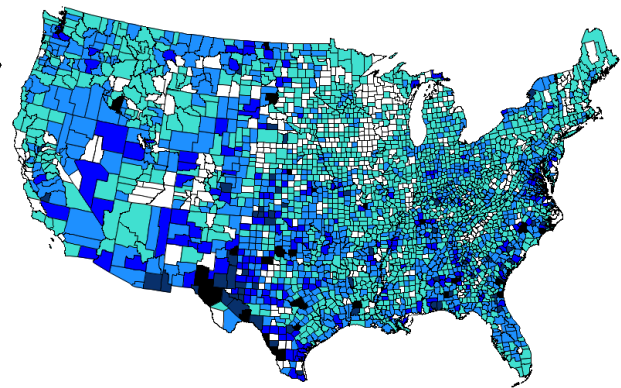
2011 HMDA: 1-4 Family Home Originations: Conventional+FHA+VA: %FHA+VA
Source: www.fiec.gov
M.D. Pohl SESUG2020



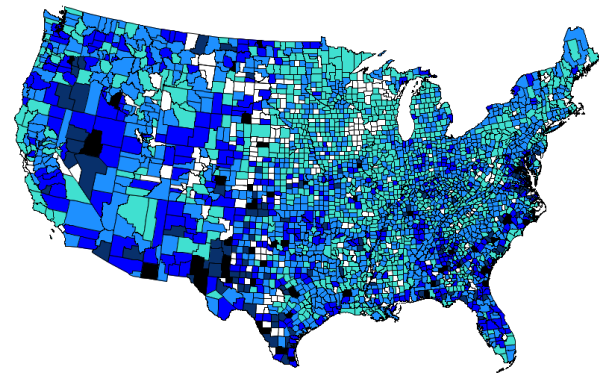
2012 HMDA: 1-4 Family Home Originations: Conventional+FHA+VA: %FHA+VA
Source: www.fiec.gov
M.D. Pohl SESUG2020



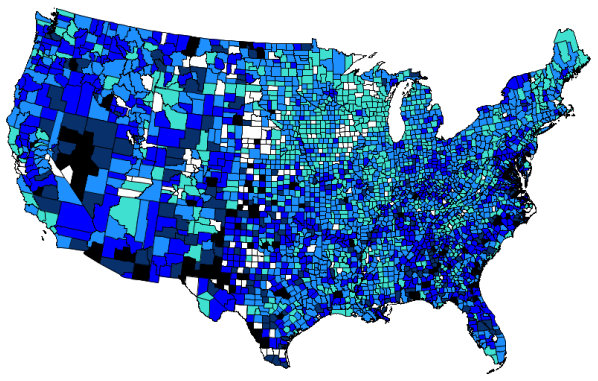
2013 HMDA: 1-4 Family Home Originations: Conventional+FHA+VA: %FHA+VA
Source: www.fiec.gov
M.D. Pohl SESUG2020



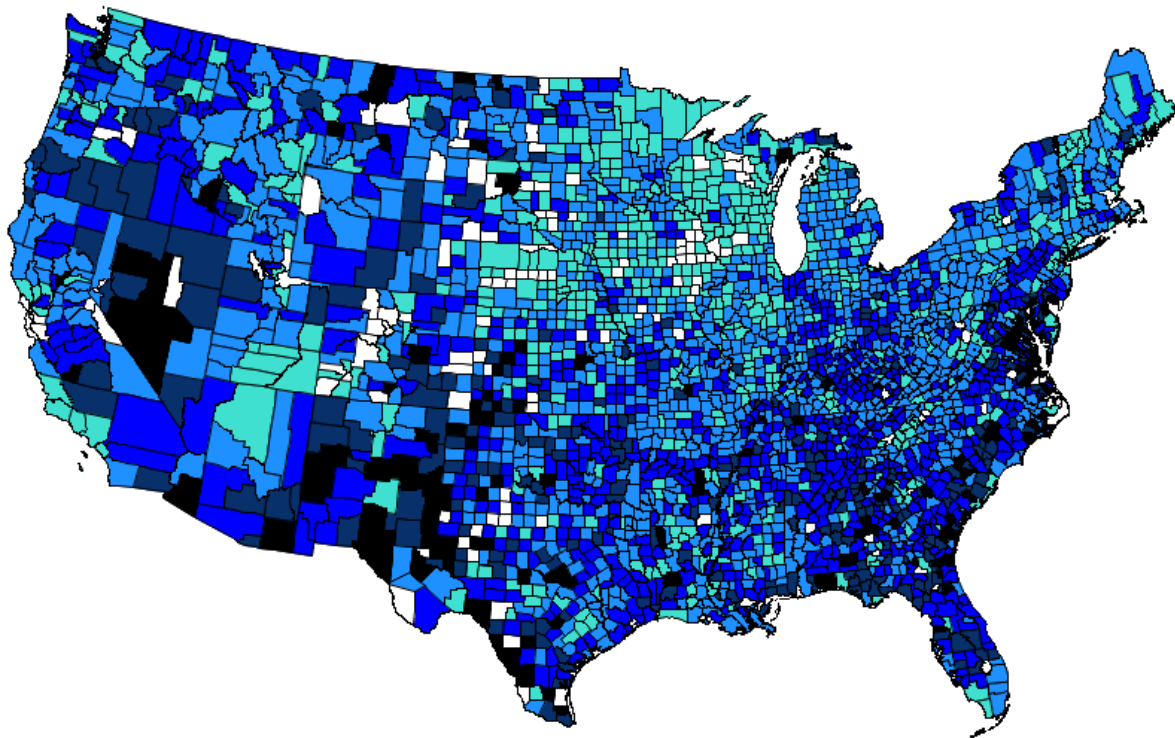
2014 HMDA: 1-4 Family Home Originations: Conventional+FHA+VA: %FHA+VA
Source: www.fiec.gov
M.D. Pohl SESUG2020



2015 HMDA: 1-4 Family Home Originations: Conventional+FHA+VA: %FHA+VA
Source: www.fiec.gov
M.D. Pohl SESUG2020



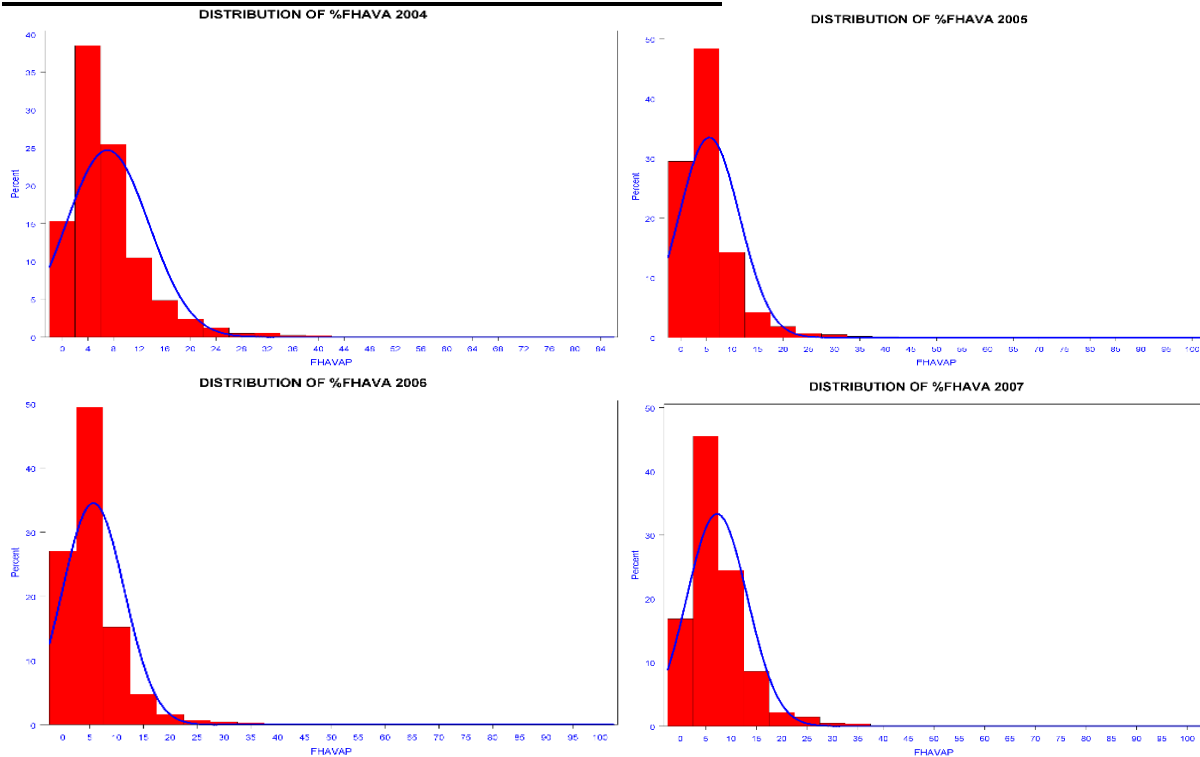
2016 HMDA: 1-4 Family Home Originations: Conventional+FHA+VA: %FHA+VA
Source: www.ffiec.gov M.D. Pohl SESUG2020



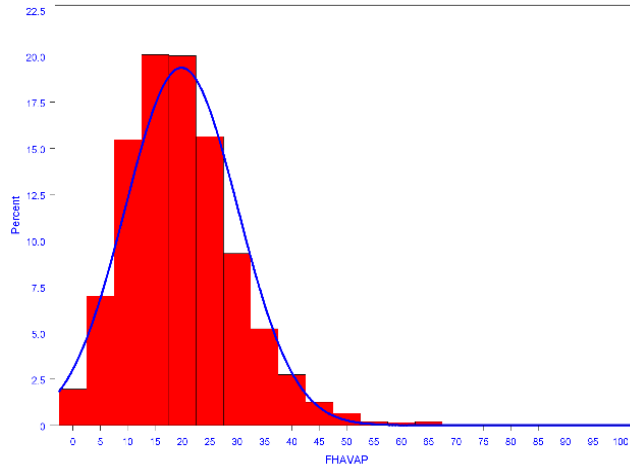
%FHA+VA

<10	>=10-<20	>=20-<30
>=30-<40	>=40-<50	>=50

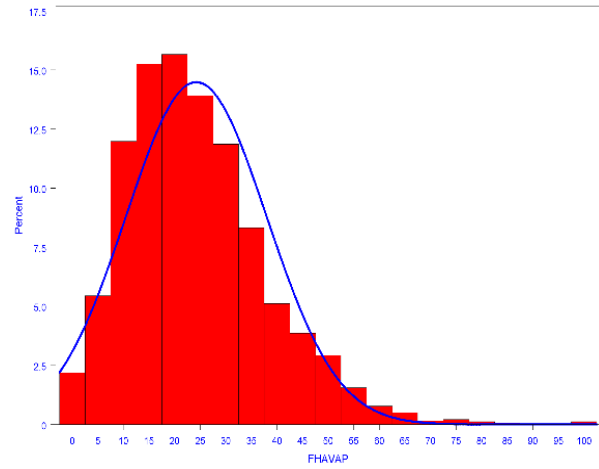
DISTRIBUTION OF %FHA+VA: 2004 TO 2016 HMDA:



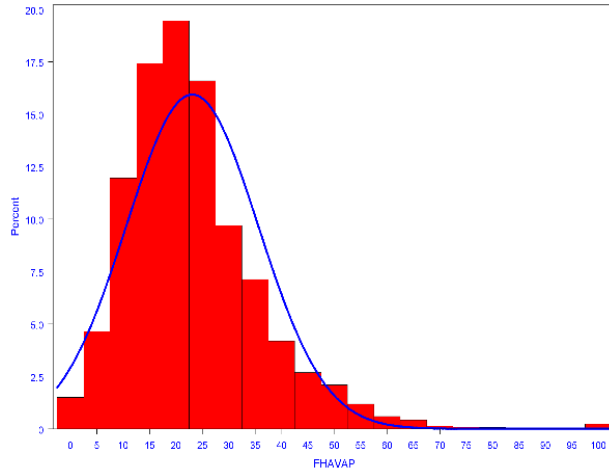
DISTRIBUTION OF %FHAVA 2008



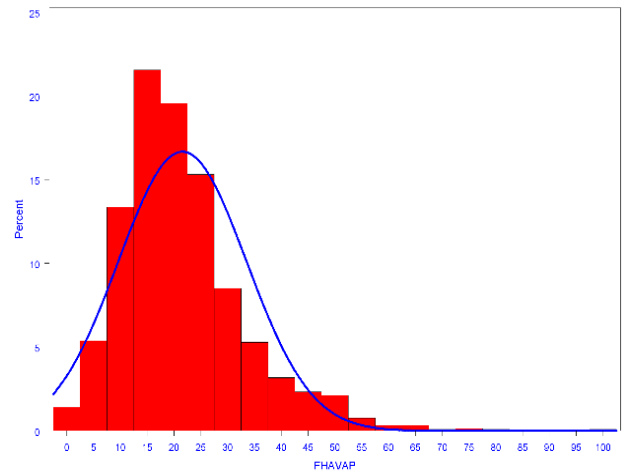
DISTRIBUTION OF %FHAVA 2009



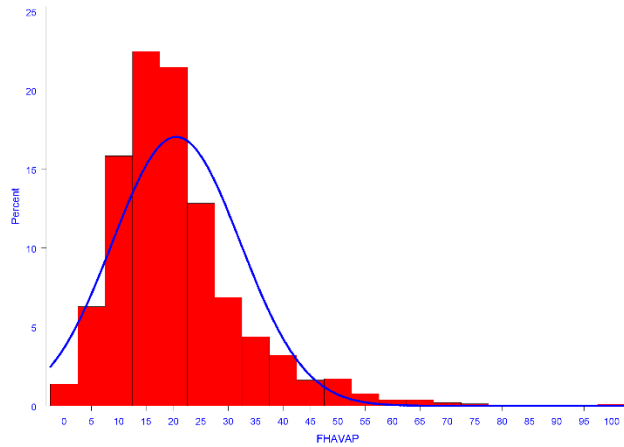
DISTRIBUTION OF %FHAVA 2010



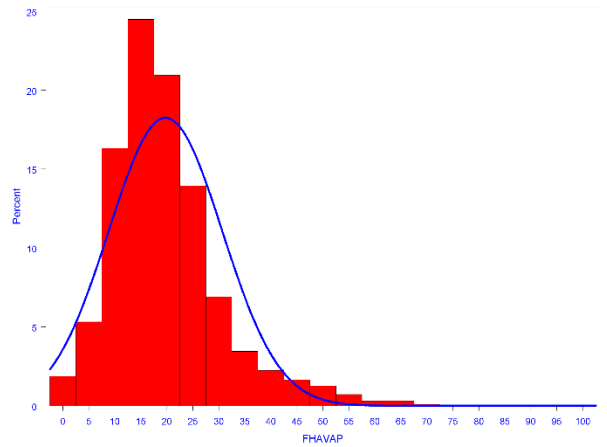
DISTRIBUTION OF %FHAVA 2011



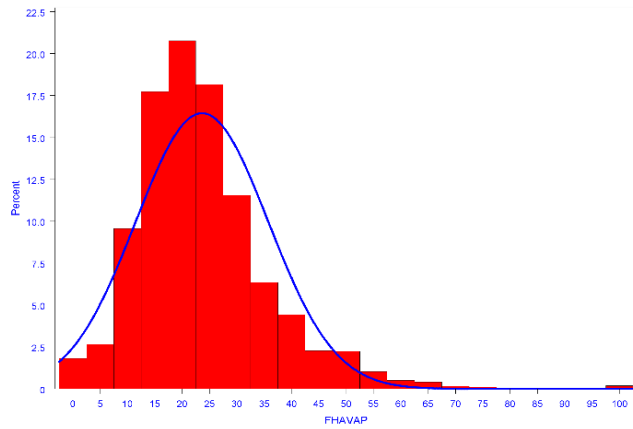
DISTRIBUTION OF %FHAVA 2012



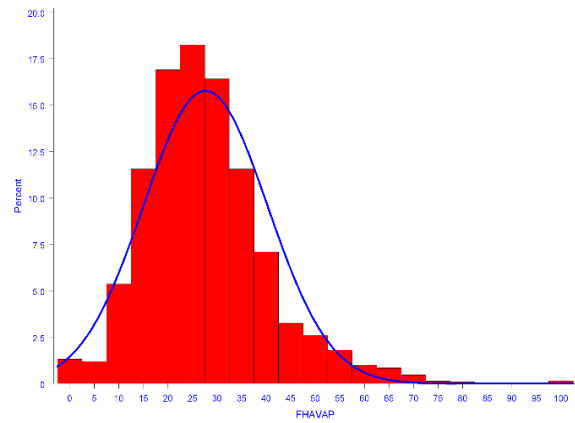
DISTRIBUTION OF %FHAVA 2013



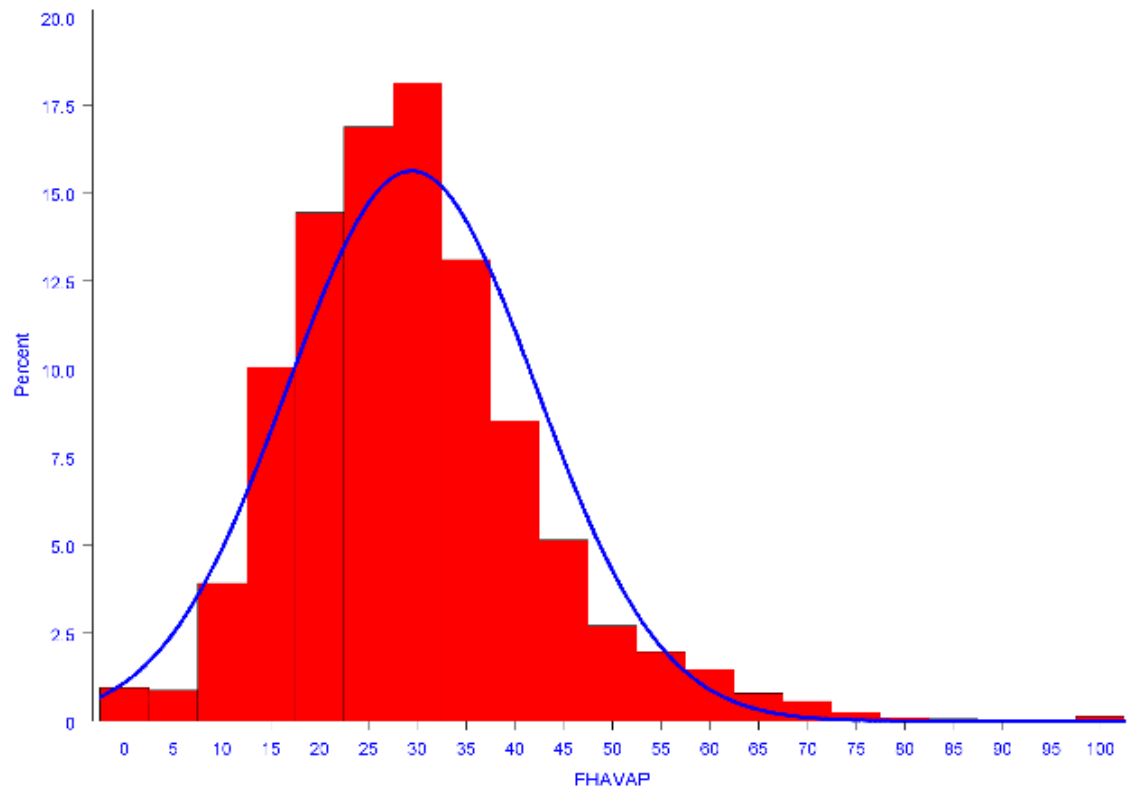
DISTRIBUTION OF %FHAVA 2014



DISTRIBUTION OF %FHAVA 2015



DISTRIBUTION OF %FHAVA 2016

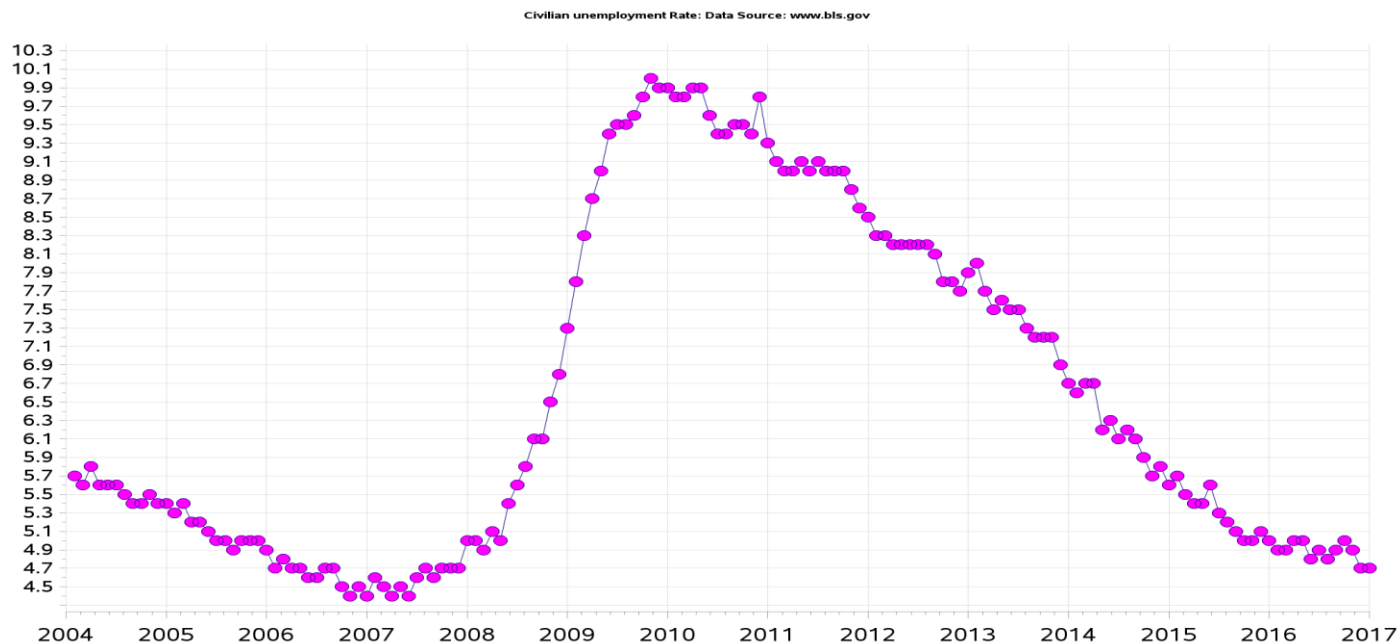


DISTRIBUTION OF %FHA+VA:

YEAR	100% Max	99%	95%	90%	75% Q3	50% Median	25% Q1	10%	5%	1%	0% Min
2004	85.7143	31.8182	18.4783	14.2341	9.0463	5.6151	3.0398	1.3267	0.3344	0.0000	0.0000
2005	100.0000	28.3582	15.0000	11.2628	6.9575	4.1827	2.1720	0.8072	0.0881	0.0000	0.0000
2006	100.0000	28.1250	15.3592	11.4286	7.2183	4.3478	2.2648	0.9174	0.0925	0.0000	0.0000
2007	100.0000	28.7770	17.0770	13.8506	9.4231	6.0811	3.4357	1.5332	0.4759	0.0000	0.0000
2008	100.0000	50.0000	37.6060	32.8671	25.6158	18.8855	12.6263	7.9084	5.5556	0.0000	0.0000
2009	100.0000	63.5341	50.0000	42.8571	31.8182	22.3188	14.3791	8.4507	5.8824	0.0000	0.0000
2010	100.0000	61.5385	46.9931	39.0895	28.7520	21.3510	14.7059	9.5808	6.8182	0.0000	0.0000
2011	100.0000	59.3686	45.1613	36.6667	26.6667	19.6970	13.7037	8.9087	6.5116	0.0000	0.0000
2012	100.0000	59.0860	43.7262	35.2941	25.2954	18.4498	12.8205	8.5106	6.2500	0.0000	0.0000
2013	100.0000	56.8493	40.8163	32.7586	24.2638	17.9194	12.8099	8.5714	6.1539	0.0000	0.0000
2014	100.0000	61.2613	46.5624	38.7997	29.3062	21.8935	15.8562	10.8475	7.8947	0.0000	0.0000
2015	100.0000	66.6667	51.5464	42.8571	33.8235	26.3736	19.4444	13.5643	10.3560	0.0000	0.0000
2016	100.0000	67.9973	53.3117	45.4510	36.1574	28.3905	20.8360	14.9860	11.6279	3.2575	0.0000

CIVILIAN UNEMPLOYMENT RATE, SEASONALLY ADJUSTED:

<https://www.bls.gov/charts/unemployment-situation/civilian-unemployment-rate.htm>



SAS CODE TO GENERATE CIVILIAN UNEMPLOYMENT RATE: Data Source: www.bls.gov

```
proc format;
  value yearfmt
    0='2004'
    12='2005'
    24='2006'
    36='2007'
    48='2008'
    60='2009'
    72='2010'
    84='2011'
    96='2012'
    108='2013'
    120='2014'
    132='2015'
    144='2016'
    156='2017';
run;

data hithere;
input yearmo $ attendance a b c d e f g;
datalines;
Jan2004 5.7 5.2 5.1 17.0 5.0 10.4 5.0 7.3
Feb2004 5.6 5.1 4.9 16.5 4.9 9.7 4.5 7.4
Mar2004 5.8 5.2 5.3 16.8 5.1 10.3 4.3 7.6
Apr2004 5.6 5.1 4.9 16.6 5.0 9.8 4.7 7.1
... etc.
Nov2016 4.7 4.3 4.3 14.9 4.2 8.1 3.1 5.8
Dec2016 4.7 4.4 4.3 14.5 4.2 7.9 2.7 5.9
;
run;

data hello; set hithere; Year=_n_;

data my_data; set hello; drop a b c d e f g;
proc print data=my_data; run;
goptions device=png;
goptions xmax=22in ymax=14in;

/*goptions xpixels=1800 ypixels=1250; */
goptions noborder;

axis1 label=none /*offset=(0,0)*/ order=(4.3 to 10.4 by 0.2) /*minor=none*/ value=(h=1.3 t=1
' ');
axis2 label=none offset=(0,0) order=(0 to 160 by 12) minor=(number=6) value=(h=1.5);

symbol1 interpol=none value=dot height=3pct color=/*cx42C0FB*/ magenta;
symbol2 interpol=none value=circle height=3pct color=navy;
symbol3 interpol=join value=none color=navy;

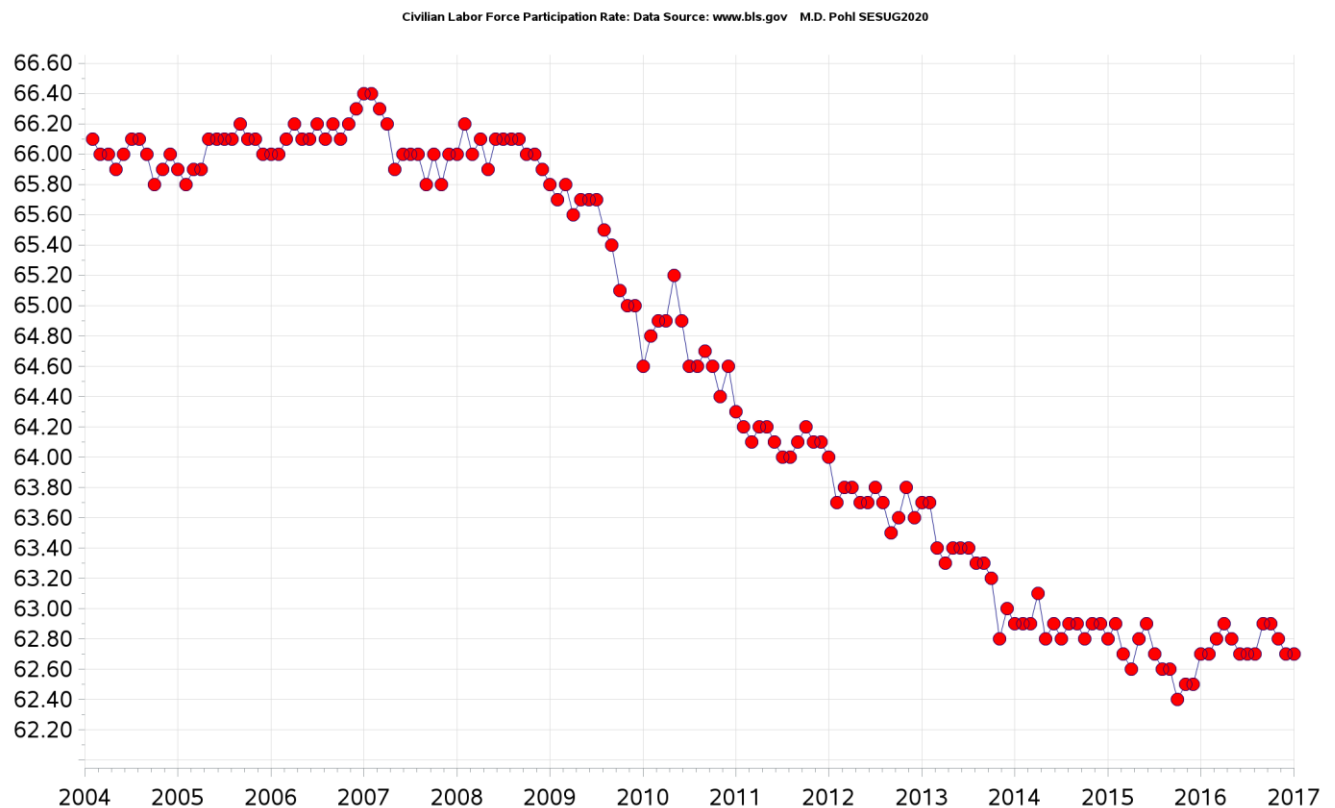
title1 link=" "
  ls=2.5 "Civilian unemployment Rate: Data Source: www.bls.gov";

proc gplot data=my_data;
plot attendance*year=3 attendance*year=1 attendance*year=2 / overlay
href=(0 12 24 36 48 60 72 84 96 108 120 132 144 156) chref=graydd
autovref cvref=graydd
  haxis=axis2 vaxis=axis1
nolegend noframe ;
format year yearfmt. attendance 6.1;
run;
quit;

ODS HTML CLOSE;
ODS LISTING;
```

CIVILIAN LABOR FORCE PARTICIPATION RATE, SEASONALLY ADJUSTED:

<https://www.bls.gov/charts/unemployment-situation/civilian-labor-force-participation-rate.htm>



SAS CODE TO GENERATE CIVILIAN LABOR FOCE PARTICIPATION RATE,

SEASONALLY ADJUSTED: Data source: www.bls.gov

```
proc format;
  value yearfmt
    0='2004'
    12='2005'
    24='2006'
    36='2007'
    48='2008'
    60='2009'
    72='2010'
    84='2011'
    96='2012'
    108='2013'
    120='2014'
    132='2015'
    144='2016'
    156='2017';
run;

data hello;
input year yearmo attendance a b c d e f g;
datalines;
  1 200401 66.1 76.1 60.2 44.5 66.4 64.3 66.7 68.5
  2 200402 66.0 75.7 60.4 43.8 66.3 63.5 66.4 68.1
  3 200403 66.0 75.8 60.5 42.8 66.3 64.1 66.0 68.9
  4 200404 65.9 75.5 60.4 43.8 66.3 63.5 66.2 68.5
  ... etc. ...
  155 201611 62.7 71.5 58.2 35.3 62.7 62.0 62.9 65.6
```

```

156 201612    62.7    71.6    58.2    34.9    62.7    61.9    62.9    65.7
;
run;

data my_data; set hello; drop a b c d e f g;
proc print data=my_data; run;
options device=png;
options xmax=22in ymax=14in;

/*options xpixels=1800 ypixels=1250; */
options noborder;

axis1 label=none /*offset=(0,0)*/ order=(62.0 to 66.6 by 0.2) /*minor=none*/ value=(h=1.5 t=1
'' );
axis2 label=none offset=(0,0) order=(0 to 160 by 12) minor=(number=6) value=(h=1.5);

symbol1 interpol=none value=dot    height=3pct color=/*cx42C0FB*/ red;
symbol2 interpol=none value=circle height=3pct color=navy;
symbol3 interpol=join value=none color=navy;

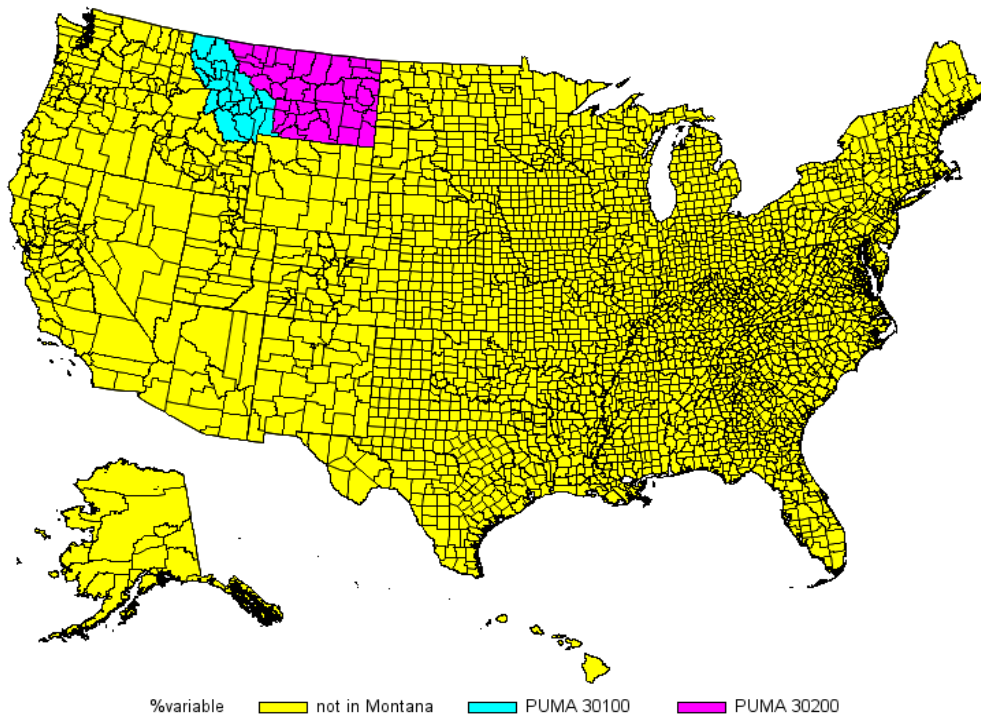
title1 link=" "
      ls=2.5 "Civilian Labor Force Participation Rate: Data Source: www.bls.gov    M.D. Pohl
SESUG2020";

proc gplot data=my_data;
plot attendance*year=3 attendance*year=1 attendance*year=2 / overlay
href=(0 12 24 36 48 60 72 84 96 108 120 132 144 156) chref=graydd
autovref cvref=graydd
  haxis=axis2 vaxis=axis1
nolegend noframe ;
format year yearfmt. attendance 5.2;
run;
quit;

ODS HTML CLOSE;
ODS LISTING;

```

2 PUMAS IN MONTANA: CENSUS 2000 **Data source: www.census.gov**
2 PUMAS IN MONTANA CENSUS 2000
Data Source: www.census.gov M.D.Pohl SESUG2020



SAS CODE FOR 2 PUMAS:

```
PROC FORMAT;
VALUE HISP
0= ' not in Montana'
1= 'PUMA 30100'
2= 'PUMA 30200' ;

data HELLO;
input X STATE COUNTY HP ;
cards;
1 1 1 69.74
2 1 3 81.56
3 1 5 36.64
etc....
3220 72 151 2.63
3221 72 153 2.31
;
/*proc freq data=hello; tables state; run;*/
data hi; set hello;
if state ne 30 then hp = .;

IF STATE EQ 30 THEN DO;
IF COUNTY = 1 OR COUNTY = 7 OR COUNTY = 23 OR COUNTY = 29 OR COUNTY = 31 OR COUNTY = 39
OR COUNTY = 43 OR COUNTY = 47 OR COUNTY = 49 OR COUNTY = 53 OR COUNTY = 57 OR COUNTY = 59
OR COUNTY = 61 OR COUNTY = 63 OR COUNTY = 67 OR COUNTY = 77 OR COUNTY = 81 OR COUNTY = 89
OR COUNTY = 93
THEN hp=1;
ELSE hp=2;
END;

DATA HIHI; SET hi;
if hp eq . then hisp=0;
IF HP ge 0 and hp le 1 THEN HISP=1;
IF HP Gt 1 THEN HISP=2;

TITLE1 "2 PUMAS IN MONTANA CENSUS 2000";
TITLE2 "Data Source: www.census.gov M.D.Pohl SESUG2020";

PATTERN1 VALUE=MS COLOR= yellow ;
PATTERN2 VALUE=MS COLOR= cyan ;
PATTERN3 VALUE=MS COLOR= magenta;

data states alaska hawaii /* pr*/;

set mapsgfk.us_counties;
if state=15 then output hawaii;
else if state=2 then do; if county ^= 16 then output alaska; end;
/*else if state=72 then output pr; */
else output states;
run;
/*proc gproject data=pr out=prproj degrees eastlong latlong;
id state county; */
proc gproject data=states out=stproj degrees eastlong latlong;
id state county;
proc gproject data=alaska out=akproj degrees eastlong latlong;
id state county;
proc gproject data=hawaii out=hiproj degrees eastlong latlong;
id state county;

/*data prproj(drop=x y);
set prproj;
length newx newy 5;
newx=(x+.315);
newy=(y-.24); */

data akproj(drop=x y);
set akproj;
length newx newy 5;
```

```

newx=(x-.55)*.50;
newy=(y-.35)*.50;
data hiproj(drop=x y);
set hiproj;
length newx newy 5;
newx=x-.12;
newy=y-.20;
run;

data all;
set stproj akproj(rename=(newx=x newy=y))
    hiproj(rename=(newx=x newy=y))
    /* prproj(rename=(newx=x newy=y)) */ ;
run;
proc sort; by state county;

proc gremove data=all out=states;
    by state;
    id county;
run;

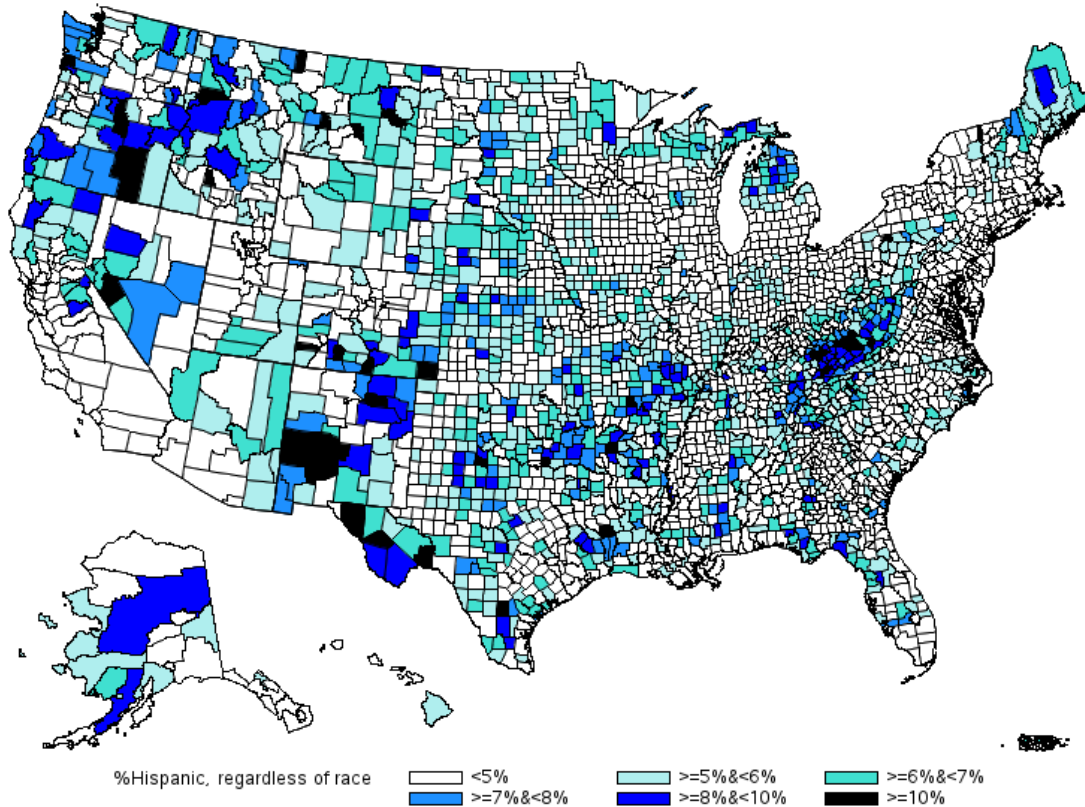
data stoutline;
    set states;
    by state segment;
    retain xsys ysys '2' when 'a' color 'black' style 'mempty' size 1.5;
    length function $8;
    if first.state or first.segment then function='poly';
    else function='polycont';
run;

proc gmap data=hihi map=all all;
ID STATE COUNTY;
CHORO hisp / DISCRETE LEVELS=6 coutline=black anno=stoutline;
FORMAT HISP HISP.;
LABEL HISP='%variable';
run;
quit;

```

HEARING DISABILITY: Data Source: www.census.gov

Percent With Hearing Disability
Data Source: www.census.gov M.D.Pohl SESEUG2020



SAS CODE FOR HEARING DISABILITY MAP

```
PROC FORMAT;
VALUE HISP
1= '<5%'
2= '>=5%&<6%'
3= '>=6%&<7%'
4= '>=7%&<8%'
5= '>=8%&<10%'
6= '>=10%';

data HELLO;
input X StATE COUNTY TOTAL HP;
cards;
1 1 1 54243 4.9942
2 1 3 188944 4.5040
3 1 5 24251 4.4328
etc. ..
3219 72 151 36830 4.9905
3220 72 153 40180 5.2464
;

DATA HIHI; SET HELLO;
IF HP LT 5 THEN HISP=1;
IF HP GT 5 AND HP LT 6 THEN HISP=2;
IF HP GT 6 AND HP LT 7 THEN HISP=3;
IF HP GE 7 AND HP LT 8 THEN HISP=4;
IF HP GE 8 AND HP LT 10 THEN HISP=5;
IF HP GE 10 THEN HISP=6;
```

```

PROC FREQ DATA=HIHI; TABLES HISP;
FORMAT HISP HISP.;

TITLE1 "Percent With Hearing Disability";
TITLE2 "Data Source: www.census.gov M.D.Pohl SESEUG2020";

PATTERN1 V=S C= white ;
PATTERN2 V=S C= PaleTurquoise;
PATTERN3 V=S C= Turquoise;
PATTERN4 V=S C= dodgerblue ;
PATTERN5 V=S C= blue;
PATTERN6 V=S C= black;

/*****/
data states alaska hawaii pr;
set maps.counties;
if state=15 then output hawaii;
else if state=2 then do; if county ^= 16 then output alaska; end;
else if state=72 then output pr;
else output states;
run;
proc gproject data=pr out=prproj;
  id state county;
proc gproject data=states out=stproj;
  id state county;
proc gproject data=alaska out=akproj;
  id state county;
proc gproject data=hawaii out=hiproj;
  id state county;

data prproj(drop=x y);
set prproj;
length newx newy 5;
newx=(x+.315);
newy=(y-.24);
data akproj(drop=x y);
set akproj;
length newx newy 5;
newx=(x-.55)*.50;
newy=(y-.35)*.50;
data hiproj(drop=x y);
set hiproj;
length newx newy 5;
newx=x-.12;
newy=y-.20;
run;

data all;
set stproj akproj(rename=(newx=x newy=y))
      hiproj(rename=(newx=x newy=y))
      prproj(rename=(newx=x newy=y));
run;
proc sort; by state county;

proc gremove data=all out=states;
  by state;
  id county;
run;

data stoutline;
  set states;
  by state segment;
  retain xsys ysys '2' when 'a' color 'black' style 'mempty' size 1.5;
  length function $8;
  if first.state or first.segment then function='poly';
  else function='polycont';
run;

proc gmap data=hihi map=all all;
ID STATE COUNTY;
CHORO hisp / DISCRETE LEVELS=6 coutline=black anno=stoutline;

```

```
FORMAT HISP HISP.;  
LABEL HISP='%Hispanic, regardless of race';  
run;  
quit;
```

DATA SOURCES:

Frequently Occurring Surnames from the 2010 Census: FILE B

https://www.census.gov/topics/population/genealogy/data/2010_surnames.html

Frequently Occurring Surnames from the Census 2000: FILE B

https://www.census.gov/topics/population/genealogy/data/2000_surnames.html

"APPENDIX E CENSUS LIST OF SPANISH SURNAMES"

<https://fcds.med.miami.edu/downloads/DataAcquisitionManual/dam2014/25%20Appendix%20E%20Census%20List%20of%20Spanish%20Surnames.pdf>

CRA: Where can you get the data? <https://www.ffiec.gov/cra/>

B19013 2013-2017 ACS 5-Year Estimates: Median Household Income

<https://data.census.gov/cedsci/>

2010 Census Summary File 1: Technical Documentation

<https://www.census.gov/prod/cen2010/doc/sf1.pdf>

Data: <https://data.census.gov/cedsci/>

CIVILIAN LABOR FORCE PARTICIPATION RATE, SEASONALLY ADJUSTED:

<https://www.bls.gov/charts/unemployment-situation/civilian-labor-force-participation-rate.htm>

Americans With Disabilities: 2014 Household Economic Studies

Current Population Reports By Danielle M. Taylor P70-152 November 2018

<https://www.census.gov/content/dam/Census/library/publications/2018/demo/p70-152.pdf>

Census 2000 Public Use Microdata Area (PUMAs) Maps

Census 2000 Super-Public Use Microdata Area (Super-PUMA) Maps (1-percent sample)

Super-PUMAs (1-percent sample) comprise areas of at least 400,000 people and are aggregations of the smaller 5-percent Public Use Microdata Areas.

Census 2000 Public Use Microdata Area (PUMA) Maps (5-percent sample):

https://usa.ipums.org/usa/resources/volii/maps/mt_puma5.pdf

These page-sized Super-PUMA based maps display the boundaries and codes of the component 5-percent sample Public Use Microdata Areas (PUMAs) within the Super-PUMA.

<https://www.census.gov/geographies/reference-maps/2000/geo/2000-pumas.html>

FIPS STATE AND COUNTY CODES:

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/home/?cid=nrcs143_013697

CIVILIAN UNEMPLOYMENT RATE, SEASONALLY ADJUSTED:

<https://www.bls.gov/charts/unemployment-situation/civilian-unemployment-rate.htm>

RECOMMENDED READING:

FREQUENTLY OCCURRING SURNAMES IN THE 2010 CENSUS, Joshua Comenetz, October 2016

<https://www2.census.gov/topics/genealogy/2010surnames/surnames.pdf>

"Demographic Aspects of Surnames from Census 2000"

by David L. Word, Charles D. Coleman, Robert Nunziata and Robert Kominski.

<https://www2.census.gov/topics/genealogy/2000surnames/surnames.pdf?#>

Census: Genealogy <https://www.census.gov/topics/population/genealogy.html>

Frequently Occurring Surnames from the 1990 Census

https://www.census.gov/topics/population/genealogy/data/1990_census.html

Frequently Occurring Surnames from Census 1990 – Names Files

https://www.census.gov/topics/population/genealogy/data/1990_census/1990_census_namefiles.html

"Building a Spanish Surname List for the 1990's— A New Approach to an Old Problem"

by David L. Word and R. Colby Perkins, Jr. dated March 1996

<https://www.census.gov/population/documentation/twpno13.pdf>

"1980 Census of Population and Housing Spanish Surname List Technical Documentation" Revised 1993.

<https://www2.census.gov/prod2/decennial/documents/D1-D80-SPSN-14-TECH.pdf>

"APPENDIX E CENSUS LIST OF SPANISH SURNAMES"

<https://fcds.med.miami.edu/downloads/DataAcquisitionManual/dam2014/25%20Appendix%20E%20Census%20List%20of%20Spanish%20Surnames.pdf>

"Measuring Race and Ethnicity Across the Decades: 1790–2010 Mapped to 1997

U.S. Office of Management and Budget Classification Standards" by Beverly M. Pratt, Lindsay Hixson, and Nicholas A. Jones.

https://www.census.gov/data-tools/demo/race/MREAD_1790_2010.html

Census: Appendix A. Geographic Terms and Concepts

https://www2.census.gov/geo/pdfs/reference/GTC_10.pdf

Census: Geographic Terms and Definitions

<https://www.census.gov/programs-surveys/popest/about/glossary/geo-terms.html>

Census: Geographic Overview

<https://www2.census.gov/geo/pdfs/reference/GARM/Ch2GARM.pdf>

Standard Hierarchy of Census Geographic Entities

<https://www2.census.gov/geo/pdfs/reference/geodiagram.pdf?#>

Evaluating the Passel-Word Spanish Surname List: 1990 Decennial Census

Post Enumeration Survey Results, R. Colby Perkins, Population Division, U.S. Bureau of the Census, Washington, DC 20233, August 1993, Population Division Working Paper No. 4

<https://www.census.gov/population/www/documentation/twps0004.html>

Technical Working Paper No. 13, U.S. Census Bureau March 1996, Building a Spanish Surname List for the 1990's— A New Approach to an Old Problem, by David L. Word and R. Colby Perkins Jr., Population Division, U. S. Bureau of the Census, Washington D.C.

<https://www.census.gov/population/documentation/twpno13.pdf>

1980 Census of Population and Housing, Summary Tape File 3. Technical Documentation

<https://www2.census.gov/prod2/decennial/documents/D1-D80-S300-14-TECH.pdf>

"Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity" dated October 30, 1997.

<https://www.govinfo.gov/content/pkg/FR-1997-10-30/pdf/97-28653.pdf>

"Office of Management and Budget (OMB) DIRECTIVE NO. 15 Race and Ethnic Standards for Federal Statistics and Administrative Reporting (as adopted on May 12, 1977)". dated January 5, 2016. <https://wonder.cdc.gov/wonder/help/populations/bridged-race/directive15.html>

A Guide to CRA Data Collection and Reporting <https://www.ffiec.gov/cra/guide.htm>

Interagency Questions & Answers <https://www.ffiec.gov/cra/qnadoc.htm>

CRA Public Federal data is available from the Federal Financial Institutions Examination Council's (FFIEC) Web Site. <https://www.ffiec.gov/default> .

Other CRA information can be found on CRA ratings, CRA Examination Schedules, CRA Examinations, CRA/HMDA

Newsletter, and on-line reports: CRA Ratings and Performance Evaluations (PEs)

<https://www.ffiec.gov/cra/ratings.htm>

CRA Examinations https://www.ffiec.gov/cra/examinations.htm#EX_SCHEDULE

CRA/HMDA Reporter Newsletter <https://www.ffiec.gov/cra/newsletter.htm>

On-Line Reports: https://www.ffiec.gov/cra/online_rpts.htm

- CRA Aggregate Reports
- CRA Disclosure Reports
- CRA National Aggregates
- FFIEC Online Census Data System

The on-line reports can be downloaded here:

CRA Data Products <https://www.ffiec.gov/cra/craproducts.htm>

The FFIEC has Census files it uses with the CRA data. They can be found in the sites below.

FFIEC Census and Demographic Data <https://www.ffiec.gov/censusproducts.htm>

FFIEC Census Information Sheets <https://www.ffiec.gov/census/censusInfo.aspx>

This includes the Median Family Income (MFI) Report which shows the MFI which corresponds to the year when the

application data was collected. FFIEC Median Family Income Report

<https://www.ffiec.gov/MedianIncome.htm>

Appendix Y: STATE AND COUNTY FIPS CODES OF ILLINOIS:

<https://www.census.gov/geographies/reference-files/2017/demo/popest/2017-fips.html>

FFIEC: 2014 to 2016 HMDA www.ffiec.gov/hmda/hmdaflat.htm
<https://www.ffiec.gov/hmda/default.htm>
<https://www.ffiec.gov/hmda/nationalarchives.htm>
<https://www.ffiec.gov/hmda/hmdaproducts.htm>

A Guide To HMDA Reporting: Getting It Right! <https://www.ffiec.gov/hmda/guide.htm> 2004 to 2016 HMDA

National Archives: HMDA flat files for 1981-2013 are available through National Archives at
<https://www.archives.gov/research/catalog>
<https://www.archives.gov/research/electronic-records/housing>
<https://www.archives.gov/research/electronic-records>

2016 File Specifications: <https://www.ffiec.gov/hmda/pdf/spec2016.pdf>

2015 File Specifications: <https://www.ffiec.gov/hmda/pdf/spec2015.pdf>

Historic File Specifications (includes 2004 to 2014 File Specifications and earlier):
<https://www.ffiec.gov/hmda/historicfilespecs.htm>

FFIEC Rate Spread Calculator: “Average Prime Offer Rates” Tables

<https://www.ffiec.gov/ratespread/aportables.htm>

tables for compliance with Regulation C (HMDA) and Regulation Z (TILA) amendments effective October 1, 2009.

For 2017 HMDA File Specifications and later: <https://ffiec.cfbp.gov/> 2017:

<https://www.ffiec.gov/hmda/pdf/2017letter.pdf>

2018: <https://www.ffiec.gov/hmda/pdf/2018guide.pdf> A Guide To HMDA Reporting: Getting It Right!

2019: <https://www.ffiec.gov/hmda/pdf/2019guide.pdf> A Guide To HMDA Reporting: Getting It Right!

2020: <https://www.ffiec.gov/hmda/pdf/2020guide.pdf> A Guide To HMDA Reporting: Getting It Right!

CFPB: 2007 to 2017 HMDA download: <https://www.consumerfinance.gov/data-research/hmda/historic-data/>

CFPB: HMDA in or after 2017: <https://ffiec.cfbp.gov/data-publication/>

CFPB: 2017 to 2019 HMDA: <https://ffiec.cfbp.gov/data-publication/modified-lar/2019>

HMDA Articles:

Data Point: 2019 Mortgage Market Activity and Trends, A First Look at the 2019 HMDA Data, This report was prepared by Young Jo, Feng Liu, Akaki Skhirtladze, and Laura Barriere.

https://files.consumerfinance.gov/f/documents/cfbp_2019-mortgage-market-activity-trends_report.pdf

Data Point: 2018 Mortgage Market Activity and Trends, A First Look at the 2018 HMDA Data, This report was prepared by Jason Dietrich, Feng Liu, Akaki Skhirtladze, , Misha Davies, Young Jo, and Corinne Candilis.

https://files.consumerfinance.gov/f/documents/cfbp_2018-mortgage-market-activity-trends_report.pdf

Data Point: 2017 Mortgage Market Activity and Trends, A First Look at the 2017 HMDA Data, Jason Dietrich, Feng Liu, Leslie Parrish, David Roell, Akaki Skhirtladze

https://files.consumerfinance.gov/f/documents/bcfp_hmda_2017-mortgage-market-activity-trends_report.pdf

Residential Mortgage Lending in 2016: Evidence from the Home Mortgage Disclosure Act Data, Neil Bhutta, Steven Laufer, and Daniel R. Ringo, of the Division of Research and Statistics, prepared this article. Jimmy Kelliher provided research assistance.

https://www.federalreserve.gov/publications/files/2016_HMDA.pdf

Residential Mortgage Lending from 2004 to 2015: Evidence from the Home Mortgage Disclosure Act Data, Neil Bhutta and Daniel R. Ringo, of the Division of Research and Statistics, prepared this article. Jimmy Kelliher provided research assistance.

<https://www.federalreserve.gov/pubs/bulletin/2016/articles/hmda/2015-hmda-data.htm>

The 2014 Home Mortgage Disclosure Act Data, Federal Reserve Bulletin, Vol 101, No. 4, November 2015 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2975511

The 2013 Home Mortgage Disclosure Act Data

<https://www.federalreserve.gov/pubs/bulletin/2014/articles/hmda/2013-HMDA-Data.htm>

Mortgage Market Conditions and Borrower Outcomes: Evidence from the 2012 HMDA Data and Matched HMDA-Credit Record Data

<https://www.federalreserve.gov/pubs/bulletin/2013/articles/hmda/default.htm>

The Mortgage Market in 2011: Highlights from the Data Reported under the Home Mortgage Disclosure Act <https://www.federalreserve.gov/pubs/bulletin/2012/articles/HMDA/default.htm>

The Mortgage Market in 2010: Highlights from the Data Reported under the Home Mortgage Disclosure Act, Robert B. Avery, Neil Bhutta, Kenneth P. Brevoort, and Glenn B. Canner

https://www.federalreserve.gov/pubs/bulletin/2011/pdf/2010_HMDA_final.pdf

The 2009 HMDA Data: The Mortgage Market in a Time of Low Interest Rates and Economic Distress, Robert B. Avery, Neil Bhutta, Kenneth P. Brevoort, and Glenn B. Canner

<https://www.federalreserve.gov/pubs/bulletin/2010/>

https://www.federalreserve.gov/pubs/bulletin/2010/pdf/2009_HMDA_final.pdf

The 2008 HMDA Data: The Mortgage Market during a Turbulent Year, Robert B. Avery, Neil Bhutta, Kenneth P. Brevoort, Glenn B. Canner, and Christa N. Gibbs, of the Division of Research and Statistics, prepared this article. Cheryl R. Cooper and Christine Coyer provided research assistance.

<https://www.federalreserve.gov/pubs/bulletin/2010/articles/HMDA/default.htm>

<https://www.federalreserve.gov/pubs/bulletin/2010/pdf/hmda08final.pdf>

The 2007 HMDA Data, Robert B. Avery, Kenneth P. Brevoort, and Glenn B. Canner

<https://www.federalreserve.gov/pubs/bulletin/2008/pdf/hmda07final.pdf>

Identifying information and loan counts for lenders that reported data for 2006 under HMDA but that subsequently ceased operations and did not report 2007 HMDA data

<https://www.federalreserve.gov/pubs/bulletin/2008/articles/hmda/hmda07tableA1.htm>

The 2006 HMDA Data, Robert B. Avery, Kenneth P. Brevoort, and Glenn B. Canner, of the Board's Division of Research and Statistics, prepared this article. Rebecca Tsang and Sean M.

Wallace provided research assistance.

<https://www.federalreserve.gov/pubs/bulletin/2007/pdf/hmda06final.pdf>

Higher-Priced Home Lending and the 2005 HMDA Data, Robert B. Avery, Kenneth P. Brevoort, and Glenn B. Canner <https://www.federalreserve.gov/pubs/bulletin/2006/hmda/bull06hmda.pdf>

New Information Reported under HMDA and Its Application in Fair Lending Enforcement, Robert B. Avery and Glenn B. Canner, of the Division of Research and Statistics, and Robert E. Cook, of the Division of Consumer and Community Affairs, prepared this article. Shannon C. Mok and Caitlin G. Coslett provided research assistance. Patricia J. Dykes and Sylvia A. Freeland assisted in preparing the 2004 HMDA data for analysis.

<https://www.federalreserve.gov/pubs/bulletin/2005/3-05hmda.pdf>

Credit Report Accuracy and Access to Credit, Robert B. Avery, Paul S. Calem, and Glenn B. Canner, of the Board's Division of Research and Statistics, prepared this article. Shannon C. Mok provided research assistance.

https://www.federalreserve.gov/pubs/bulletin/2004/summer04_credit.pdf

September 28, 2017 The Decline in Lending to Lower-Income Borrowers by the Biggest Banks, Neil Bhutta, Steven Laufer, and Daniel R. Ringo

<https://www.federalreserve.gov/econres/notes/feds-notes/the-decline-in-lending-to-lower-income-borrowers-by-the-biggest-banks-20170928.htm>

September 29, 2016 Changing FHA Mortgage Insurance Premiums and the Effects on Lending, Neil Bhutta and Daniel Ringo

<https://www.federalreserve.gov/econresdata/notes/feds-notes/2016/changing-fha-mortgage-insurance-premiums-and-the-effects-on-lending-20160929.htm>

COLOR SELECTION:

SAS/GRAPH® 9.4: Reference, Fifth Edition

<https://documentation.sas.com/api/docsets/graphref/9.4/content/graphref.pdf?locale=en#nameddest=n161ukdyz9wpfsn1nh8sihforvyq>
<https://documentation.sas.com/?docsetId=graphref&docsetTarget=p0edl20cvxxmm9n1i9ht3n21eict.htm&docsetVersion=9.4&locale=en>

Predefined Colors SAS/GRAPH® 9.4: Reference, Fifth Edition

<https://documentation.sas.com/?docsetId=graphref&docsetTarget=n161ukdyz9wpfsn1nh8sihforvyq.htm&docsetVersion=9.4&locale=en>

Color-Naming Schemes SAS® 9.4 Graph Template Language: User's Guide, Fifth Edition

<https://documentation.sas.com/?docsetId=grstatug&docsetTarget=p0edl20cvxxmm9n1i9ht3n21eict.htm&docsetVersion=9.4&locale=en>

Appendix C: Color Names Defined by SAS/GRAPH

https://support.sas.com/content/dam/SAS/support/en/books/pro-template-made-easy-a-guide-for-sas-users/62007_Appendix.pdf

SAS/GRAPH Colors : Color-naming Schemes - SAS OnlineDoc, V8

<https://v8doc.sas.com/sashtml/gref/zgscheme.htm>

CONTACT INFORMATION:

Your comments and questions are valued and encouraged. Contact the author:

Martha D. Pohl

703-403-4249

maze44@verizon.net