

## Using Population Data: Migration

### Douglas County Population Forecast 2010 to 2040

The Center for Economic Development and Business Research, W. Frank Barton School of Business at Wichita State University, recently released online population projections by age cohort from 2010 through 2040 for all Kansas counties. This report is the second in a series of reports aimed at identifying ways to use population projection data. This report analyzes the population projections for Douglas County in order to demonstrate the impact migration patterns have on estimates.

#### Migration Overview

Two sets of population projections were completed to compensate for the unreliability of migration patterns. Migration patterns can change rapidly due to economic conditions, government policy or natural disasters. The first projection set is based on the continuation of migration patterns (domestic and international) as experienced in each county from 2000 through 2009. The second set of projections assumes a net migration rate of zero throughout the forecast period.

The study applied the U.S. Census Bureau's 2000 to 2009 migration rates, by county to estimate migration over the forecast period.<sup>1</sup> Total migration was distributed by age cohort based on the Census Bureau's November 2011 report on geographic mobility.<sup>2</sup>

Two simplifying assumptions have been made. First, it was assumed that migration affects sex cohorts equally. The second assumption was that migration patterns will remain constant over the study period. This is unlikely, but forecasting migration rates is an inexact process. For that reason, population estimates should be updated every five years to reflect changing migration patterns. Furthermore, estimates should be forecasted as decennial census data becomes available.

#### Douglas County Migration

Douglas County has a high rate of, and variance in, net migration over time. In 2000, there was a net increase of 164 individuals, while in 2006 there was a net increase of 999 individuals. The average net rate of migration

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<sup>1</sup> U. S. Census Bureau. <http://www.census.gov/popest/counties/CO-EST2009-06.html>

<sup>2</sup> U.S. Census Bureau. <http://www.census.gov/prod/2011pubs/p20-565.pdf>

between 2000 and 2009 was 5.8 per 1,000 individuals. Much of the migration is due to Kansas University students. Noting this, migration was isolated by age group in Douglas County. In addition, population distribution among age groups was controlled for the presence of the University population.

Based on projected population patterns, one can see there is significantly higher net migration into the county for those between the ages of 15 and 24. Those aged 25 to 29 continue to be an unusually large cohort within the total population, but a significant decline in population occurs with the 30 to 34 age group. The 35 to 39 age cohort appears to be typical in size, as a percentage of total population, relative to other Kansas communities.

No Migration								Migration							
	2010	2015	2020	2025	2030	2035	2040		2010	2015	2020	2025	2030	2035	2040
0-4	6,209	6,317	6,423	6,536	6,650	6,794	6,976	0-4	6,209	6,317	6,677	7,003	7,300	7,650	8,047
5-9	6,000	6,163	6,271	6,368	6,480	6,593	6,736	5-9	6,000	6,411	6,523	6,878	7,213	7,519	7,880
10-14	5,607	5,995	6,159	6,265	6,362	6,473	6,587	10-14	5,607	6,189	6,614	6,721	7,086	7,432	7,747
15-19	10,489	10,484	11,211	11,514	11,712	11,894	12,102	15-19	10,489	10,678	11,787	12,587	12,792	13,487	14,145
20-24	20,126	20,103	20,095	21,476	22,057	22,436	22,784	20-24	20,126	20,416	20,785	22,944	24,501	24,900	26,253
25-29	9,979	9,956	9,945	9,930	10,613	10,900	11,087	25-29	9,979	10,446	10,599	10,751	11,868	12,673	12,880
30-34	7,526	7,496	7,479	7,458	7,447	7,958	8,174	30-34	7,526	7,939	8,312	8,391	8,511	9,395	10,033
35-39	6,183	6,153	6,129	6,102	6,085	6,076	6,493	35-39	6,183	6,390	6,742	7,029	7,095	7,197	7,944
40-44	5,818	6,142	6,112	6,078	6,051	6,034	6,025	40-44	5,818	6,378	6,592	6,943	7,238	7,306	7,411
45-49	6,234	5,777	6,100	6,058	6,024	5,998	5,981	45-49	6,234	6,013	6,595	6,798	7,159	7,464	7,534
50-54	6,200	6,115	5,661	5,954	5,913	5,879	5,854	50-54	6,200	6,260	6,036	6,596	6,798	7,160	7,464
55-59	5,911	6,081	5,997	5,524	5,810	5,770	5,737	55-59	5,911	6,226	6,288	6,041	6,600	6,803	7,165
60-64	4,677	5,707	5,875	5,738	5,286	5,559	5,521	60-64	4,677	5,791	6,107	6,109	5,869	6,413	6,610
65-69	3,041	4,473	5,486	5,555	5,426	4,999	5,257	65-69	3,041	4,557	5,674	5,887	5,889	5,657	6,182
70-74	2,143	2,779	4,162	4,915	4,977	4,862	4,479	70-74	2,143	2,816	4,300	5,157	5,351	5,353	5,142
75-79	1,754	1,881	2,487	3,548	4,189	4,242	4,144	75-79	1,754	1,918	2,571	3,743	4,489	4,658	4,660
80-84	1,346	1,310	1,424	1,749	2,496	2,947	2,984	80-84	1,346	1,327	1,476	1,837	2,674	3,207	3,328
85+	1,019	902	871	874	1,073	1,531	1,808	85+	1,019	919	902	928	1,155	1,682	2,017
Total	110,262	113,837	117,886	121,641	124,651	126,947	128,730	Total	110,262	116,993	124,579	132,340	139,589	145,957	152,442

## Douglas County Total Population

### No Migration

The total population of Douglas County is expected to grow to 128,730 individuals, or 16.7 percent, from 2010 to 2040, for an average annual growth rate of 0.6 percent, without migration. Initially, total population is expected to increase 0.6 percent annually. Growth rates are expected to slow to an average annual rate of 0.3 percent by 2040. Much of the slowing growth rate can be attributed to a decline in the birth rate over the analysis period.

### Migration

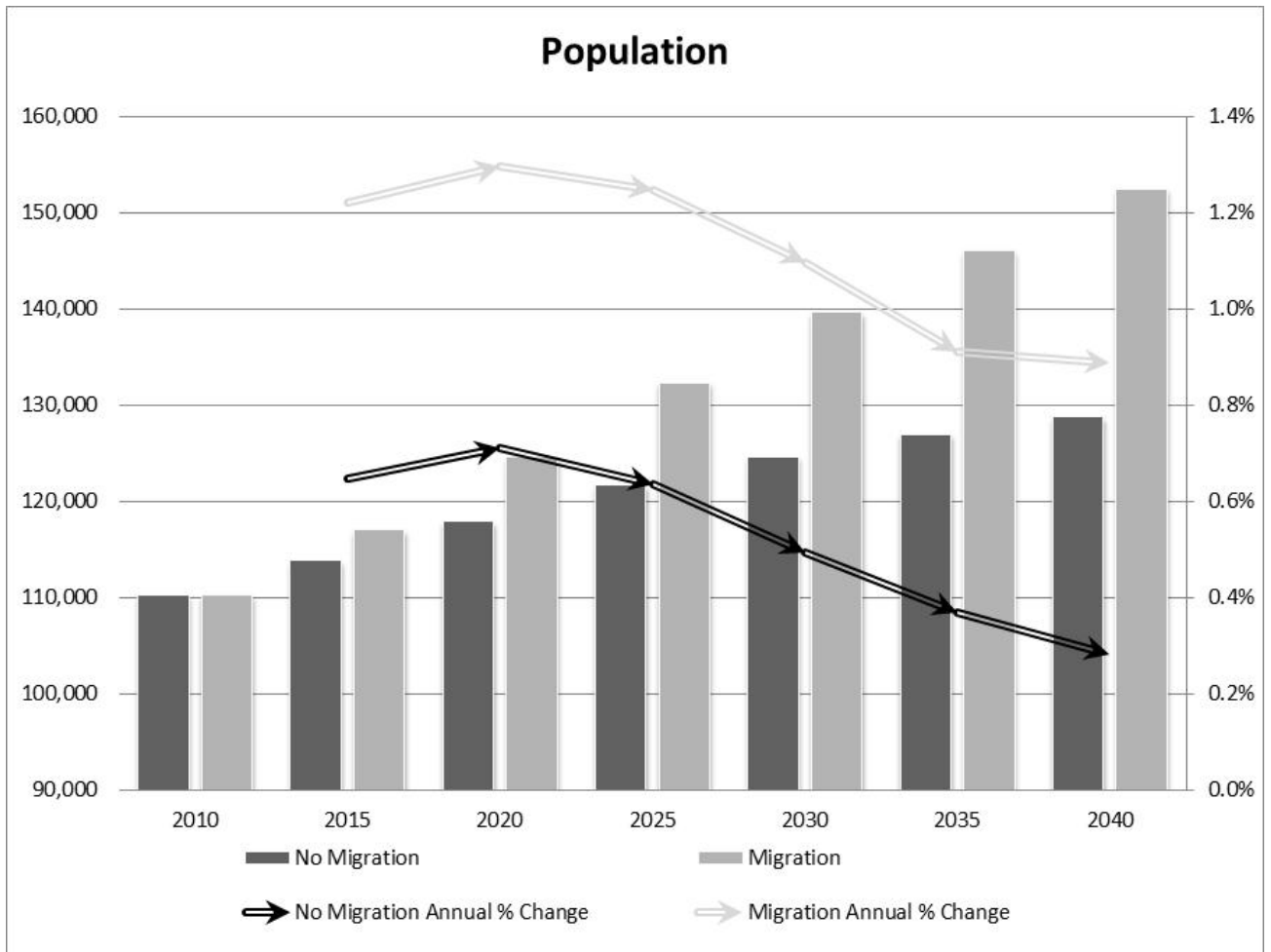
The total population of Douglas County is expected to grow to 152,442 individuals, or 38.3 percent, from 2010 to 2040, for an average annual growth rate of 1.3 percent, with migration. Initially, total population is expected to increase 1.2 percent annually. Growth rates are expected to slow to an average annual rate of 0.9 percent by 2040. Much of the slowing growth rate can be attributed to a decline in the birth rate over the analysis period.

## No Migration vs. Migration

As previously noted, migration patterns are not consistent from one time period to the next. That being said, they do create a significant impact on local populations. In the case of Douglas County, assuming average annual migration patterns hold, the total population is expected to increase by an additional 23,712 individuals between 2010 and 2040. This is the equivalent of 18.4 percent of additional growth over the “No Migration” projections.

	2010	2015	2020	2025	2030	2035	2040
No Migration	110,262	113,837	117,886	121,641	124,651	126,947	128,730
Annual % Change		0.6%	0.7%	0.6%	0.5%	0.4%	0.3%
% Change from 2010		3.2%	6.9%	10.3%	13.0%	15.1%	16.7%
Migration	110,262	116,993	124,579	132,340	139,589	145,957	152,442
Annual % Change		1.2%	1.3%	1.2%	1.1%	0.9%	0.9%
% Change from 2010		6.1%	13.0%	20.0%	26.6%	32.4%	38.3%
Migration - No Migration	0	3,157	6,693	10,699	14,939	19,010	23,712
as a % of No Migration	0.0%	2.8%	5.7%	8.8%	12.0%	15.0%	18.4%

Note: Annual % Change refers to the average percentage change during the previous five-year period.



## Population Projection Methodology

The CEDBR prepared population forecasts for Kansas counties using the conventional cohort survival model. For each of 36 age/sex cohort groups, population was forecasted using individual cohort projections of survival rates, birth rates and migration. The starting point for the projections was the Census Bureau's 2010 Demographic Profile Data. The cohort survival model can be summarized mathematically as:

$$T = \sum_{x=1}^{36} p_{x1}$$

Where  $T$  = Population at the end of the period for all age/sex cohort groups

$p_{x1}$  = Population at the end of the period for cohort group  $x$

and

$$p_{x1} = p_{x0} + b_x - d_x + nm_x$$

where  $p_{x1}$  = Population at the end of the period for cohort group  $x$

$p_{x0}$  = Population at the beginning of the period for cohort group  $x$

$b_x$  = Births during the period for cohort  $x$

$d_x$  = Deaths during the period for cohort  $x$

$nm_x$  = Net migration during the period for cohort  $x$

$x$  = cohort group