

# American Community Survey

## Comparing Trends Over Time

PRESENTATION BY **BETH JAROSZ OF THE POPULATION REFERENCE BUREAU**

# Five Key Questions For Comparing ACS Data Over Time

- Where do I get the data?
- What product should I use?
- When is a change significant?
- How do I adjust for inflation?
- What else might affect data comparisons over time?

# Where To Access Trend Data

The screenshot shows a web browser window with multiple tabs. The active tab is 'www.census.gov/acs/www'. The address bar shows 'factfinder.census.gov/faces/nav/jsf/pages/index.xhtml###'. The browser's bookmark bar includes 'Apps', 'Work & Career', 'South China Restaur...', 'Writing', 'Running & Fit', 'Reading', 'DC area info', 'Maps, Geog. Data, a...', 'Recipes', 'Baby', 'Utilities', 'Great Blogs', 'Music', and 'Other bookmarks'. The website header features the 'U.S. Department of Commerce' and 'United States Census Bureau' logos, the 'AMERICAN FactFinder' title, and a navigation menu with 'MAIN', 'COMMUNITY FACTS', 'GUIDED SEARCH', 'ADVANCED SEARCH', and 'DOWNLOAD CENTER'. A language selector shows 'English' and 'Español'. A banner message states: 'The American Community Survey needs your feedback! Please take a moment to complete the ACS Data Products Survey.' The main content area has a 'Community Facts' section with a description: 'Find popular facts (population, income, etc.) and frequently requested data about your community.' Below this is a search input field with the placeholder 'Enter a state, county, city, town, or zip code:' and a 'GO' button. To the right is a large image of a smiling young woman. Below the search section are links for 'Guided Search', 'Advanced Search', and 'Download Center'. At the bottom, there is a 'Popular Tables' section with two columns of links: 'Population and Housing' (including 'Annual Population Estimates (2014 PEP, PEPPANNRES)' and 'Demographic and Housing Estimates (2013 ACS, DP05)') and 'Poverty and Income' (including 'General Economic Characteristics (2013 ACS, DP03)' and 'Age, Race, Sex, and Education'). The Windows taskbar at the bottom shows various application icons and the system clock indicating 10:14 AM on 5/4/2015.

# Choosing An ACS Data Product

1-year

When *current*  
matters most

Large  
geographies

Large population  
groups

5-year

When *precise*  
matters most

Small  
geographies

Small population  
groups

# Choosing An ACS Data Product

The screenshot shows the American FactFinder web interface. The browser tabs include 'GoToMyPC Corporate', 'American FactFinder - Res', 'PAD - Cornell Program on', and 'www.c'. The address bar shows the URL 'factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=...'. The breadcrumb trail includes 'Apps', 'Work & Career', 'South China Restaur...', 'Writing', 'Running & Fit', 'Reading', and 'DC area'. The main content area displays 'S1901' and 'INCOME IN THE PAST 12 MONTHS (IN 2013 INFLATION-ADJUSTED DOLLARS) 2009-2013 American Community Survey 5-Year Estimates'. Below this, there is a 'Table View' button and a row of action buttons: 'Modify Table', 'Bookmark/Save', 'Print', 'Download', and 'Create a Map'. A paragraph of text explains that the ACS produces population, demographic, and housing unit estimates. On the left, a sidebar shows 'Versions of this table are available for the following years:' with buttons for '2013', '2012', '2011', and '2010'. The main table has columns for 'Subject', 'Households Estimate', 'Households Margin of Error', 'Families Estimate', and 'Families Margin of Error'. The table data includes 'Total', 'Less than \$10,000', '\$10,000 to \$14,999', '\$15,000 to \$24,999', and '\$25,000 to \$34,999'.

**Table View**

Actions: [Modify Table](#) | [Bookmark/Save](#) | [Print](#) | [Download](#) | [Create a Map](#)

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's primary source of information on the nation's population and housing. The ACS provides estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

Versions of this table are available for the following years:

- 2013**
- 2012
- 2011
- 2010

Subject	Households		Families	
	Estimate	Margin of Error	Estimate	Margin of Error
Total	303,441	+/-1,344	200,498	+/-1,344
Less than \$10,000	4.0%	+/-0.2	2.8%	+/-0.2
\$10,000 to \$14,999	2.6%	+/-0.2	1.6%	+/-0.2
\$15,000 to \$24,999	5.7%	+/-0.3	4.5%	+/-0.3
\$25,000 to \$34,999	6.0%	+/-0.3	5.0%	+/-0.3

# Product Considerations When Comparing Estimates

- Compare equivalent data products.
  - e.g. 1-year to 1-year, 5-year to 5-year
- Note: Years overlap in 5-year products
  - Label data accordingly

2012 5-year

2013 5-year

2008

2009

2010

2011

2012

2009

2010

2011

2012

2013

# When Is A Change Significant?

GoToMyPC Corporate : M x American FactFinder - Res x

factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF

Apps Work & Career South China Restaur... Writing Running & Fit Reading DC area info Maps, Geog. Data, a... Recipes Baby Utilities Great Blogs Music » Other bookmarks

S1901 INCOME IN THE PAST 12 MONTHS (IN 2013 INFLATION-ADJUSTED DOLLARS) 2009-2013 American Community Survey 5-Year Estimates

Table View

Actions: Modify Table Bookmark/Save Print Download Create a Map

View Geography Notes View Table Notes

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

Versions of this table are available for the following years: 2013 2012 2011 2010 2009

16 of 16

Subject	Households		Families		Married-couple families		Nonfamily households	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Total	303,441	+/-1,344	200,498	+/-1,918	117,539	+/-1,844	102,943	+/-1,709
Less than \$10,000	4.0%	+/-0.2	2.8%	+/-0.3	0.6%	+/-0.2	7.5%	+/-0.5
\$10,000 to \$14,999	2.6%	+/-0.2	1.6%	+/-0.2	0.6%	+/-0.2	4.9%	+/-0.4
\$15,000 to \$24,999	5.7%	+/-0.3	4.5%	+/-0.3	2.3%	+/-0.3	9.6%	+/-0.6
\$25,000 to \$34,999	6.9%	+/-0.3	5.8%	+/-0.3	3.5%	+/-0.3	9.6%	+/-0.5
\$35,000 to \$49,999	12.2%	+/-0.4	10.5%	+/-0.4	7.4%	+/-0.5	16.2%	+/-0.9
\$50,000 to \$74,999	19.5%	+/-0.4	18.2%	+/-0.5	15.7%	+/-0.7	22.3%	+/-0.9
\$75,000 to \$99,999	15.1%	+/-0.4	15.4%	+/-0.5	15.6%	+/-0.7	13.9%	+/-0.7
\$100,000 to \$149,999	19.2%	+/-0.4	22.1%	+/-0.6	27.0%	+/-0.9	11.5%	+/-0.6
\$150,000 to \$199,999	8.7%	+/-0.4	11.1%	+/-0.5	15.2%	+/-0.7	3.0%	+/-0.3
\$200,000 or more	6.1%	+/-0.3	7.9%	+/-0.4	12.2%	+/-0.6	1.6%	+/-0.2
Median income (dollars)	73,613	+/-735	84,008	+/-1,090	106,850	+/-1,560	51,935	+/-798
Mean income (dollars)	88,861	+/-621	93,622	+/-969	120,355	+/-1,239	61,589	+/-948
PERCENT IMPUTED								
Household income in the past 12 months	33.1%	(X)	(X)	(X)	(X)	(X)	(X)	(X)
Family income in the past 12 months	(X)	(X)	35.0%	(X)	(X)	(X)	(X)	(X)

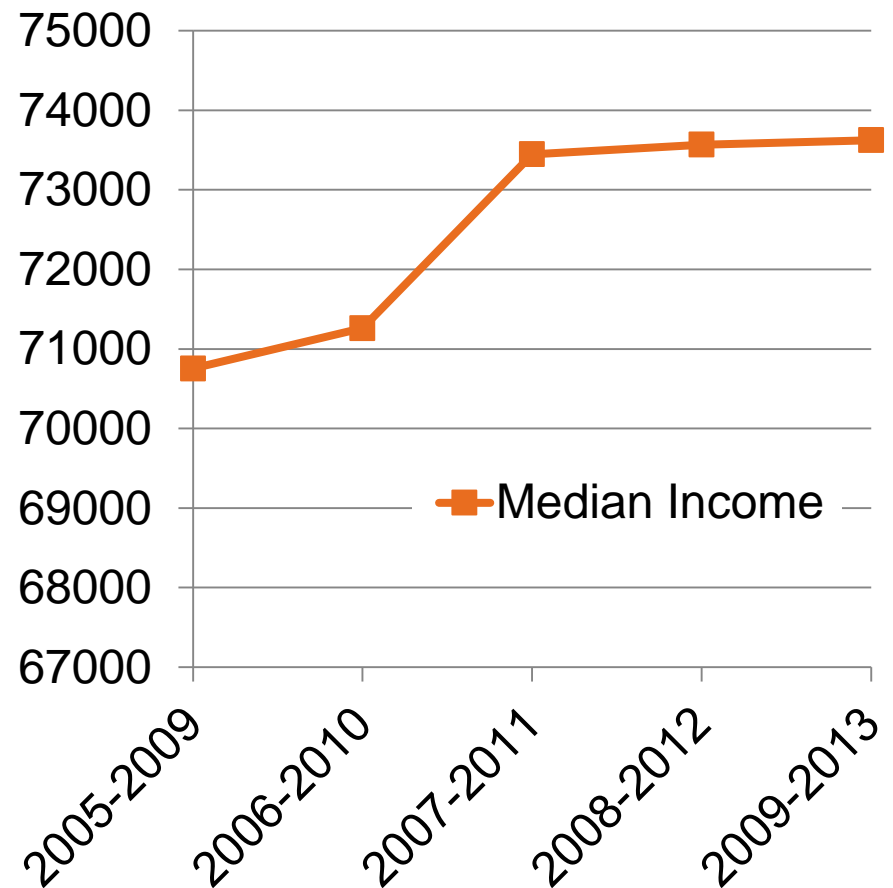
acs\_statistics\_calculat... ACS\_Affect\_Est (1).ppt ACS\_Affect\_Est.ppt

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# Trend Example: Median Income, Prince George's County, MD

	Median Income	MOE
2009-2013	73,623	735
2008-2012	73,568	818
2007-2011	73,447	806
2006-2010	71,260	789
2005-2009	70,753	816





# Is A Change Significant? (Statistics Refresher)

- Sampling error is the error introduced by taking a sample survey rather than a complete census

# Statistics Refresher, cont'd.

- Standard Error (SE) = a measure of sampling error
- Margin of Error (MOE) = standard error for a given confidence interval (90% for ACS)
  - $MOE = 1.645 \times \text{Standard Error}$
  - MOE used to define probable range (lower and upper bounds) of estimate

# Lower and Upper Bounds

Estimate = 73,623 (MOE = 735)

## Lower Bound

= Estimate - MOE

= 73,623 - 735 = **72,888**

## Upper Bound

= Estimate + MOE

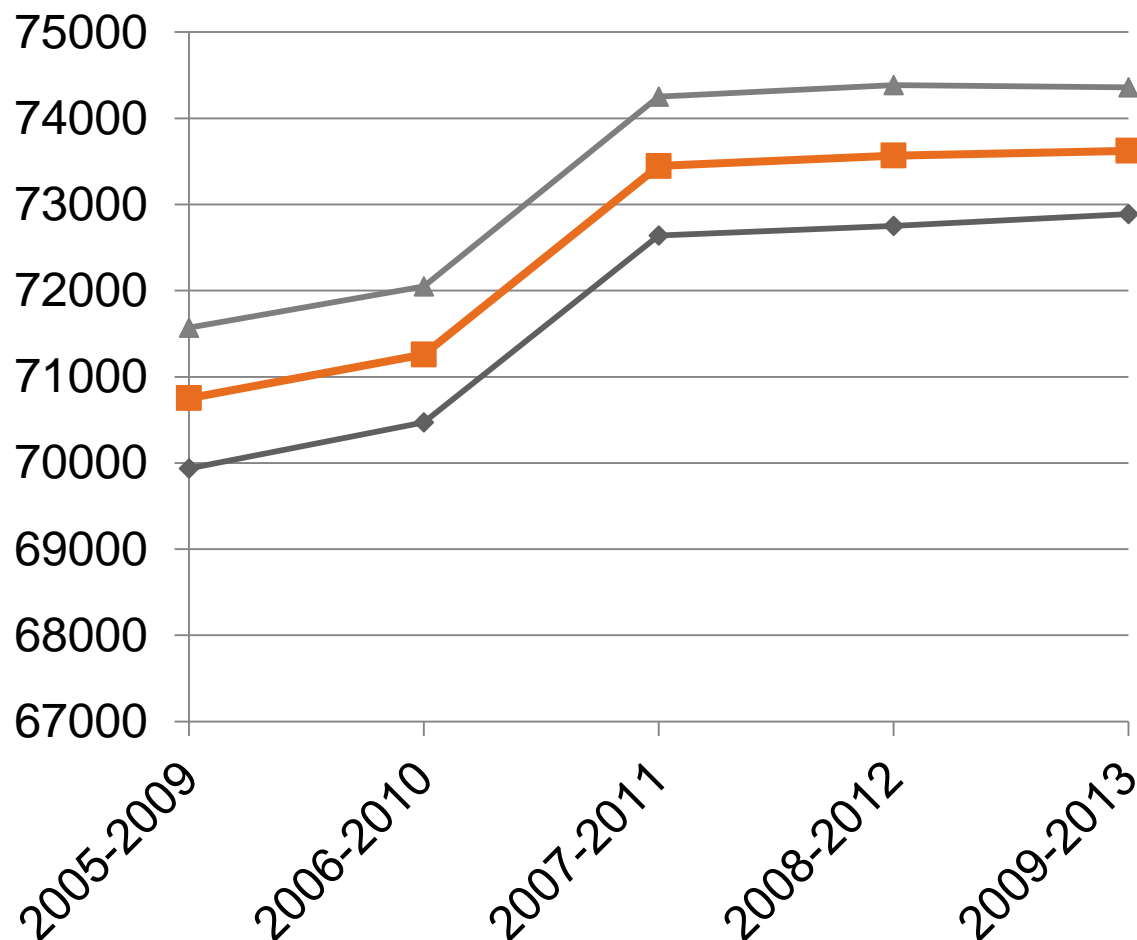
= 73,623 + 735 = **74,358**

*90% of the time, “true” value will be between lower and upper bounds of estimate*

# Example: Median Income, Prince George's County, MD

	Median Income	MOE	Lower	Upper
2009-2013	73,623	735	72,888	74,358
2008-2012	73,568	818	72,750	74,386
2007-2011	73,447	806	72,641	74,253
2006-2010	71,260	789	70,471	72,049
2005-2009	70,753	816	69,937	71,569

# Example: Median Income, Prince George's County, MD



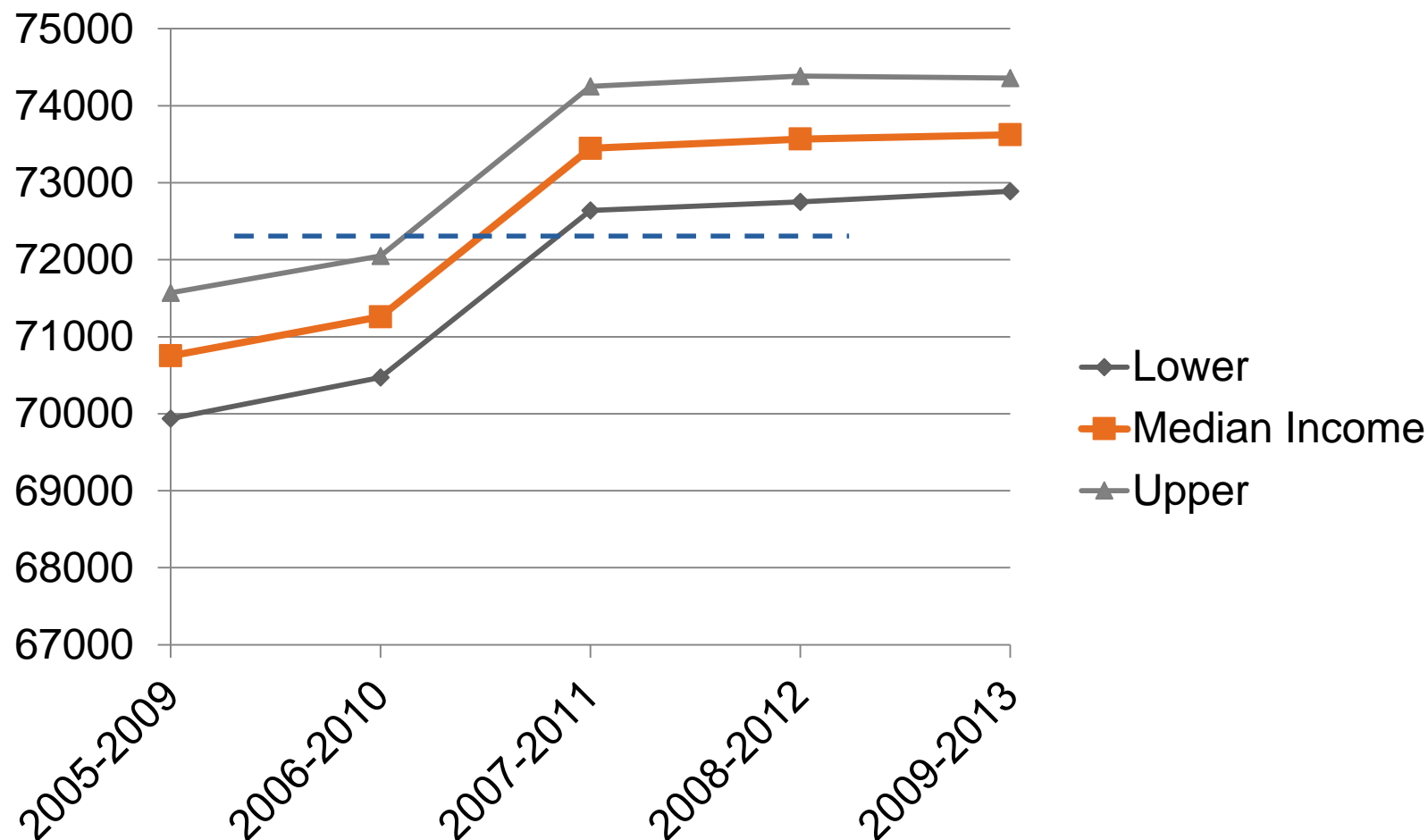
We can be 90% confident that "real" median is between lower & upper bound

◆ Lower  
■ Median Income  
▲ Upper

# Is the Change Significant?

- Is margin of error wider than difference in the estimates?
- Quick test:
  - If upper and lower bounds of estimates do not overlap, difference is significant
- Statistical test:
  - If upper and lower bounds do overlap, difference may still be significant - must test

# Example: Median Income, Prince George's County, MD



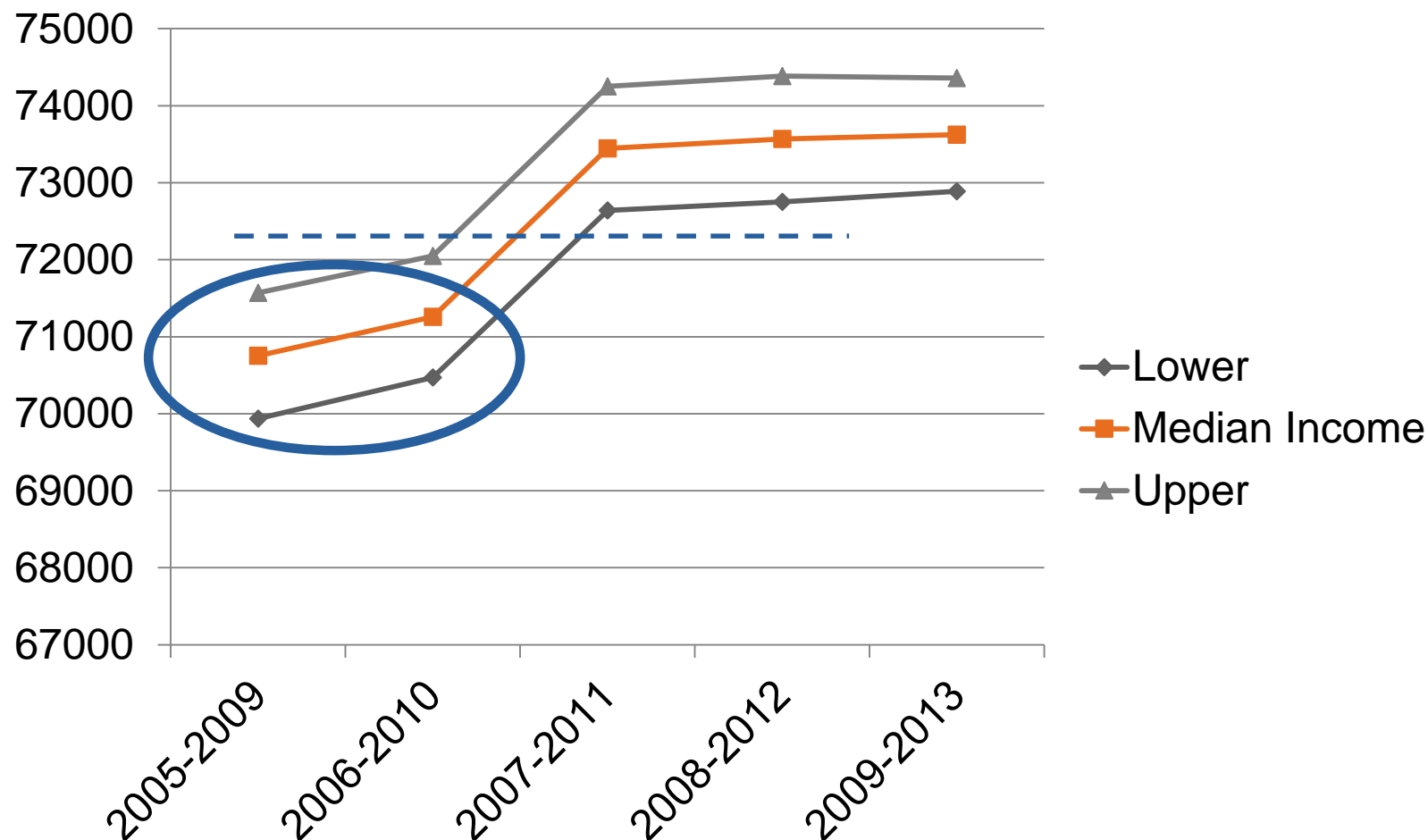
# Example: Median Income, Prince George's County, MD

	Median Income	MOE	Lower	Upper
2009-2013	73,623	735	72,888	74,358
2008-2012	73,568	818	72,750	74,386
2007-2011	73,447	806	72,641	74,253
2006-2010	71,260	789	70,471	72,049
2005-2009	70,753	816	69,937	71,569

**Quick test:** We know the changes between 2006-10 and 2009-13 are significantly different.  
*But what about 2009 to 2010?*



# Example: Median Income, Prince George's County, MD



# Formula for Testing Significance (90% confidence interval)

## ■ Formulas:

- Absolute Value of Difference =  $ABS(a-b)$
- $SE(a) = MOE_a / 1.645$
- $SE(b) = MOE_b / 1.645$
- $SE(a-b) = \sqrt{SE_a^2 + SE_b^2}$
- $MOE(a-b) = SE(a-b) * 1.645$
- TEST: If  $ABS(a-b) > MOE(a-b)$  difference is significant

# Example: Median Income, Prince George's County, MD

	Median Income	MOE	Lower	Upper
2009-2013	73,623	735	72,888	74,358
2008-2012	73,568	818	72,750	74,386
2007-2011	73,447	806	72,641	74,253
2006-2010	71,260	789	70,471	72,049
2005-2009	70,753	816	69,937	71,569

# Example: Formula for Testing Significance (90% conf. interval)

## ■ Formulas:

- $ABS(a-b) = 71,260 - 70,753 = 507$
- $SE(a) = MOE_a / 1.645 = 789 / 1.645 = 479.6$
- $SE(b) = MOE_b / 1.645 = 816 / 1.645 = 496$
- $SE(a-b) = \sqrt{SE_a^2 + SE_b^2} = \sqrt{479.6^2 + 496^2} = 690$
- $MOE(a-b) = SE(a-b) * 1.645 = 690 * 1.645 = 1135$
- **TEST:** If  $ABS(a-b) > MOE(a-b)$  difference is significant

## Example: Formula for Testing Significance (90% conf. interval)

- TEST: If  $ABS(a-b) > MOE(a-b)$  difference is significant
  - $ABS(a-b) = 507$
  - $MOE(a-b) = 1135.1$
  - $ABS(a-b)$  ***is less than***  $MOE(a-b)$
- Change 2009 to 2010 is NOT significant

# Online Tools for Significance Testing

- Online calculator tool:  
<http://pad.human.cornell.edu/acscalculator/>
- Excel file “calculator” available for download from  
<http://www.statswmmaryland.iupui.edu/topic/acs.asp>

# Inflation Adjustment

factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

Prince George's County, Maryland

Subject

Estimate

Margin of Error

Percent

Percent Margin of Error

Unpaid family workers

244

+/-100

0.1%

+/-0.1

INCOME AND BENEFITS (IN 2013 INFLATION-ADJUSTED DOLLARS)

Total households

303,441

+/-1,344

303,441

(X)

Less than \$10,000

12,062

+/-695

4.0%

+/-0.2

\$10,000 to \$14,999

7,750

+/-601

2.6%

+/-0.2

\$15,000 to \$24,999

17,354

+/-894

5.7%

+/-0.3

\$25,000 to \$34,999

20,858

+/-946

6.9%

+/-0.3

\$35,000 to \$49,999

37,055

+/-1,252

12.2%

+/-0.4

\$50,000 to \$74,999

59,318

+/-1,305

19.5%

+/-0.4

\$75,000 to \$99,999

45,937

+/-1,291

15.1%

+/-0.4

\$100,000 to \$149,999

58,265

+/-1,376

19.2%

+/-0.4

\$150,000 to \$199,999

26,438

+/-1,092

8.7%

+/-0.4

\$200,000 or more

18,404

+/-801

6.1%

+/-0.3

Median household income (dollars)

73,623

+/-735

(X)

(X)

Mean household income (dollars)

88,867

+/-621

(X)

(X)

With earnings

265,446

+/-1,434

87.5%

+/-0.3

Mean earnings (dollars)

86,198

+/-650

(X)

(X)

With Social Security

60,385

+/-1,028

19.9%

+/-0.3

Mean Social Security income (dollars)

15,330

+/-253

(X)

(X)

With retirement income

63,474

+/-1,257

20.9%

+/-0.4

Mean retirement income (dollars)

34,193

+/-655

(X)

(X)

With Supplemental Security Income

10,411

+/-635

3.4%

+/-0.2

Mean Supplemental Security Income (dollars)

8,604

+/-376

(X)

(X)

With cash public assistance income

5,465

+/-488

1.8%

+/-0.2

Mean cash public assistance income (dollars)

4,133

+/-336

(X)

(X)

With Food Stamp/SNAP benefits in the past 12 months

27,683

+/-1,134

9.1%

+/-0.4

Families

200,498

+/-1,918

200,498

(X)

Less than \$10,000

5,598

+/-560

2.8%

+/-0.3

\$10,000 to \$14,999

3,250

+/-407

1.6%

+/-0.2

\$15,000 to \$24,999

9,048

+/-678

4.5%

+/-0.3

\$25,000 to \$34,999

11,673

+/-687

5.8%

+/-0.3

\$35,000 to \$49,999

21,044

+/-922

10.5%

+/-0.4

Versions of this table are available for the following years:

2013

2012

2011

2010

acs\_statistics\_calculat...xlsx

ACS\_Affect\_Est (1).ppt

ACS\_Affect\_Est.ppt

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# Inflation Adjustment

- Source for inflation rate:  
<http://www.bls.gov/cpi/cpiurs.htm>
- Inflation Adjusted to New Year =  
$$\text{Median}_{\text{OrigYear}} \times (\text{CPI}_{\text{NewYear}} / \text{CPI}_{\text{OrigYear}})$$



# Example: Inflation Adjustment

- Convert 2012 median to 2013 dollars:  
=  $\text{Med}_{\text{OYr}} \times (\text{CPI}_{\text{NYr}} / \text{CPI}_{\text{OYr}})$   
= 73,568 x (342.2 / 337.3)  
= 74,637 in 2013 dollars

	Median Income	CPIURS
2013	73,623	342.2
2012	73,568	337.3
2011	73,447	330.4
2010	71,260	320.3
2009	70,753	315.2

# Other Caveats in Comparing Data Over Time?

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Census.gov > American Community Survey > Guidance for Data Users: Comparing ACS Data > Comparing 2013 American Community Survey Data

## American Community Survey

Main | About the Survey | **Guidance for Data Users** | Data & Documentation | Methodology | Library

- Guidance Main
- Subjects included in ACS
- Geography and the ACS
- Which Data Tool Should I Use?
- When to Use 1-year, 3-year, or 5-year Estimates
- Comparing ACS Data**
  - ACS/Census Table Comparisons
    - 2013**
      - 3-year to 3-year comparison guidance
    - 2012
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    - 2009
    - 2008
    - 2007

### Comparing 2013 American Community Survey Data

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Subject Area	2013 ACS 1-Year, 2011-2013 ACS 3-Year, and 2008-2013 ACS 5-Year with Census 2000	2013 ACS 1-Year with 2012 ACS 1-Year	2013 ACS 1-Year, 2011-2013 ACS 3-Year, and 2008-2013 ACS 5-Year with 2010 Census
+ Age and Sex (01)			
- Race (02)			
Topic	2013 ACS with Census 2000	2013 ACS 1-Year with 2012 ACS 1-Year	2013 ACS with 2010 Census
Race	Compare with Caution (Details)	Compare	Compare with Caution (Details)
+ Hispanic Origin (03)			
+ Ancestry (04)			
+ Foreign Born; Citizenship; Year of Entry; Nativity (05)			

acs\_statistics\_calculat...xlsx | ACS\_Affect\_Est (1).ppt | ACS\_Affect\_Est.ppt

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[http://www.census.gov/acs/www/guidance\\_for\\_data\\_users/comparing\\_2013/](http://www.census.gov/acs/www/guidance_for_data_users/comparing_2013/)

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