

Higher Education: Women Take Lead

The latest educational attainment data from the U.S. Census Bureau show that more women under the age of 45, at both the state and national level, have earned a bachelor's degree or higher when compared to their male counterparts.

These data come from the 2007 American Community Survey and all differences reported in this article are statistically significant. For more information about using margins of error and statistical significance, see the article "[The Search for Significance: A Crash Course in Statistical Significance Using ACS 2007.](#)"

Looking at the population 25 and over, nearly 23 percent of men in Indiana have a bachelor's degree or higher, compared to just over 21 percent of women. This is due to the large male advantage in the oldest age group (see **Table 1**).

Table 1: Percent of Hoosiers with a Bachelor's Degree or Higher by Age and Gender, 2007

Percent Bachelor's Degree or Higher	Male	Female
Population 25 years and over	22.8 (+/-0.4)	21.4 (+/-0.3)
Population 25 to 34 years	23.4 (+/-1.0)	28.1 (+/-1.0)
Population 35 to 44 years	22.8 (+/-0.9)	25.7 (+/-0.9)
Population 45 to 64 years	24.2 (+/-0.6)	21.5 (+/-0.7)
Population 65 years and over	18.9 (+/-0.9)	11.1 (+/-0.6)

Note: Differences between men and women are significant at the 99 percent confidence level.

Source: U.S. Census Bureau American Community Survey

However, when looking at the 35-to-44 age group, 25.7 percent of Hoosier women have a bachelor's or higher as opposed to just 22.8 percent of men. We see an even larger gap in the 25-to-34 age group, where 28.1 percent of women have a bachelor's degree or more, compared to 23.4 percent of men.

For women, the younger the age group, the higher the educational attainment—not surprising given the shift in women's working habits over the past several decades. One might expect a similar pattern to hold for men given the increasing importance of higher education in the job market;

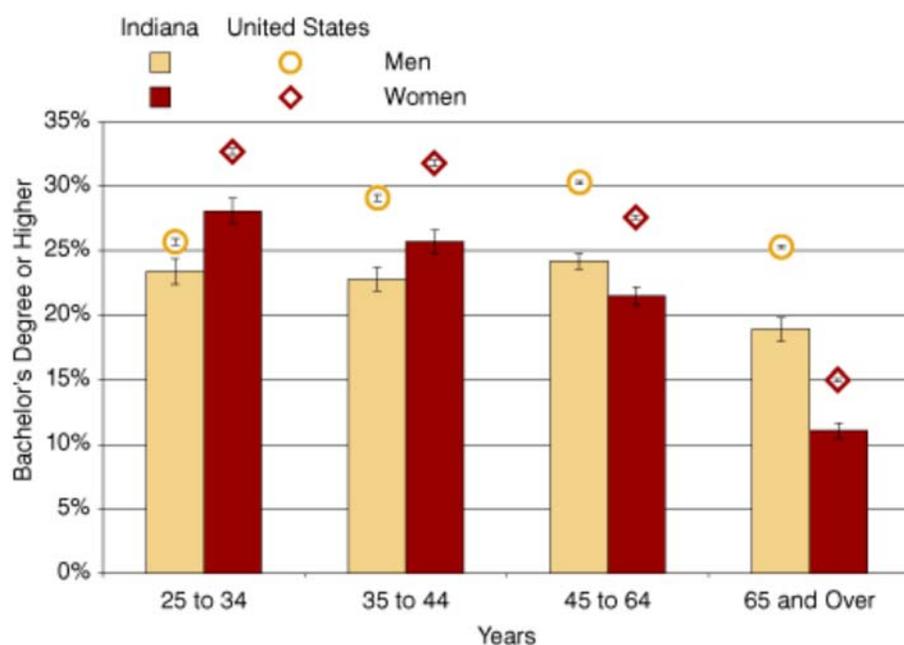
however, it is the men of the baby boom who have the highest percentage with a bachelor's degree or higher (refer again to **Table 1**).

While 24.2 percent of the male population between the ages of 45 and 64 have earned a bachelor's degree or more, that figure falls to 22.8 percent for the 35-to-44 age group, (a difference which is significant at the 95 percent level). However, it is worth mentioning that the attainment gap between men in the 45-to-64 age group and those in the 25-to-34 age group is not statistically significant, so we cannot conclude (with reasonable certainty) that the difference between the two is due to anything other than chance.

National Comparison

Before Hoosier women are overcome with a superiority complex, it is worth mentioning that Indiana lags the nation in educational attainment across the board (see **Figure 1**). For women, the smallest gap between Indiana and the United States is in the 65-and-older age group, while for men it is in the 25-to-34 age group. Therefore, even though male educational attainment in Indiana's younger age groups appears to have stagnated relative to the attainment of the baby boom generation, it compares fairly well to the national figure.

Figure 1: Percent of Male and Female Population with a Bachelor's Degree or Higher, 2007



Note: Lines show the margin of error at the 90 percent confidence level.

Source: IBRC, using U.S. Census Bureau data

Recent Changes

Between 2006 and 2007, only one measure has changed enough to register as statistically significant. We saw a 1.8 percentage point increase in the number of women age 35 to 44 with a bachelor's degree or higher (significant at the 95 percent confidence level). This could be the result of any number of factors: more women returning to school to get a degree; more educated women

moving into the state; less educated women leaving the state; or a shift due to the changing age cohort.

Looking Ahead

Many of the fastest growing jobs of tomorrow will require at least a bachelor's degree.¹ Indiana business and government leaders have cited education of our workforce as one of our most important issues. With this in mind, and as Indiana's economy continues to transition to a knowledge economy, it will be important that both our men and women bring the necessary skills and degree achievements to the table.

Note

1. Rachel Justis, "Are the Well-Educated Coming to Indiana?" *InContext*, November 2006. Available online at www.incontext.indiana.edu/2006/november/2.html

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The Kokomo Metro Story: Told by STATS Indiana

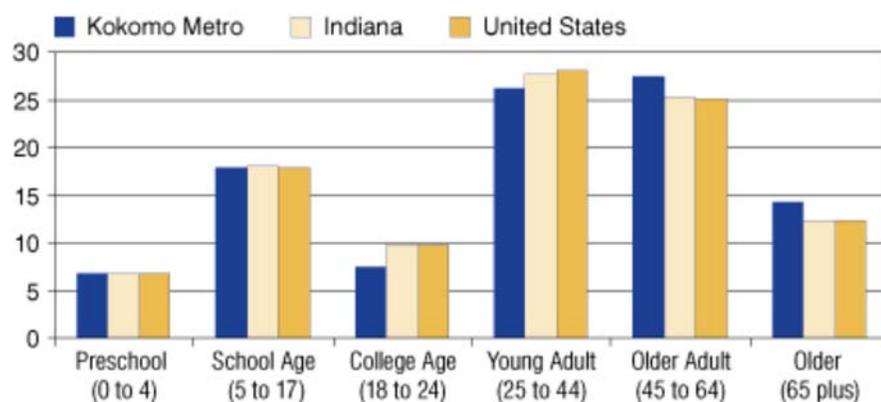
This is the ninth in a series of articles on Indiana's metropolitan statistical areas (metros). All the data used in this article can be found using the USA Counties and Metros Side-by-Side feature on STATS Indiana (www.stats.indiana.edu) unless otherwise noted.

The Area

The Kokomo metro is made up of Howard and Tipton counties, located north of the Indianapolis-Carmel metro. The largest city is Kokomo, also called "The City of Firsts." Population in the metro has returned to its 1970 level, with approximately 99,800 people. In comparison, Indiana saw an increase of 22.1 percent over that time while the U.S. population grew 48.4 percent.

According to the most recent data, this change in population is largely due to net domestic out migration. International migration was positive for the Kokomo metro and so was the natural increase (births minus deaths) from 2006 to 2007. However, if we look at population by age data (the latest available is 2006), we find that the Kokomo metro has two age groups with a high percentage of its population compared to the United States and Indiana: the 45-to-64 age group and the 65-and-older age group (see **Figure 1**). The median age in the metro (39 years) is nearly three years older than the median age in Indiana.

Figure 1: Percent of Total Population by Age, 2006



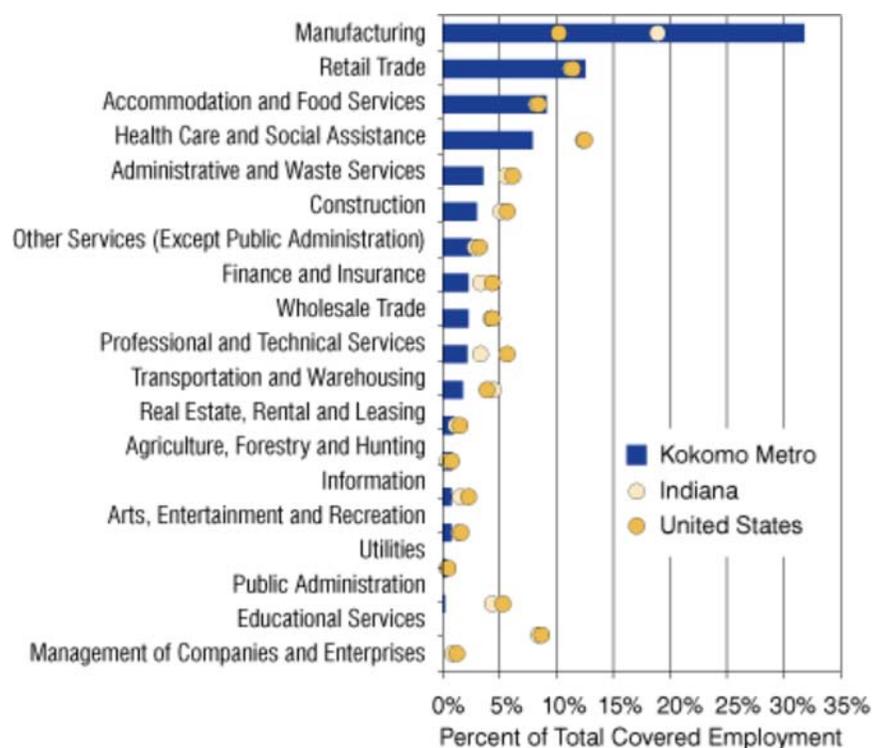
Source: IBRC, using U.S. Census Bureau data

Jobs and Wages

News about jobs in the Kokomo metro will come as no surprise to those familiar with the area. Unlike Indiana and the United States, both of which bounced back from the 2001 recession fairly well, the Kokomo metro has been steadily losing jobs. Kokomo, a manufacturing-intensive metro to

say the least, shows the effects of the changing manufacturing industry more dramatically than the state or nation. Three out of every 10 people in the metro held a manufacturing job in 2007, far exceeding Indiana's 18.9 percent of employment in the manufacturing industry and the United State's 10.3 percent. Needless to say, with such a concentrated industry portfolio, the Kokomo metro was bound to take a hit when the manufacturing industry did so. The top three industries in the Kokomo metro made up more than half of employment in the metro in 2007 (see **Figure 2**).

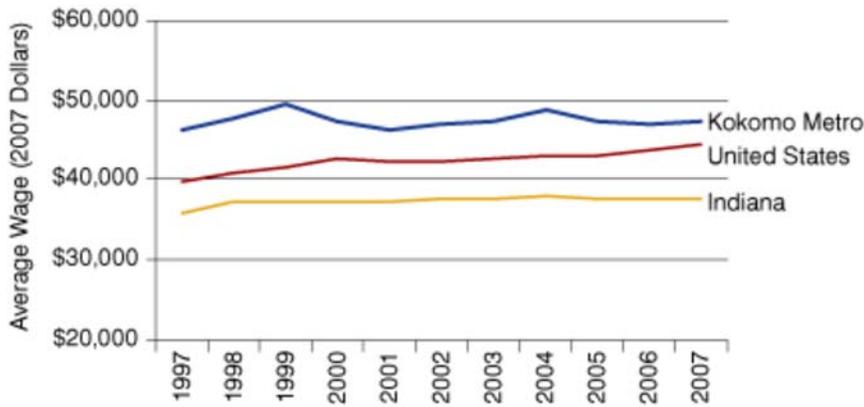
Figure 2: Jobs as a Percent of Total Covered Employment, 2007



Note: Mining data are not available for the Kokomo metro
Source: IBRC, using Bureau of Labor Statistics data

The good news for the Kokomo metro is that average wages per job consistently remained above Indiana and U.S. wages from 1997 to 2007. There were a couple of dips, as **Figure 3** shows, in 2001 and again in 2005 and 2006, but the smallest margin between Kokomo and U.S. wages over the time span still shows Kokomo paying at least \$2,800 more per job than the United States. However, growth in U.S. wages has been decreasing the margin for the past four years.

Figure 3: Average Wage per Job in the Kokomo Metro, Indiana and the United States, 1997 to 2007

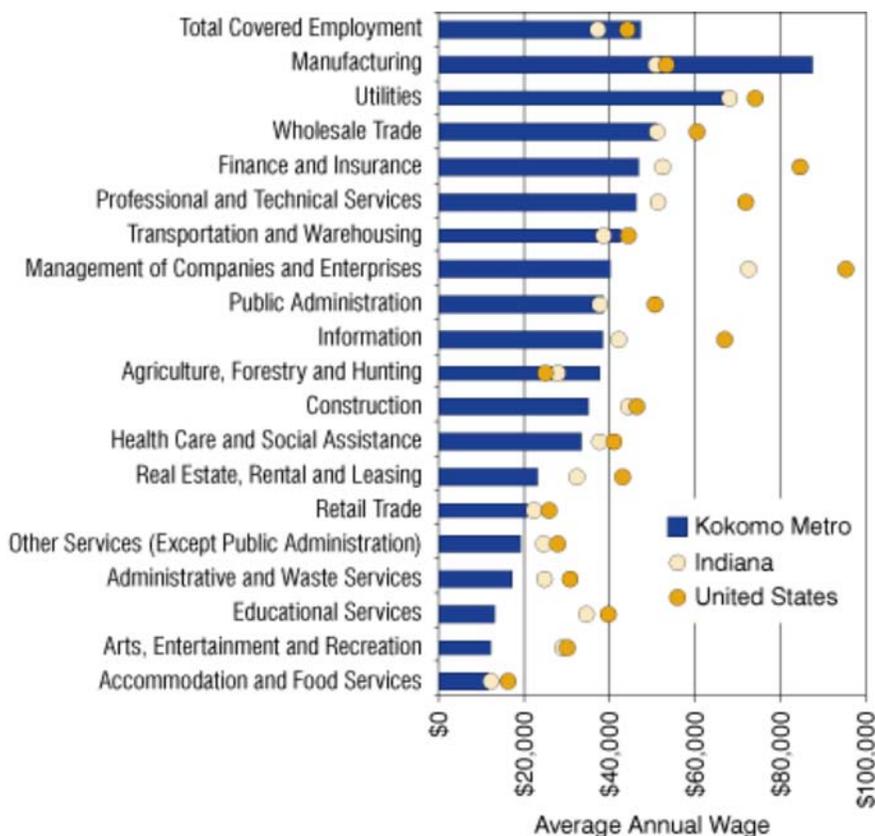


Source: IBRC, using Bureau of Labor Statistics data

In 2007, the manufacturing industry in the Kokomo metro paid an average wage that was \$36,329 higher than Indiana's wages in manufacturing, with Kokomo workers making an average \$87,471 per year (see **Figure 4**). Other industries that paid higher wages in Kokomo include the following:

- Agriculture, forestry and hunting (\$9,760 higher than the state average)
- Transportation and warehousing (\$3,649 higher than the state average)
- Public administration (\$781 higher than the state average)
- Utilities industry (\$62 higher than the state average)

Figure 4: Average Wage by Industry in the Kokomo Metro, Indiana and the United States, 2007



Note: Mining data are not available for the Kokomo metro
 Source: IBRC, using Bureau of Labor Statistics data

Conclusion

Population and jobs aren't looking the best at this point for the Kokomo metro area, but wages in the metro remain high. Although Delphi and Chrysler layoffs have been hard on the Kokomo metro economy, recent news articles suggest the area is attempting to bolster its economy in areas other than manufacturing. Tipton County is becoming part of a two-county arts trail that will provide people with the opportunity to explore the arts and culture of Tipton and Hamilton counties.¹ The new U.S. 31 Kokomo corridor could also bring new business to the area.² In the grand scheme of things, however, the Kokomo metro's ability to diversify across nonmanufacturing industries or alter its manufacturing path will likely determine how well the area economy will be doing over the next decade.

1. Ken de la Bastide, "Tipton to be part of two-county Arts Trail," *Kokomo Tribune*, September 25, 2008.
2. Scott Smith, "Ceremony for new U.S. 31 Kokomo corridor draws crowd," *Kokomo Tribune*, September 18, 2008.

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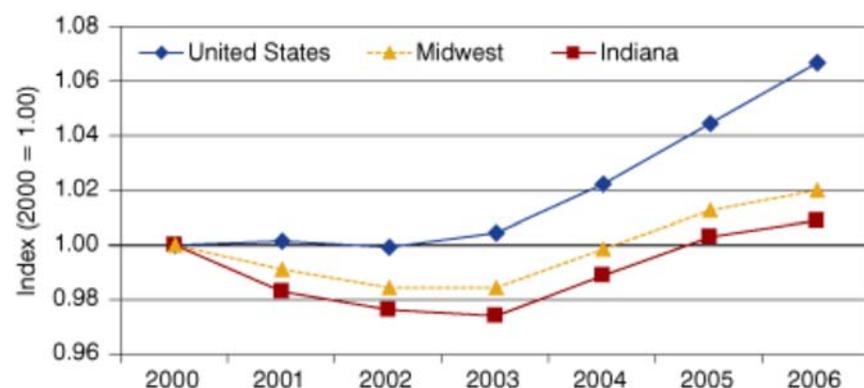
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Increasing Per Capita Personal Income in Indiana

This is one of those good news, bad news stories. First, some good news: In recent years, the unemployment rate in Indiana has been lower than all Midwestern states, except for Iowa and Minnesota. The bad news? Indiana's average earnings per job and personal income per capita remain below national and Midwestern averages. But there is an upside: Hoosiers' per capita personal incomes have been accelerating recently. Let's take a closer look at these trends.

Indiana's economy has been slowly gaining jobs. From 2001 to 2006, Indiana had a net increase of about 28,280 wage and salary jobs, or an increase of 94,700 jobs if we use the broader measure of employment that includes proprietors.¹ That doesn't sound too impressive until one considers that Indiana lost more than 41,000 wage and salary jobs from 2001 to 2003. Since 2001, the lowest point for economic output during the last economic slowdown, total employment has increased at an average annual rate of 0.5 percent. Over the same time period, U.S. employment increased at an average annual rate of 1.3 percent. **Figure 1** shows that Indiana and the rest of the Midwest continued to lose jobs after the official end of the recession (November 2001), while employment for the nation as a whole regained its footing more quickly.

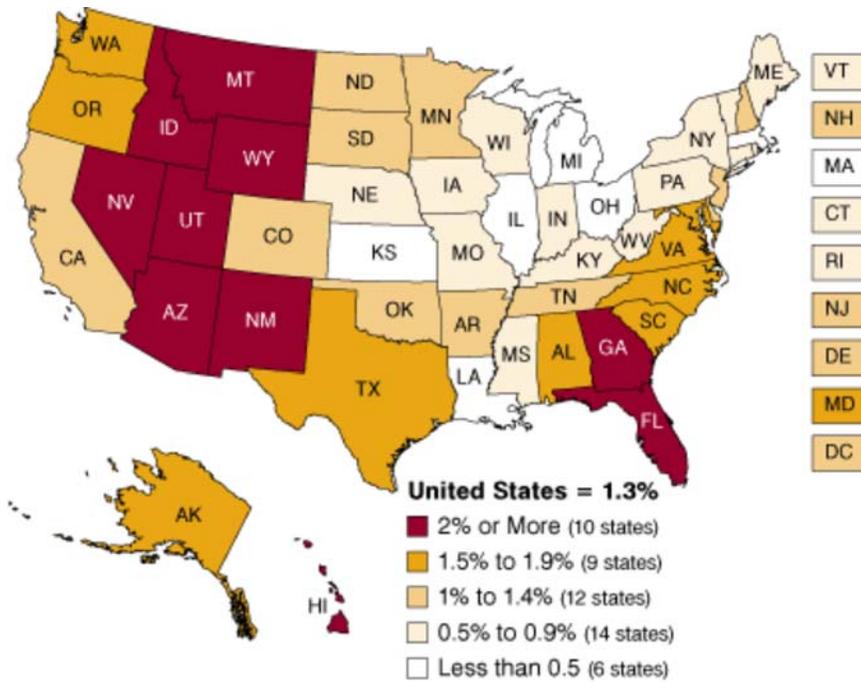
Figure 1: Employment Growth in Indiana, the Midwest and the United States, 2001 to 2006



Source: IBRC, using Bureau of Economic Analysis data

Figure 2 shows how Indiana's job growth has done relative to the rest of the country. Indiana's 0.5 percent average annual growth rate in employment is well behind many Western states, plus Florida and Georgia—which have enjoyed employment growth of more than 2 percent.

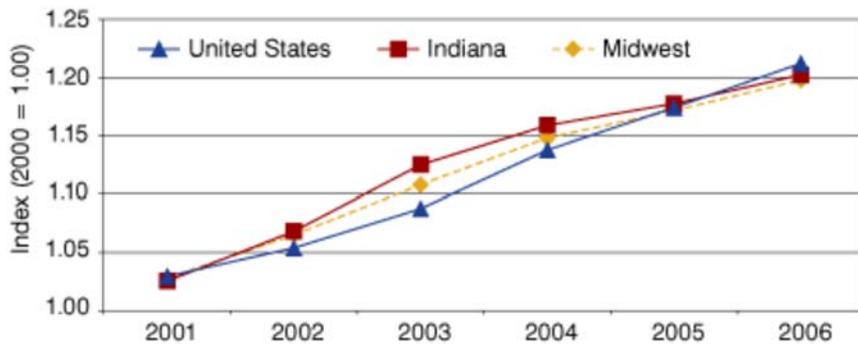
Figure 2: Average Annual Rate of Change for Total Employment, 2001 to 2006



Source: IBRC, using Bureau of Economic Analysis data

Without adjusting for inflation, average earnings per job in Indiana grew faster between 2000 and 2004 than in the Midwest or the United States. In 2006, however, the state's rate of growth in average earnings per job fell slightly below the average for the United States (see **Figure 3**).

Figure 3: Growth in Average Earnings per Job in Indiana, the Midwest, and the United States, 2001 to 2006

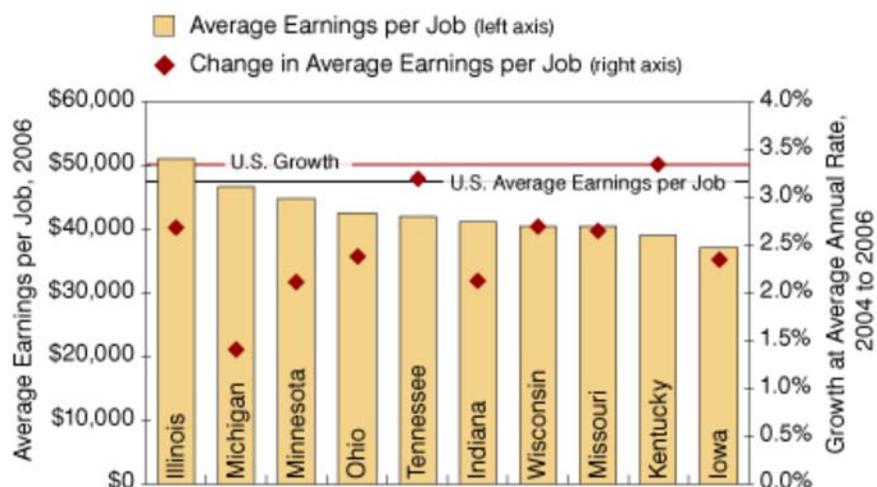


Source: IBRC, using Bureau of Economic Analysis data

The change in the trend since 2004 from faster than the national average to slower than the national average means that the gap between the national average earnings level and Indiana's has widened. Among its Midwestern neighbors, Indiana finds itself in the middle tier in terms of both its level and recent growth in average earnings per job (see **Figure 4**). **Figure 5** shows how all the states compare in average earnings per job growth from 2001 to 2006. Only two states were in the top 10 for both growth rate in employment and average earnings per job: Wyoming and Hawaii. Two states share the dubious distinction of being in the bottom 10 for both growth rate in employment and average earnings per job from 2001 to 2006: Michigan and Ohio. In contrast to the rate of

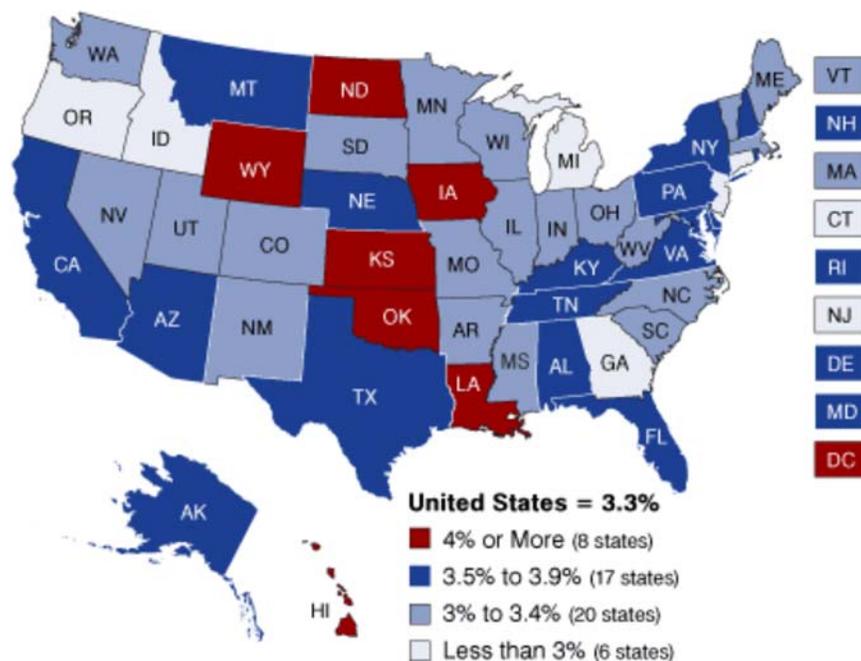
employment growth, the growth rate for average earnings per job in Indiana is in the middle of the pack, placing the state 30th in the country and close to the national average.

Figure 4: Average Earnings per Job in the Midwest



Source: IBRC, using Bureau of Economic Analysis data

Figure 5: Average Annual Rate of Change in Average Earnings per Job, 2001 to 2006



Source: IBRC, using Bureau of Economic Analysis data

While the middle of the pack may not be such a bad place to be, Indiana's position is largely attributable to the spurt early in the time series, as **Figure 3** shows. More recently, Indiana's rate of growth in earnings per job has been 1.2 percentage points lower than the national average. If this trend continues, Indiana's average earnings will continue to lose ground relative to most other states and, to the degree that earnings per job drives per capita personal income, the acceleration in per

capita personal income will be short lived.

Indiana's high concentration of manufacturing jobs may further drag down employment and earnings figures. Data from 2006 indicate that while average earnings for manufacturing jobs are among the fastest growing in the nation, the industry is one of the few that is losing employment across the United States. Please see "[Shifting Gears: Recent Changes in Indiana's Economy](#)" published in the *Indiana Business Review* that dissects recently released sector-by-sector data that may help explain the dynamics underlying Indiana's income per capita and average earnings per job.

Indiana Counties

From 2001 to 2006, Hamilton County gained the most employment in absolute terms (nearly 32,000) and was second in terms of average rate of growth, just behind Hendricks County. Marion County was a net job loser from 2001 to 2006, dropping 5,300 jobs over the period. However, from 2005 to 2006, the county employment situation turned around and Marion County gained 5,300 jobs.

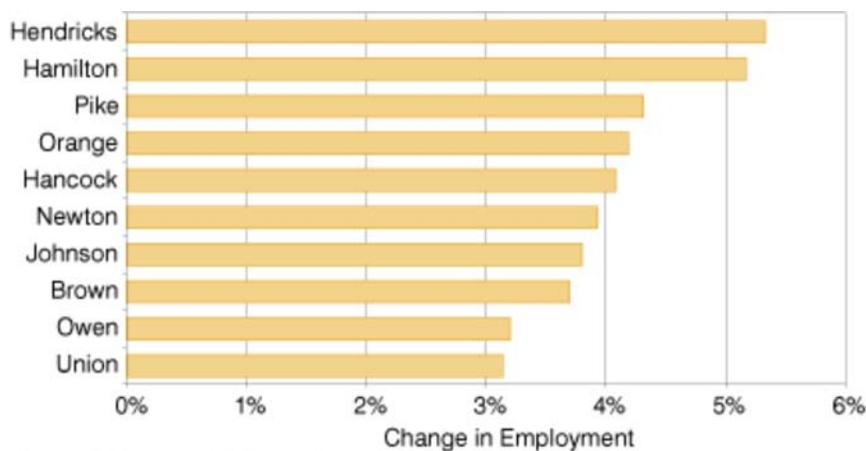
In cases like Marion County, the five-year average provides an inaccurate picture of recent and perhaps future performance. Trends or averages for several years may also fall short in providing insight to the dynamics of the local economy. Delaware County, hard hit by the restructuring automobile industry, is another case in point. While annual job loss averaged over 800 per year from 2001 to 2006, Delaware County gained nearly 1,000 jobs in 2006. There are, of course, counties where recent performance partially negated a positive five-year trend. Adams County, for example, gained more than 1,600 jobs from 2001 to 2005 but registered a loss of about 40 jobs in 2006.

Over the five-year period, 63 counties gained in total employment, while 29 lost jobs (see **Figure 6**). **Figures 7** and **8** highlight the counties with the highest rates of employment gains and the greatest rates of employment loss from 2005 to 2006.

Figure 6: Average Annual Rate of Change in Employment for Indiana Counties, 2001 to 2006

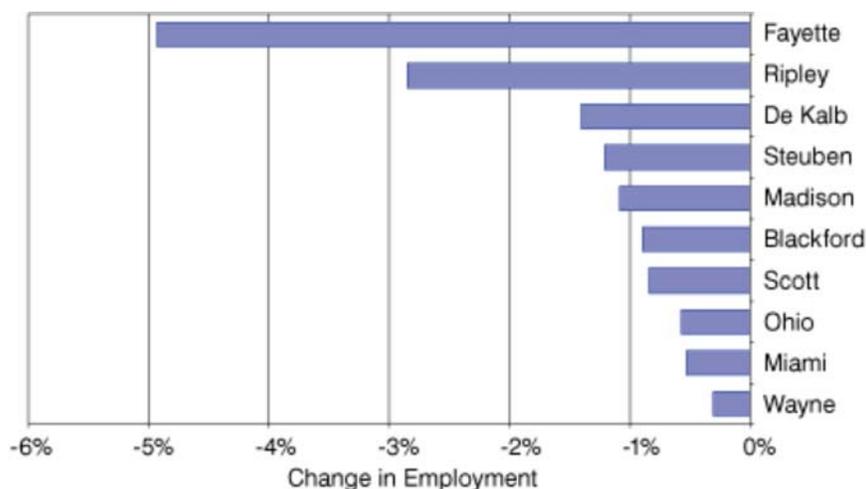


Figure 7: Ten Fastest Growing Counties for Employment, 2005 to 2006



Source: IBRC, using U.S. Census Bureau data

Figure 8: Ten Fastest Declining Counties for Employment, 2005 to 2006

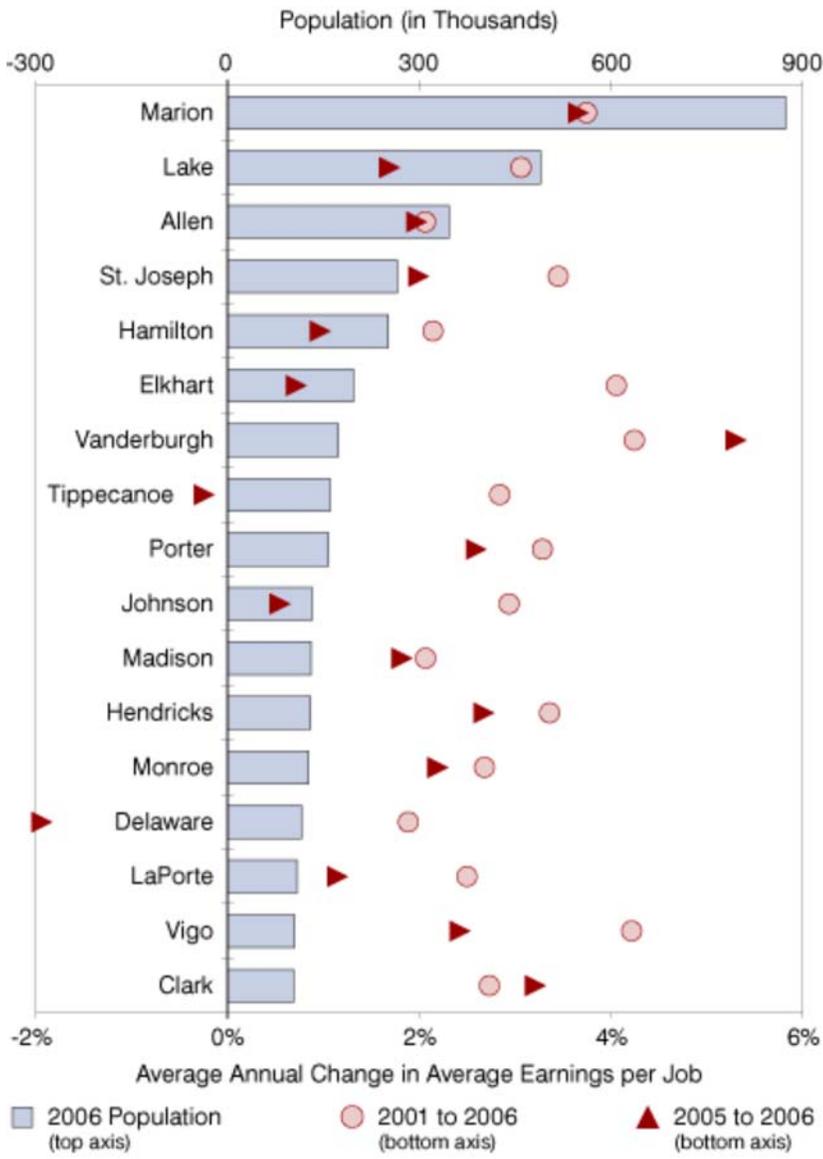


Source: IBRC, using U.S. Census Bureau data

Between 2001 and 2006, the highest rate of growth in average earnings per job was in Gibson County with an annual average growth rate of more than 6.7 percent, although the gains have not been as robust recently. From 2005 to 2006, average earnings declined slightly. Fayette County was the only county to experience a decline in average earnings between 2001 and 2006, but a total of 19 counties saw a decline in average earnings per job from 2005 to 2006.

Figure 9 shows how Indiana's largest counties performed in terms of average earnings per job. Of those 17 counties in the figure, just two saw earnings growth for 2005 and 2006 exceed the trend from 2001 to 2006. Of all Indiana counties, roughly 85 percent have experienced a slowdown in the rate of growth in average earnings per job. It is not surprising then that the 2005 to 2006 rate of change for the state as a whole also lags behind the five-year trend. **Figure 10** shows the growth rates for average earnings per job in Indiana for 2001 to 2006 county by county.

Figure 9: Growth in Average Earnings per Job for Indiana's Largest Counties, 2001 to 2006



Source: IBRC, using U.S. Census Bureau data

Figure 10: Average Annual Rate of Change in Average Earnings per Job, 2001 to 2006

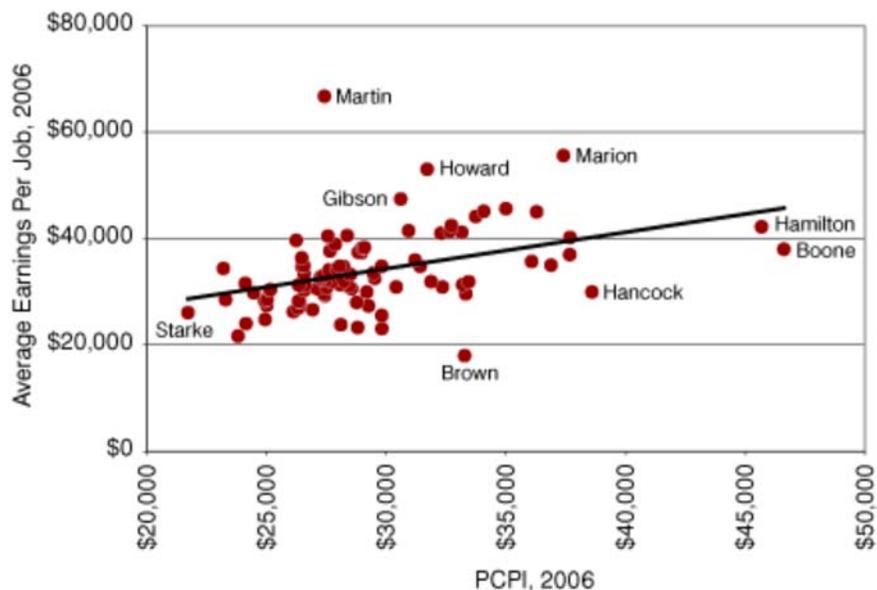


From Earnings to Income

Employment growth and average earnings growth are two important data series that help address the questions about economic well-being. Per capita personal income (PCPI), however, probably better encapsulates relative economic well-being. As PCPI increases, so does one's standard of living, all other things equal (like the cost of living). As the geographic boundaries for analysis become smaller—for example, shifting from state to county boundaries—personal income will increasingly diverge from average earnings because personal income is measured based on place of residence. Average earnings, on the other hand, are measured based on place of work. As a result, average earnings that are rising in, say, Greene County, may show up as rising per capita personal income in adjacent Daviess or Sullivan counties. Nevertheless, PCPI and average earnings per job are

correlated (see **Figure 11**).

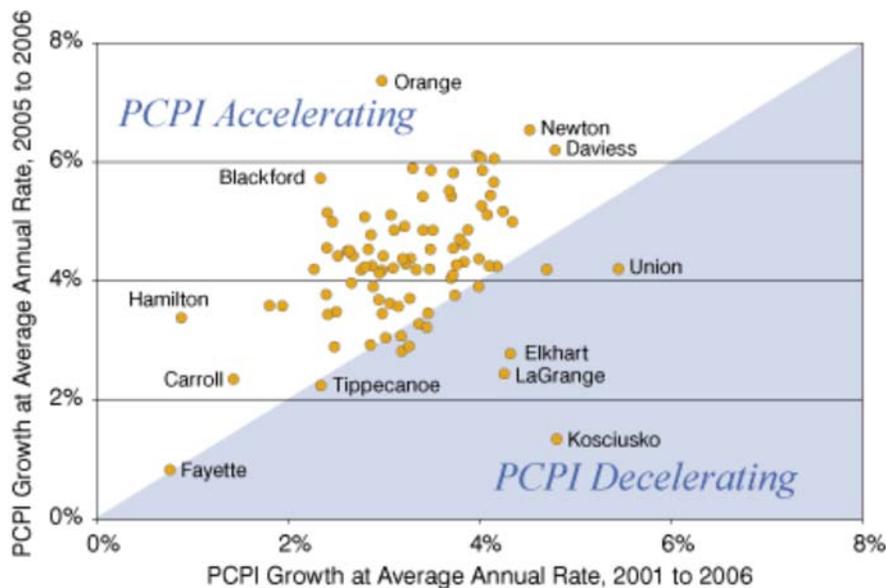
Figure 11: PCPI and Average Earnings, 2006



Source: IBRC, using Bureau of Economic Analysis data

There is an encouraging sign in Indiana's PCPI data. **Figure 12** plots the five-year average annual growth rate of PCPI against the 2005 to 2006 growth by county. Most counties are above the diagonal line, indicating acceleration in PCPI growth. Statewide, Indiana's PCPI has grown at an average annual rate of 3.3 percent from 2001 to 2006. Between 2005 and 2006, the average annual rate of growth was 4.4 percent.

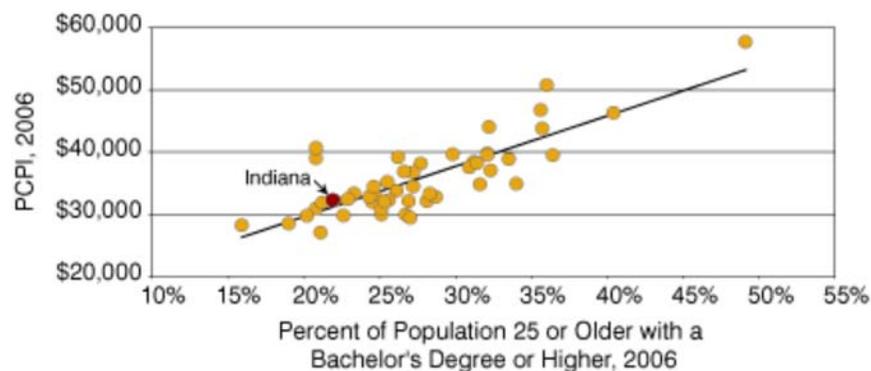
Figure 12: Employment and Earnings Trends in Indiana Counties, 2001 to 2006



Source: IBRC, using Bureau of Economic Analysis data

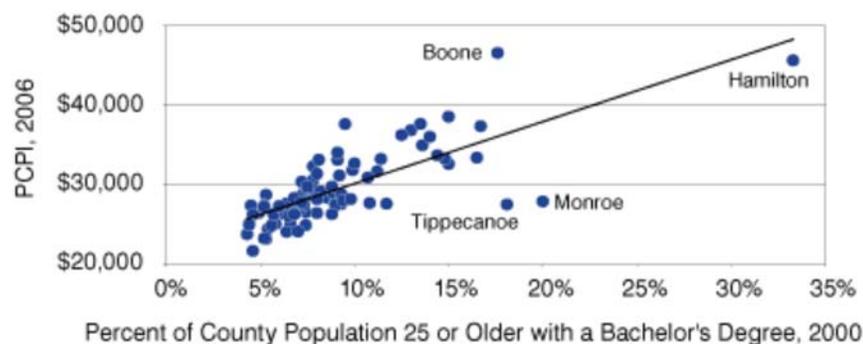
How can Indiana further improve its PCPI trends? In a word: education. The correlation between educational attainment and per capita personal income across states should come as no surprise. As **Figure 13** shows, there is a positive relationship between the percentage of the state's population 25 and older holding at least a bachelor's degree and the state's PCPI. This relationship also holds within Indiana. **Figure 14** plots the percentage of the county population holding a bachelor's degree against PCPI in the county.

Figure 13: PCPI and Educational Attainment in States



Source: IBRC, using Bureau of Economic Analysis and U.S. Census Bureau data

Figure 14: PCPI and Educational Attainment in Indiana Counties



Source: IBRC, using Bureau of Economic Analysis and U.S. Census Bureau data

Counties with a particularly large collegiate population tend to have a low average PCPI. This is because traditional college students, with typically low income, contribute little to the county's aggregate personal income total. So while their high population numbers inflate the county's population metric (the denominator), their low incomes don't add much to the aggregate county personal income figures (the numerator), thus reducing PCPI.

While students may dilute the PCPI statistic in Monroe and Tippecanoe counties, once the students graduate and settle elsewhere in Indiana, they enhance Hoosier income and wealth. That's a good news story for everyone.

Note

1. Although state-level data are now available for 2007, the data for 2006 were used in order to be consistent with the county-level analysis elsewhere in the article.

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The Search for Significance: A Crash Course in Statistical Significance Using ACS 2007

If we told you the American Community Survey (ACS) found that 26 percent of Hoosier women between the ages of 35 and 44 had a bachelor's degree or more compared to just 23 percent of men, how can you know if that is a real difference in educational attainment (that is, a statistically significant finding) or just a result of random sampling error? This article provides a brief tutorial on calculating statistical significance for those who want to accurately use ACS data without becoming statisticians.¹

Margins of Error

As with any survey, margins of error are critical—particularly as the size of the population in question decreases (because that typically increases the margin of error). A large margin of error makes the survey estimate less reliable, which can negatively affect your analysis and comparisons. The ACS reports the margin of error for the 90 percent confidence level. Therefore, if we look at the first row in **Table 1**, we can say that we're 90 percent confident that the number of Hoosier men between the ages of 25 and 34 is between 422,281 and 427,919 (that range—which is the estimate plus or minus the margin of error—is known as the confidence interval). In other words, there's only a 10 percent chance that the actual number of men in that age group falls outside of that range.

Table 1: Educational Attainment and Confidence Intervals for Indiana Men and Women, 2007

Subject	Male			Female		
	Estimate	Margin of Error	Confidence Interval	Estimate	Margin of Error	Confidence Interval
Population 25 to 34 years	425,100	+/-2,819	422,281-427,919	412,591	+/-2,879	409,712-415,470
Percent high school graduate or higher	86.7	+/-0.8	85.9-87.5	89.3	+/-0.7	88.6-90
Percent bachelor's	23.4	+/-1.0	22.4-24.4	28.1	+/-1.0	27.1-29.1

degree or higher						
Population 35 to 44 years	447,489	+/-2,440	445,049-449,929	444,091	+/-2,585	441,506-446,676
Percent high school graduate or higher	87.1	+/-0.9	86.2-88	90.5	+/-0.8	89.7-91.3
Percent bachelor's degree or higher	22.8	+/-0.9	21.9-23.7	25.7	+/-0.9	24.8-26.6
Population 45 to 64 years	796,162	+/-2,157	794,005-798,319	824,930	+/-2,596	822,334-827,526
Percent high school graduate or higher	88.1	+/-0.5	87.6-88.6	89	+/-0.5	88.5-89.5
Percent bachelor's degree or higher	24.2	+/-0.6	23.6-24.8	21.5	+/-0.7	20.8-22.2
Population 65 years and over	328,860	+/-1,151	327,709-330,011	464,296	+/-1,431	462,865-465,727
Percent high school graduate or higher	75.3	+/-1.2	74.1-76.5	73.7	+/-0.9	72.8-74.6
Percent bachelor's degree or higher	18.9	+/-0.9	18-19.8	11.1	+/-0.6	10.5-11.7

Source: IBRC, using data from the U.S. Census Bureau American Community Survey

One might think that this is all the information we need to determine statistical significance: As long as the confidence intervals of two numbers don't overlap, we're good to go, right? Unfortunately, it is

a bit more complex than that, and the Census Bureau discourages the use of confidence intervals alone to determine a value's statistical significance. Instead, we should calculate z-scores, which are standardized figures that allow us to make comparisons.

Three Steps to Determining Significance

The first step in determining statistical significance is to convert the margin of error into a standard error. This calculation varies depending on if we are using numbers directly from published ACS tables or if we've done some intermediate calculations on our own, such as calculating a percentage. Since our data do not contain any derived estimates, all we need to do for this step is divide the margin of error value by 1.645.²

The second step is to calculate the z-score itself (see **Table 2**). If we let A represent the male estimates, use B for the female estimates and use SE(A) and SE(B) for the standard errors of those respective estimates, the formula is as follows:

$$z = \frac{A - B}{\sqrt{SE(A)^2 + SE(B)^2}}$$

Table 2: Comparing Male and Female Educational Attainment Z-Scores for Indiana, 2007

Subject	Male (A)			Female (B)			Z-Score Comparing Male and Female Populations*
	Estimate	Margin of Error	Standard Error	Estimate	Margin of Error	Standard Error	
Population 25 to 34 years	425,100	2,819	1,714	412,591	2,879	1,750	5.11
Percent high school graduate or higher	86.7	0.8	0.486	89.3	0.7	0.426	-4.02
Percent bachelor's degree or higher	23.4	1	0.608	28.1	1	0.608	-5.47
Population 35 to 44 years	447,489	2,440	1,483	444,091	2,585	1,571	1.57
Percent high school	87.1	0.9	0.547	90.5	0.8	0.486	-4.64

graduate or higher							
Percent bachelor's degree or higher	22.8	0.9	0.547	25.7	0.9	0.547	-3.75
Population 45 to 64 years	796,162	2,157	1,311	824,930	2,596	1,578	-14.02
Percent high school graduate or higher	88.1	0.5	0.304	89	0.5	0.304	(2.09)
Percent bachelor's degree or higher	24.2	0.6	0.365	21.5	0.7	0.426	4.82
Population 65 years and over	328,860	1,151	700	464,296	1,431	870	-121.32
Percent high school graduate or higher	75.3	1.2	0.729	73.7	0.9	0.547	1.75
Percent bachelor's degree or higher	18.9	0.9	0.547	11.1	0.6	0.365	11.86

Note: Bold cells are significant at the 99 percent confidence level.

Source: IBRC, using data from the U.S. Census Bureau American Community Survey

Here's an important note for Excel users: When downloading percentage data from American FactFinder, it will format the values as percents (22.8%), which Excel stores in decimal form (0.228). The margins of error, however, are stored as regular numbers (0.9). As one can imagine, mixing those two formats yields utterly meaningless z-scores. Therefore, always make sure to convert any percentages to numeric format (22.8) so they are in the same units as the margin of error before calculating the z-score.

The third step is to use the z-score to determine if the difference between the genders is significant or if random chance can explain the difference. **Table 3** provides the z-score thresholds with their

corresponding confidence level. Essentially, as the absolute value of the z-score becomes larger, the more confident we are that a real difference in the estimates exists. Looking back at **Table 2**, we find that nearly all of the values are significant at the 99 percent level, which means that we're 99 percent sure that the difference is not due to random chance.

Table 3: Z-Scores and Levels of Significance

If ...	Then the difference between A and B is ...
$z < -1.645$ or $z > 1.645$	Significant at the 90 percent confidence level
$z < -1.96$ or $z > 1.96$	Significant at the 95 percent confidence level
$z < -2.576$ or $z > 2.576$	Significant at the 99 percent confidence level

Source: U.S. Census Bureau American Community Survey

For more information, download the Census Bureau's instructions on statistical testing and ACS 2007 available at www.census.gov/acs/www/Products/users_guide/ACS_2007_Statistical_Testing.pdf.

Notes

1. Data in this article are extracted from Table S1501 in the 2007 American Community Survey dataset, available via American Factfinder at <http://factfinder.census.gov/>.
2. The denominator is 1.645 for ACS data from 2006 and later; For ACS data from 2005 or earlier, 1.65 should be used. For the Census Bureau recommended calculations for derived estimates, visit www.census.gov/acs/www/Products/users_guide/ACS_2007_Statistical_Testing.pdf

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