

Post Evaluation of the Arkansas 2005-2030 County Projections Using 2010 Census Data

Gregory L. Hamilton, Alison Wiley, and Kevin Koonce
Institute for Economic Advancement
University of Arkansas at Little Rock
September 2013

In 2004 population projections by county were created for the 2005-2030 period. The projections utilized July 1st population estimates from the 1980-2004 period.¹ The 2005-2030 population projections were trend projections derived by extrapolating historic population trends into the future using a technique based on Holt's exponential smoothing method.

The 1980-2004 data for this population projection was a mixture of the 1980, 1990, 2000 Census midyear estimates, annual intercensal population estimates from the 1980-2000 period, and the annual midyear population estimates produced by the Census Bureau for 2001-2004. In the County Charts of the Time Series available online this data is denoted as the historic data series.¹ Using Holt's technique and the historic data, the values for the chart's fitted series were estimated. This series consisted of the predicted values for the 1980-2004 historic series and the 2005-2030 annual population projections for the county. Lower and upper bounds for a 95% confidence interval about the population projections were also estimated. This range shows an interval of population projections that could be expected to occur 95 out of 100 projections. That is, 95% of the time the population projections should fall within this interval.

After Census in 2010, the Census Bureau revised the 2001-2009 annual estimates with their permanent intercensal estimates based upon the Census 2010 enumeration.² The annual population estimates were dispensed with and replaced with the intercensal estimates for the 2001-2009 period. In addition the mid-year 2010 population estimate became the enumeration for that year. The analysis reported in this document used these latter population estimates to evaluate the forecast accuracy of the 2001-2010 projections that were made in 2004.

The analysis compared the two 2001-2010 times series by adding the new intercensal estimates to the online county charts. This allows for a visual inspection of the accuracy of the 2004

¹ Hamilton, G.L. Arkansas 2005-2030 County and State Population Projections: Time Series Extrapolations, http://www.aiea.ualr.edu/images/rokdownloads/DemoRes/population/expo_proj_doc_05_30.pdf.

² County Charts of Time Series, 1980-2030. <http://www.aiea.ualr.edu/population-estimates/34-data-and-economic-research/demographic-research/518-county-charts-of-time-series-1980-2030.html>

population projections for the 2001-2010 period. The accompanying table summarizes findings from this inspection.

There were a total of 75 county projections. Of these projections, populations in eight counties grew slower than projected. This means that at the end 2001-2010 period the revised intercensal estimates were below the lower bound of the 95% confidence interval constructed around their projections. In other words, the counts in these counties were significantly less than projected in 2004. On the other hand, five counties had population counts significantly higher than projected in 2004. Their revised population estimates (intercensal estimates) were above the upper bound of the 95% confidence interval at the end of the 2001-2010. In these counties, their populations were greater in 2010 than originally projected in 2004. For the remaining sixty-two counties, the revised population estimates fell within their 95% confidence interval indicating that the projections are not significantly different from the intercensal revisions. The population counts in these counties were in line with their projections. For the counties whose intercensal estimates fell within the confidence interval of their trend projections, 16 counties (21%) had intercensal estimates that were below the predicted counts; 33 counties (44%) intercensal estimates were effectively the same as the predicted values; and in 13 counties (17%) the intercensal estimates were above their predicted counts.

The mean absolute percent error (MAPE) is a widely used measure of forecast accuracy. In this case the percent error is the percentage difference between the annual values of the projected population and the intercensal estimate. For each county, the mean of the absolute values of the percentage errors were calculated and are reported in the table. The smaller the MAPE the greater the accuracy of the forecast which means in terms of the charts that the fitted values are closer to the intercensal estimates. The average value of the MAPEs for the seventy-five counties was 1.58%, the median value was 1.35%, and the MAPEs ranged from .42% to 4.91%.

In conclusion, the projections that were made in 2004 for the 2001 to 2010 period were acceptable for 83% of the counties. For these projections, the revised intercensal population estimates fell within the 95% confidence interval about the county's trend projections. For 11% of the counties, the revised intercensal estimates reported by the U.S. Census Bureau were significantly less than the trend projections. For these counties their projected population counts were greater than their intercensal counts. Their populations actually grew slower than projected. In the remaining counties (approximately 7% of the counties), the U.S. Census Bureau revised intercensal estimates were significantly higher than the trend projections indicating that the actual population counts were higher than projected. Populations in these counties grew faster than predicted. Overall, 21 counties had intercensal population estimates that were below their projections, 18 county's intercensal population estimates exceeded their

trend projections, and for 33 counties the intercensal population estimated coincided with their projections. (See Map below)

Post Evaluations of 2004's County Population Projections for the 2001-2010 Period						
Counties	Intercensal Population Estimates Below and Outside Projection Interval	Intercensal Population Estimates Within Predicted			Intercensal Population Estimates Population Above and Outside Projection Interval	Mean Absolute Percent Error
		Intercensal Population Estimates in Projection Interval and Below Projected Counts	Intercensal Population Estimates in Projection Interval and Along Projected Counts	Intercensal Population Estimates Above in Projection Interval and Above Projected Counts		
	Outside Projection (Below)	Below Projection	Along Projection	Above Projection	Outside Projection Interval (above)	
Arkansas	0	1	0	0	0	1.51%
Ashley	1	0	0	0	0	3.15%
Baxter	0	1	0	0	0	1.66%
Benton	0	0	1	0	0	0.45%
Boone	0	0	1	0	0	0.94%
Bradley	0	1	0	0	0	2.67%
Calhoun	0	0	1	0	0	1.39%
Carroll	0	0	1	0	0	0.98%
Chicot	0	1	0	0	0	2.63%
Clark	0	0	1	0	0	0.70%
Clay	0	0	1	0	0	0.75%
Cleburne	0	1	0	0	0	1.11%
Cleveland	1	0	0	0	0	2.25%
Columbia	0	0	1	0	0	0.97%
Conway	0	0	0	1	0	1.12%
Craighead	0	0	0	0	1	1.53%
Crawford	0	0	1	0	0	0.94%
Crittenden	0	1	0	0	0	1.48%
Cross	1	0	0	0	0	2.57%
Dallas	0	0	1	0	0	0.71%
Desha	1	0	0	0	0	4.30%
Drew	0	0	1	0	0	0.42%
Faulkner	0	0	0	1	0	1.91%
Franklin	0	0	1	0	0	0.88%
Fulton	0	0	1	0	0	1.31%
Garland	0	0	1	0	0	0.74%
Grant	0	1	0	0	0	1.59%
Greene	0	0	1	0	0	0.77%
Hempstead	0	1	0	0	0	2.20%
Hot Spring	0	0	0	0	1	3.26%
Howard	1	0	0	0	0	3.97%
Independence	0	0	0	1	0	1.12%
Izard	0	0	1	0	0	0.97%
Jackson	0	0	0	1	0	4.91%

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		Intercensal Population Estimates in Projection Interval and Below Projected Counts	Intercensal Population Estimates in Projection Interval and Along Projected Counts	Intercensal Population Estimates Above in Projection Interval and Above Projected Counts		
	Outside Projection (Below)	Below Projection	Along Projection	Above Projection	Outside Projection Interval (above)	
Jefferson	1	0	0	0	0	2.34%
Johnson	0	0	0	1	0	1.11%
Lafayette	0	0	1	0	0	0.97%
Lawrence	0	0	1	0	0	0.54%
Lee	0	1	0	0	0	1.57%
Lincoln	0	0	1	0	0	0.72%
Little River	0	0	1	0	0	0.94%
Logan	1	0	0	0	0	2.13%
Lonoke	0	0	1	0	0	0.46%
Madison	0	0	1	0	0	1.39%
Marion	0	0	1	0	0	1.04%
Miller	0	1	0	0	0	1.35%
Mississippi	0	0	1	0	0	1.20%
Monroe	0	0	1	0	0	1.61%
Montgomery	0	0	1	0	0	0.92%
Nevada	0	1	0	0	0	2.12%
Newton	0	0	1	0	0	1.02%
Ouachita	0	0	1	0	0	0.63%
Perry	0	1	0	0	0	1.30%
Phillips	0	0	1	0	0	0.99%
Pike	0	0	0	1	0	1.87%
Poinsett	0	1	0	0	0	1.37%
Polk	0	0	0	1	0	1.75%
Pope	0	0	0	0	1	2.44%
Prairie	0	0	1	0	0	1.44%
Pulaski	0	0	0	0	1	1.00%
Randolph	0	1	0	0	0	2.12%
Saint Francis	0	0	0	1	0	2.66%
Saline	0	0	0	0	1	3.81%
Scott	0	0	1	0	0	0.95%
Searcy	0	0	0	1	0	1.51%
Sebastian	0	0	0	1	0	1.45%
Sevier	0	0	1	0	0	1.04%
Sharp	0	1	0	0	0	1.31%
Stone	0	0	0	1	0	1.65%
Union	1	0	0	0	0	2.72%
Van Buren	0	0	1	0	0	0.91%
Washington	0	0	0	1	0	2.07%
White	0	0	1	0	0	1.08%
Woodruff	0	1	0	0	0	1.35%
Yell	0	0	0	1	0	1.90%
Counts (Totals)	8	16	33	13	5	Ave 1.58%

