

The Beehive Shape: Provisional 50-Year Demographic and Economic Projections for the State of Utah, 2015-2065

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Table of Contents

Introduction 1
 Scenarios 2
 Interpreting the Data 3
 Overall Population Growth 4
 Components of Change 4
 Age Composition of the Population 6
 Households and Employment 9
 Conclusion 12

Appendix: Assumptions and Scenarios 13
 Endnotes 15

Highlights

- **5.5 million in 2065** – Utah’s population is projected to increase from approximately 3 million in 2015 to 5.5 million in 2065.
- **Median age** – Utah’s median age is projected to increase by about nine years, rising to 39.5 years in 2065. The shape of the population pyramid is projected to change from a cone to a beehive shape as a result of declining fertility and increasing life expectancy.
- **65-and-older population** – The share of the population ages 65 and older is projected to double over the next 50 years to 21.3 percent.
- **School-age population** – The population ages 5-17 is projected to increase, but compose a smaller share of the population than it does today. Annual increases in this population are projected to exceed 9,000 through 2018, but are projected to remain below 9,000 every subsequent year.

Introduction

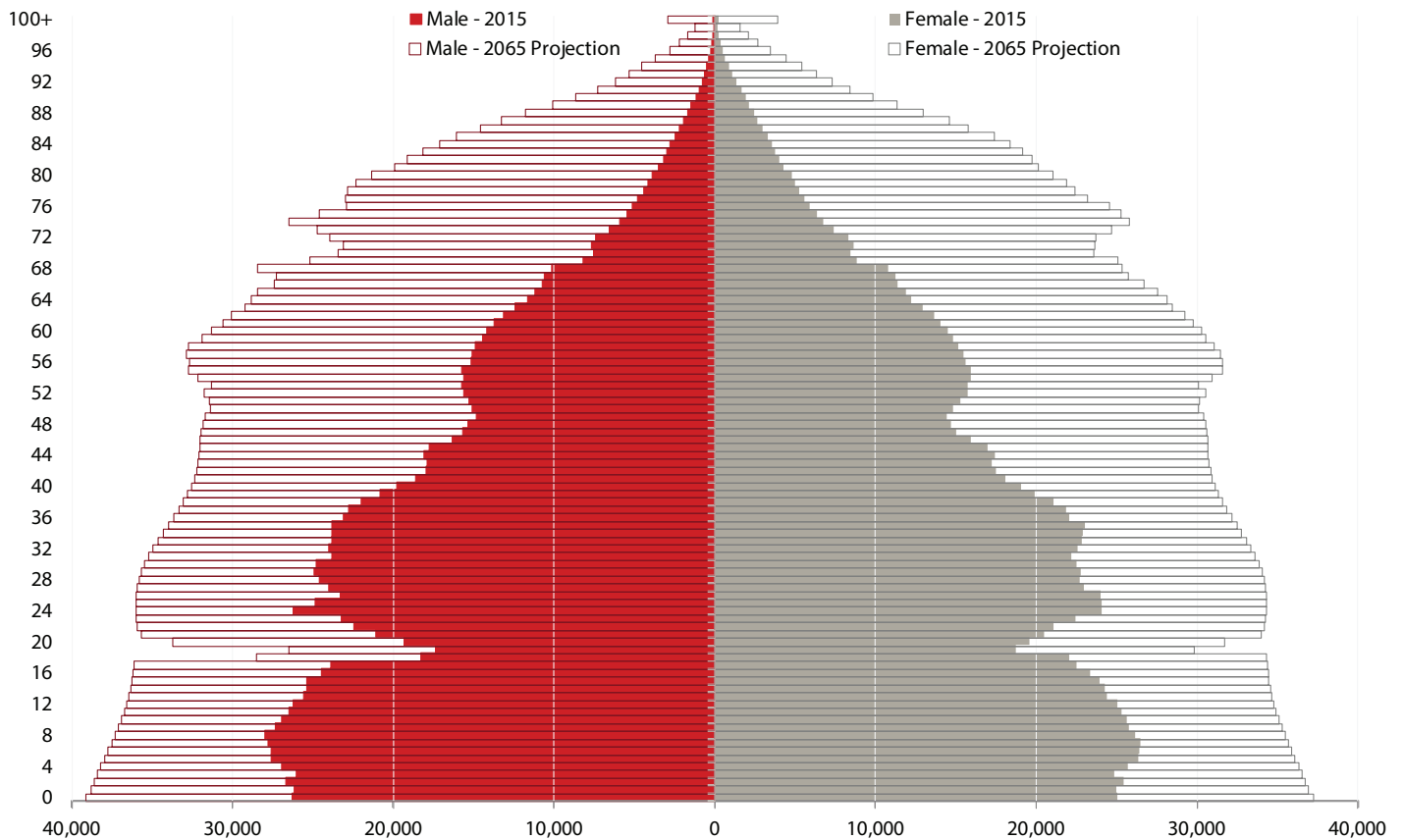
The Kem C. Gardner Policy Institute has produced provisional long-term demographic and economic projections for the State of Utah. This is a significant milestone as we continue our research efforts to produce the state’s official long-term, state- and county-level projections by July 2017. The Utah Legislature funded this work to enhance the state’s demographic data and decision support. These projections will be used to inform education, transportation, water, and other long-term planning endeavors. By mid-summer 2017 we will revise these projections and add county-level specificity.

These 50-year state projections illustrate continued population growth and a range of future demographic and economic possibilities for the Beehive State. The shape of Utah’s likely future demographics can be summarized by a simple chart overlaying two population pyramids.

Figure 1 outlines Utah’s shifting age structure. It compares population counts by sex and single year of age over time. In Utah’s past, we have typically seen a cone shaped pyramid with a large number of children at the bottom, a fair amount of working age adults in the middle, and then a quick tapering off once we get into the retirement ages as people start to die. However, the 2065 pyramid tells a different story. Instead of a cone, we see more of a beehive shape, with much more even distributions of children and working age adults, and many more individuals living into the older ages (including 100 years and above).

The figure is only a succinct summary, and the fully-detailed projections provide a clear roadmap of what Utah’s demographic future may look like given the likely trends of steady economic growth, declining fertility and

Figure 1
Utah Population Pyramid: 2015 and 2065



Source: Kem C. Gardner Policy Institute 2015-2065 State Projections

increasing longevity. This roadmap provides a solid technical foundation for policy and infrastructure planning as well as further analytic work.

We cannot forecast the future. Rather, our intent is to provide a reliable and comprehensible framework for a reasonable range of likely alternative demographic futures for Utah. We use our custom-built long-range projection model to explore how alternative assumptions about the future of key demographic and economic drivers shape population outcomes. So, even though we cannot exactly predict the future (especially as uncertainty increases over time), this work permits us to identify reasonable bounds for the shape of Utah’s future demographic landscape.

We begin with a general overview of our scenario work and results, including a brief explanation of the technical approach and factual basis for the analysis. The bulk of the document describes our baseline scenario, including a discussion of methods, data, and assumptions.

Scenarios

These projections are produced using the Utah Demographic and Economic Model (UDEM), which has been designed and built by researchers at the Kem C. Gardner Policy Institute. UDEM is essentially a customized demographic cohort-component model in which the population changes over time through aging, births, deaths, and migration.¹ Plausible ranges for expected fertility, mortality, and migration are entered into the model, generating time paths for upper and lower bounds of expected future populations. This approach provides a reasonable portrayal of Utah’s future population possibilities.

UDEM is designed to incorporate state and regional economic conditions (e.g., labor force and employment dynamics), special populations (e.g., higher education and correctional facilities), and multiple types of migration (e.g., retirement, labor market, LDS mission service). While accounting for this additional information in population projections increases data demands and resources, it offers the advantage of the capability to produce scenarios that incorporate contextual or policy changes.

Examples include policies related to family, business, health care, education, and others. In this way, we implement the vision of the Kem C. Gardner Policy Institute—to provide policy makers, business leaders, and the public with the best possible information to make informed decisions.

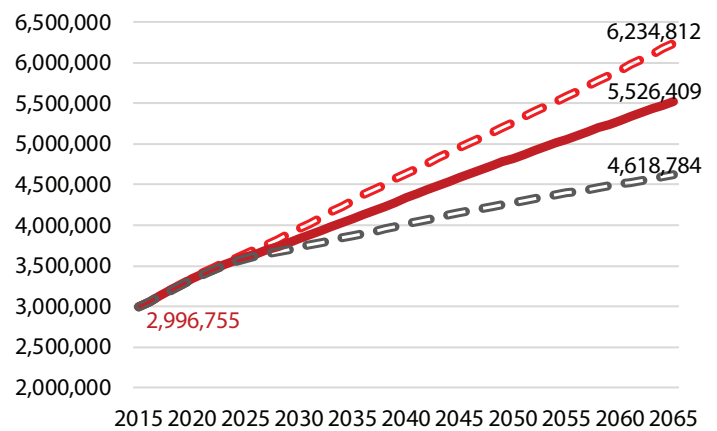
We have produced three sets of projections for high, baseline, and low scenarios of population growth by single year of age (up to 100 and above) and sex. The 50-year projections extend from 2015 to 2065. The baseline scenario incorporates assumptions that embody Utah’s most likely future for fertility, mortality, migration, labor force dynamics, and economic growth. The high and low scenarios are constructed using reasonable upper and lower bounds for the forces that most strongly shape Utah’s population. All three scenarios result in continued population growth and an aging population. The scenarios were defined by different assumptions regarding Utah’s future total fertility rate, life expectancy, and economic growth. The details of these assumptions are discussed in the Appendix, but are briefly summarized here.

The three scenarios are defined as follows:

- **The baseline scenario** generates population growth by assuming a moderately decreasing fertility rate, a moderately increasing life expectancy, and moderate trend employment growth. We consider this to be the most likely scenario.
- **The high scenario** generates a larger population by assuming a temporary increase in the fertility rate, a higher life expectancy, and more rapid employment growth.
- **The low scenario** generates a smaller population by assuming a more rapidly decreasing fertility rate, a slight increase in life expectancy, and lower rates of employment growth.²

Figure 2 shows the overall total population projected under the different scenarios. The results are also summarized in the sequential million markers for the total population (see Table 1). The baseline scenario reaches a population of 4 million in 2034, with the high scenario reaching that marker 3 years earlier (2031) and the low scenario reaching that marker 6 years later (2040) than the baseline. As time progresses, the scenario differences become more pronounced, with the high scenario reaching a population of 5 million in 2046, the baseline reaching it eight years later in 2054, and the low scenario never reaching 5 million during the projection horizon. While the baseline and low scenarios fail to reach a population of 6 million in our projection timeline, the high scenario reaches this milestone in 2062.

Figure 2
Total Population: Low, Baseline, and High Scenarios



Source: Kem C. Gardner Policy Institute 2015-2065 State Projections

Table 1
Utah Total Population Million Markers by Year and Scenario

	4 Million	5 Million	6 Million
High Scenario	2031	2046	2062
Baseline Scenario	2034	2054	--
Low Scenario	2040	--	--

Source: Kem C. Gardner Policy Institute 2015-2065 State Projections

Purposeful policies and investments as well as unanticipated events, such as financial crises, natural disasters, wars, and significant policy changes, can result in different projection outcomes. The UDEM model has been built to incorporate and analyze some different alternative futures as they affect the major drivers of demographic change. Unknown change and uncertainty are inevitable realities of life and projection modeling, but with this type of research we are able to identify a range of possible futures given trend changes in fundamental demographic drivers.

Interpreting the Data

Population projections are modeled estimates of the future population based on assumptions about the future patterns of births, deaths, and migration. These assumptions are based on rigorous analyses of historical and current trends and state-of-the-practice estimation techniques. Although the assumptions made here are grounded in theory, research, and historical trends, uncertainty about the future is an inescapable reality of life.

An exact prediction of the future remains beyond our capabilities. However, responsible planning and budgeting requires a clear understanding of how trends and actions impact the size and characteristics of the future population. A key consideration in this work is that policy and resource allocation decisions will, in fact, alter the

course of the future. While multiple scenarios are provided, we consider the baseline scenario to be the most realistic, and refer to them as our state-level projections.

Overall Population Growth

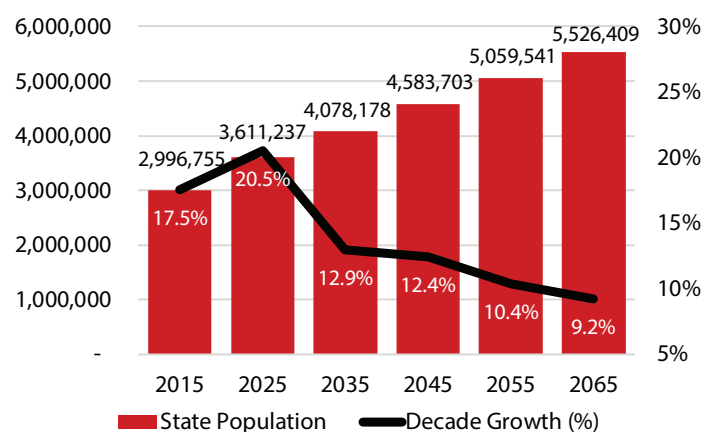
The Utah population is projected to grow by approximately 2.5 million people, or 84 percent, over the next 50 years. Decadal growth ranges from 9.2 percent in the 2055 to 2065 period to 20.5 percent in the 2015 to 2025 period (see Figure 3). As the projection period progresses, decadal growth rates stabilize around 10 percent. An average increase of nearly half a million new Utahns is projected for each of the next five decades. Both natural increase (births minus deaths) and net in-migration (in-migration minus out-migration) are projected to remain positive throughout the projection period.

In 2015, the Utah population achieved the 3 million milestone,⁴ just 20 years after reaching 2 million in 1995. Utah is projected to likely reach 4 million people during 2034 (19 years out), and then 5 million people 20 years later in 2054.

Growth rates are projected to decelerate and yet remain more rapid than those of the nation. Utah's growth per decade exceeds that of the nation by about six percentage points. Figure 4 compares the projected decadal percentage growth for Utah to the U.S.

Table 2 shows the yearly baseline population projections for selected age groups, as well as median age. Total population, school age population, working age population, and retirement age population are all projected to grow. Annual growth of the total population is projected to exceed 70,000 in 2018, then slowly decline (while remaining positive). School age population growth increments are projected to remain below 10,000 per year after

Figure 3
Utah Population and Growth Projections by Decade: 2015-2065



Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections; DemographyUTAH Population Committee 2015 Population Estimates

2018. Retirement age population growth is projected to exceed 10,000 annually with annual growth increments expanding into the future. Median age of the population is expected to rise nearly nine years from 30.8 to 39.5 over the projection horizon. The next sections examine these results and the components of change in more detail.

Components of Change

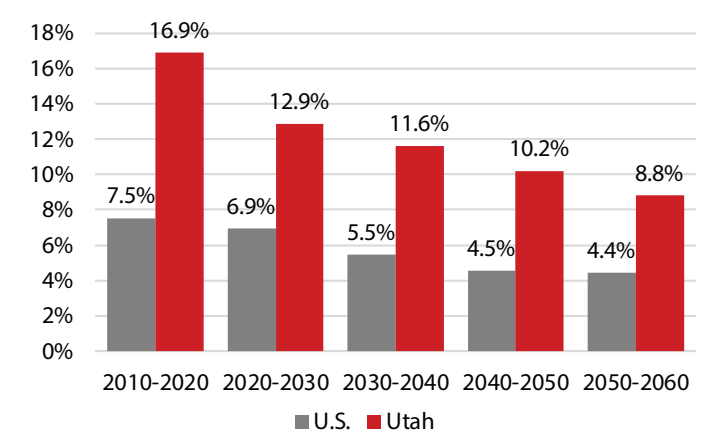
Fertility, mortality, and migration are the fundamental determinants of the size and age composition of the population. The total fertility rate (TFR) is a summary measure representing the number of children a woman would be expected to have between the ages of 15 and 44 if that woman experienced all of the age-specific fertility rates of a given year. Mortality may be expressed as life expectancy and differs for both males and females. Net migration is estimated to be the difference of the people who move into a state and the people who move out of a state in a given year. Positive net migration indicates more people are coming to reside in Utah than leaving, while negative net migration is the reverse. Mortality and migration vary by both age and sex.

Fertility and Mortality

Baseline fertility projections indicate that the Utah fertility rate will continue to slowly decline, but will remain well above that of the U.S. (see Figure 5). Consistent with past Utah fertility trends, the state TFR is projected to decline by 0.03 children per woman between 2015 and 2065.

Life expectancy in Utah is projected to increase over the next 50 years, with a 4.5 year increase for women, and a 7.1 year increase for men. This sharper increase for men results in a narrowing of the life expectancy gap traditionally seen between the sexes. Figure 6 shows the

Figure 4
Projected Percent Growth by Decade: Utah and the United States



Sources: Census Bureau 2014-2060 National Projections; Kem C. Gardner Policy Institute 2015-2065 State Projections

Table 2
Utah Demographic Summary: 2015-2065

Year	Total Population				School Age Population (5-17)			Working Age Population (18-64)			Retirement Age Population (65+)		
	Total	Absolute Growth	Growth Rate	Median Age	Total	Absolute Growth	Growth Rate	Total	Absolute Growth	Growth Rate	Total	Absolute Growth	Growth Rate
2015	2,996,755	54,862	1.9%	30.8	667,798	13,715	2.1%	1,765,451	28,994	1.6%	305,461	12,808	4.2%
2016	3,061,160	64,405	2.1%	31.1	679,536	11,737	1.8%	1,801,938	36,488	2.1%	320,416	14,955	4.9%
2017	3,130,136	68,976	2.3%	31.4	689,222	9,687	1.4%	1,841,368	39,430	2.2%	336,919	16,503	5.2%
2018	3,200,621	70,485	2.3%	31.7	699,571	10,349	1.5%	1,880,869	39,501	2.1%	354,958	18,039	5.4%
2019	3,269,956	69,335	2.2%	31.9	708,394	8,823	1.3%	1,919,277	38,407	2.0%	373,603	18,645	5.3%
2020	3,336,353	66,397	2.0%	32.2	716,083	7,689	1.1%	1,955,810	36,534	1.9%	392,546	18,943	5.1%
2021	3,398,907	62,553	1.9%	32.5	722,183	6,099	0.9%	1,991,079	35,269	1.8%	411,371	18,825	4.8%
2022	3,457,380	58,474	1.7%	32.8	726,885	4,702	0.7%	2,024,199	33,120	1.7%	430,086	18,716	4.5%
2023	3,511,959	54,578	1.6%	33.1	730,008	3,123	0.4%	2,055,645	31,446	1.6%	448,456	18,370	4.3%
2024	3,563,070	51,111	1.5%	33.4	731,772	1,764	0.2%	2,085,708	30,063	1.5%	466,186	17,730	4.0%
2025	3,611,237	48,167	1.4%	33.7	731,813	40	0.0%	2,114,443	28,735	1.4%	483,952	17,766	3.8%
2026	3,652,819	41,582	1.2%	33.9	730,285	(1,528)	-0.2%	2,139,735	25,292	1.2%	500,319	16,367	3.4%
2027	3,694,313	41,494	1.1%	34.1	729,006	(1,278)	-0.2%	2,165,063	25,329	1.2%	515,977	15,658	3.1%
2028	3,737,633	43,320	1.2%	34.2	728,254	(753)	-0.1%	2,191,664	26,601	1.2%	531,174	15,197	2.9%
2029	3,782,551	44,918	1.2%	34.4	729,273	1,019	0.1%	2,218,737	27,072	1.2%	545,296	14,122	2.7%
2030	3,829,201	46,650	1.2%	34.5	732,616	3,343	0.5%	2,245,858	27,121	1.2%	558,414	13,118	2.4%
2031	3,877,306	48,105	1.3%	34.7	735,531	2,915	0.4%	2,275,580	29,722	1.3%	570,517	12,103	2.2%
2032	3,926,576	49,270	1.3%	34.9	740,039	4,508	0.6%	2,304,335	28,755	1.3%	582,939	12,422	2.2%
2033	3,976,749	50,172	1.3%	35.1	745,286	5,247	0.7%	2,332,940	28,605	1.2%	595,591	12,652	2.2%
2034	4,027,339	50,590	1.3%	35.2	750,608	5,322	0.7%	2,360,918	27,977	1.2%	609,243	13,652	2.3%
2035	4,078,178	50,839	1.3%	35.4	756,391	5,783	0.8%	2,386,928	26,010	1.1%	624,765	15,522	2.5%
2036	4,129,098	50,920	1.2%	35.6	762,669	6,278	0.8%	2,412,309	25,382	1.1%	640,710	15,945	2.6%
2037	4,179,646	50,548	1.2%	35.8	769,463	6,794	0.9%	2,437,928	25,619	1.1%	655,849	15,139	2.4%
2038	4,231,151	51,505	1.2%	35.9	777,031	7,568	1.0%	2,464,167	26,239	1.1%	670,800	14,950	2.3%
2039	4,282,334	51,183	1.2%	36.1	785,069	8,038	1.0%	2,489,346	25,179	1.0%	686,366	15,566	2.3%
2040	4,333,400	51,065	1.2%	36.3	793,518	8,450	1.1%	2,512,677	23,331	0.9%	703,575	17,209	2.5%
2041	4,383,865	50,466	1.2%	36.5	802,166	8,648	1.1%	2,534,138	21,461	0.9%	722,179	18,604	2.6%
2042	4,434,110	50,245	1.1%	36.7	810,917	8,751	1.1%	2,553,576	19,438	0.8%	742,712	20,532	2.8%
2043	4,484,474	50,364	1.1%	36.9	819,677	8,760	1.1%	2,572,010	18,433	0.7%	764,508	21,797	2.9%
2044	4,534,683	50,208	1.1%	37.1	828,253	8,577	1.0%	2,590,363	18,354	0.7%	786,532	22,023	2.9%
2045	4,583,703	49,020	1.1%	37.3	836,331	8,078	1.0%	2,607,100	16,737	0.6%	809,619	23,088	2.9%
2046	4,632,521	48,818	1.1%	37.5	843,985	7,654	0.9%	2,624,488	17,388	0.7%	832,298	22,678	2.8%
2047	4,681,026	48,505	1.0%	37.7	851,113	7,129	0.8%	2,642,572	18,084	0.7%	854,477	22,179	2.7%
2048	4,729,285	48,259	1.0%	37.9	857,679	6,565	0.8%	2,661,470	18,898	0.7%	876,100	21,623	2.5%
2049	4,777,291	48,006	1.0%	38.0	863,654	5,976	0.7%	2,681,582	20,111	0.8%	896,745	20,645	2.4%
2050	4,825,101	47,810	1.0%	38.2	869,048	5,393	0.6%	2,701,198	19,617	0.7%	918,134	21,389	2.4%
2051	4,872,734	47,633	1.0%	38.3	873,892	4,844	0.6%	2,720,923	19,724	0.7%	939,622	21,488	2.3%
2052	4,920,050	47,316	1.0%	38.4	878,223	4,331	0.5%	2,741,406	20,483	0.8%	960,365	20,743	2.2%
2053	4,966,945	46,895	1.0%	38.5	882,097	3,875	0.4%	2,762,541	21,135	0.8%	980,302	19,937	2.1%
2054	5,013,384	46,439	0.9%	38.7	885,616	3,518	0.4%	2,783,563	21,022	0.8%	1,000,062	19,760	2.0%
2055	5,059,541	46,157	0.9%	38.8	888,933	3,318	0.4%	2,803,225	19,662	0.7%	1,020,899	20,837	2.1%
2056	5,105,602	46,061	0.9%	38.9	892,195	3,262	0.4%	2,821,492	18,267	0.7%	1,042,888	21,989	2.2%
2057	5,151,658	46,056	0.9%	39.0	895,526	3,331	0.4%	2,843,933	22,441	0.8%	1,060,440	17,552	1.7%
2058	5,197,846	46,188	0.9%	39.1	899,058	3,531	0.4%	2,869,078	25,145	0.9%	1,075,048	14,608	1.4%
2059	5,244,266	46,421	0.9%	39.1	902,894	3,836	0.4%	2,895,941	26,863	0.9%	1,087,719	12,672	1.2%
2060	5,291,027	46,760	0.9%	39.2	907,126	4,232	0.5%	2,923,305	27,364	0.9%	1,099,716	11,997	1.1%
2061	5,337,990	46,964	0.9%	39.3	911,788	4,662	0.5%	2,948,049	24,744	0.8%	1,114,035	14,319	1.3%
2062	5,384,874	46,884	0.9%	39.3	916,878	5,090	0.6%	2,969,731	21,682	0.7%	1,130,894	16,859	1.5%
2063	5,431,753	46,879	0.9%	39.4	922,437	5,558	0.6%	2,992,790	23,059	0.8%	1,145,922	15,028	1.3%
2064	5,478,910	47,157	0.9%	39.4	928,522	6,085	0.7%	3,015,435	22,645	0.8%	1,161,150	15,227	1.3%
2065	5,526,409	47,499	0.9%	39.5	935,141	6,619	0.7%	3,036,865	21,430	0.7%	1,177,462	16,312	1.4%

Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections; DemographyUTAH Population Committee 2015 Population Estimates

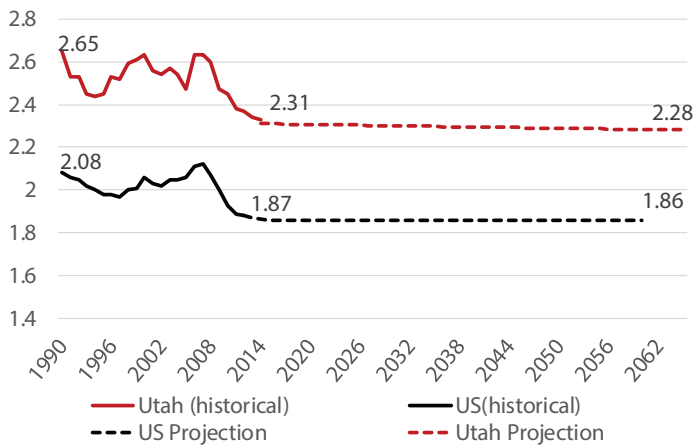
projected increases of life expectancy and the gains men are projected to make compared to women in the future.

Natural Increase and Net Migration

Utah is known for its positive natural increase, with births consistently exceeding deaths. Given increasing life expectancy and declining fertility, over time the rate and amount of natural increase will remain positive but slowly decline. Natural increase accounts for 1,682,148 or 66.5 percent of the cumulative population increase of the state over the projection period.

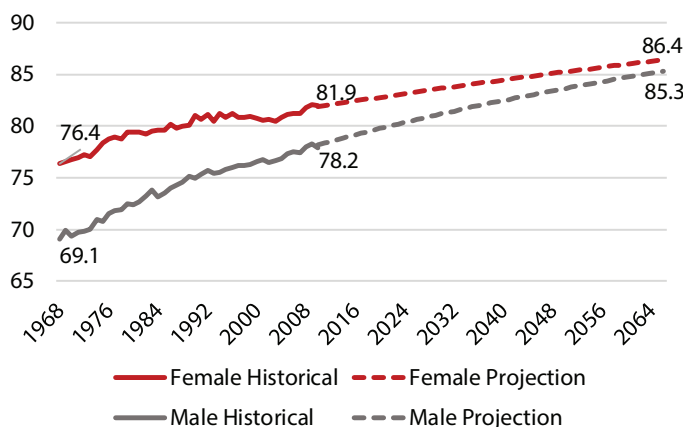
The balance of this increase is net in-migration. Migration may occur for a variety of reasons, including economic

Figure 5
Historical and Projected Total Fertility Rates: Utah and the U.S.



Sources: Census Bureau 2014-2060 National Projections; Kem C. Gardner Policy Institute 2015-2065 State Projections; Utah Department of Health

Figure 6
Historical and Projected Utah Life Expectancy: Males and Females



Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections; Utah Department of Health

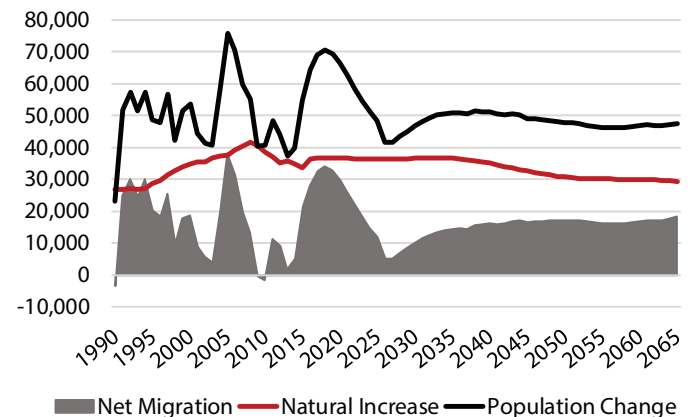
and educational opportunity, retirement, or the presence of amenities. About 33.5 percent of the projected total growth of 2.53 million people over the next half century is attributed to migration. This means that 847,506 of those 2.53 million people are net in-migrants⁴.

In the later years, the projection shows a trending convergence between net migration and natural increase. This suggests net migration may become the major source of population growth for Utah further in the future. Figure 7 shows the changing trends and composition of natural increase and net migration, along with absolute population growth. Table 3 shows detailed information on the projected components of change and total population for every year of the projections period.

Age Composition of the Population

Utah's population is also projected to experience a change in age structure. Our projections indicate that Utah will maintain its signature demographic profile of a young population with large households relative to the nation. However, Utah will continue to trend in the same direction as the nation. The relatively young population, with a median age of 29.2 in the 2010 Census, has been due in large part to Utah's-highest-in-the-nation fertility rates, meaning more children born per woman. As Utah's fertility rate continues to decline, the median age will increase. Life expectancy for men and women will also continue to increase, resulting in a larger share of retirement-aged people in the population. We project an increase in Utah's median age by about 8.7 years from 30.8 in 2015 to 39.5 by 2065.

Figure 7
Utah Components of Change: Historical and Projected



Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections; Utah Population Estimates Committee (UPEC) Population Estimates 1990-2009; DemographyUtah Population Committee (DUPC) Population Estimates 2010-2015

Table 3
Utah Components of Population Change: 2015-2065

Year	Births	Deaths	Natural Increase	Net Migration	July 1 Population	Annual Percent Change
2015	50,904	17,353	33,551	21,311	2,996,755	1.9%
2016	51,903	15,501	36,402	28,003	3,061,160	2.1%
2017	52,463	15,986	36,477	32,499	3,130,136	2.3%
2018	53,054	16,500	36,554	33,931	3,200,621	2.3%
2019	53,625	17,044	36,581	32,755	3,269,956	2.2%
2020	54,155	17,594	36,561	29,836	3,336,353	2.0%
2021	54,662	18,142	36,520	26,033	3,398,907	1.9%
2022	55,156	18,686	36,470	22,003	3,457,380	1.7%
2023	55,638	19,224	36,415	18,164	3,511,959	1.6%
2024	56,135	19,758	36,377	14,735	3,563,070	1.5%
2025	56,660	20,293	36,368	11,799	3,611,237	1.4%
2026	57,215	20,830	36,386	5,196	3,652,819	1.2%
2027	57,725	21,348	36,378	5,117	3,694,313	1.1%
2028	58,285	21,883	36,402	6,918	3,737,633	1.2%
2029	58,914	22,447	36,468	8,450	3,782,551	1.2%
2030	59,588	23,038	36,550	10,100	3,829,201	1.2%
2031	60,282	23,656	36,626	11,479	3,877,306	1.3%
2032	60,991	24,299	36,691	12,579	3,926,576	1.3%
2033	61,688	24,967	36,722	13,450	3,976,749	1.3%
2034	62,344	25,653	36,691	13,900	4,027,339	1.3%
2035	62,952	26,356	36,596	14,243	4,078,178	1.3%
2036	63,492	27,072	36,420	14,499	4,129,098	1.2%
2037	63,946	27,795	36,151	14,397	4,179,646	1.2%
2038	64,330	28,521	35,809	15,696	4,231,151	1.2%
2039	64,672	29,256	35,416	15,767	4,282,334	1.2%
2040	64,960	29,991	34,969	16,096	4,333,400	1.2%
2041	65,214	30,723	34,492	15,974	4,383,865	1.2%
2042	65,442	31,447	33,995	16,250	4,434,110	1.1%
2043	65,658	32,165	33,492	16,872	4,484,474	1.1%
2044	65,874	32,877	32,996	17,212	4,534,683	1.1%
2045	66,097	33,576	32,521	16,499	4,583,703	1.1%
2046	66,321	34,252	32,069	16,749	4,632,521	1.1%
2047	66,567	34,918	31,650	16,855	4,681,026	1.0%
2048	66,843	35,579	31,263	16,995	4,729,285	1.0%
2049	67,157	36,223	30,934	17,073	4,777,291	1.0%
2050	67,510	36,850	30,660	17,150	4,825,101	1.0%
2051	67,907	37,467	30,440	17,193	4,872,734	1.0%
2052	68,351	38,078	30,274	17,043	4,920,050	1.0%
2053	68,839	38,685	30,154	16,741	4,966,945	1.0%
2054	69,366	39,291	30,075	16,364	5,013,384	0.9%
2055	69,927	39,896	30,031	16,126	5,059,541	0.9%
2056	70,517	40,506	30,011	16,049	5,105,602	0.9%
2057	71,133	41,125	30,009	16,047	5,151,658	0.9%
2058	71,768	41,760	30,009	16,179	5,197,846	0.9%
2059	72,415	42,415	30,000	16,421	5,244,266	0.9%
2060	73,067	43,094	29,973	16,787	5,291,027	0.9%
2061	73,718	43,804	29,915	17,049	5,337,990	0.9%
2062	74,358	44,540	29,818	17,066	5,384,874	0.9%
2063	74,977	45,304	29,673	17,206	5,431,753	0.9%
2064	75,570	46,095	29,475	17,682	5,478,910	0.9%
2065	76,137	46,916	29,221	18,278	5,526,409	0.9%

Note: Components are for the fiscal year ending July 1 of each year indicated.

Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections; DemographyUTAH Population Committee 2015 Population Estimates

Utah's changing age structure is part of a much larger national and international trend in which better health care, a more health-conscious population, and medical advances are keeping people alive longer. Figure 8 shows selected age groups as a share of the population. The most notable difference is that the age groups 65 through 84 and 85 years and older roughly double as a share of the population over the 50 year projection period. In 2015, they account for 10.2 percent of the population, and in 2065 they account for 21.3 percent of the population.

Another summary measure of the age structure is the dependency ratio. The dependency ratio is the number of youth (population less than 18 years old) plus the number of elders (persons 65 years and older) per 100 persons of working age (population ages 18 through 64).

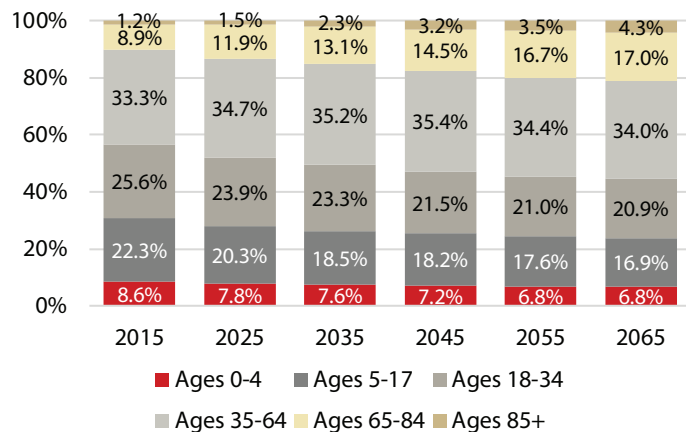
Utah's total dependency ratio has been, and is projected to remain, higher than the dependency ratio for the United States (see Figure 9). The difference between the U.S and Utah's historical dependency ratio and composition was most pronounced in 1980, as the nation's

numbers dropped drastically, and continued to shift to an even distribution of older and younger dependents. Utah's overall dependency ratios slowly decreased but the younger dependents were still over 75 percent of the total dependency ratio by 2010.

The dependency ratios of both the U.S. and Utah are projected to increase in the future, with increases in the retirement component and decreases in the youth component. Also, the gap between Utah and the U.S. ratios is expected to diminish over time. The most telling part about these ratios is the changing share of the young age dependency ratio and retirement age dependency ratios (see Figure 10). In 2010, the young age dependency ratio makes up the vast majority of the total dependency ratio, but by 2065, the young age and retirement age dependency ratios are almost equally responsible for the total dependency ratio, converging with earlier U.S. trends. The youth component of the Utah dependency ratio is projected to remain higher than that of the nation while the retirement component is projected to remain lower than that of the nation.

Utah's shifting age structure is also illustrated by its projected population pyramid. This is illustrated in Figure 1, which showed the shift from a younger cone shaped pyramid to an older beehive shaped pyramid. The implication is a shifting of dependency ratios from younger to older ages over time.

Figure 8
Selected Age Groups as a Percent of Total Population: 2015-2065



Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections

Table 4
Utah Population Projections by Selected Age Groups: 2015-2065

Age Groups	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065
0 - 4	263,924	258,044	271,914	281,030	292,313	310,095	323,629	330,652	336,721	346,484	360,879	376,940
5 - 17	607,103	667,798	716,083	731,813	732,616	756,391	793,518	836,331	869,048	888,933	907,126	935,141
18 - 34	763,716	767,347	817,164	862,302	912,864	950,638	973,427	983,912	1,018,277	1,064,562	1,114,636	1,157,127
35 - 64	879,680	998,104	1,138,646	1,252,141	1,332,994	1,436,289	1,539,251	1,623,188	1,682,922	1,738,663	1,808,669	1,879,739
65 - 84	218,471	268,089	347,168	429,726	489,992	532,992	583,884	662,828	753,858	845,018	900,860	937,508
85+	30,991	37,372	45,377	54,226	68,421	91,772	119,691	146,792	164,276	175,881	198,856	239,954
Total	2,763,885	2,996,755	3,336,353	3,611,237	3,829,201	4,078,178	4,333,400	4,583,703	4,825,101	5,059,541	5,291,027	5,526,409
Median Age	29.2	30.8	32.2	33.7	34.5	35.4	36.3	37.3	38.2	38.8	39.2	39.5
16 - 64	1,729,517	1,859,650	2,063,732	2,231,026	2,358,091	2,501,512	2,629,911	2,730,554	2,832,501	2,939,786	3,062,194	3,178,023
65+	249,462	305,461	392,546	483,952	558,414	624,765	703,575	809,619	918,134	1,020,899	1,099,716	1,177,462

Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections; DemographyUTAH Population Committee 2015 Population Estimates; U.S. Census Bureau Decennial Census, Population Division

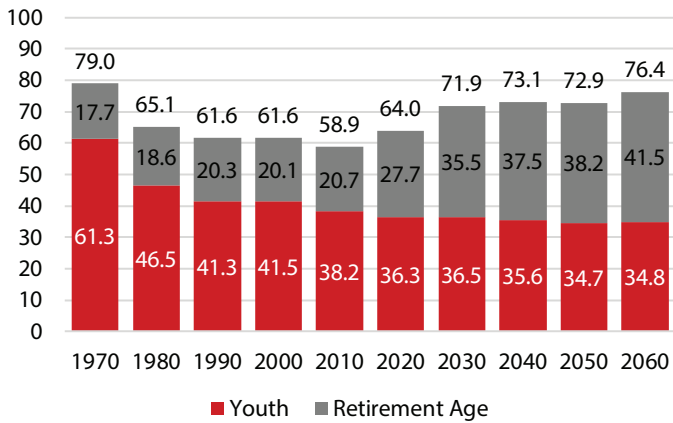
Table 5
Utah Dependency Ratios: 2015-2065

	2015	2025	2035	2045	2055	2065
Total	69.7	70.8	70.9	75.8	80.5	82.0
Young Age	52.4	47.9	44.7	44.8	44.1	43.2
Retirement Age	17.3	22.9	26.2	31.1	36.4	38.8

Note: The dependency ratio is defined as the population ages 0-17 and 65 plus per 100 persons ages 18-64

Source: Kem C. Gardner Policy Institute 2015-2065 State Projections

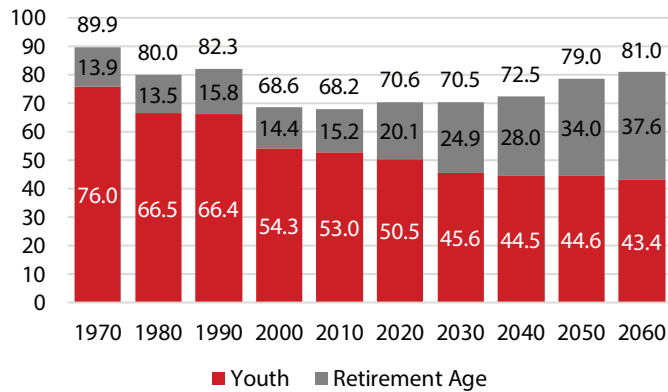
Figure 9
U.S. Dependency Ratios: 1970-2060



Note: The dependency ratio is defined as the population ages 0-17 and 65 plus per 100 persons ages 18-64.

Sources: Kem C. Gardner Policy Institute analysis of U.S. Census Bureau Decennial Census and Population Division data and Kem C. Gardner Policy Institute 2015-2065 State Projections

Figure 10
Utah Dependency Ratios: 1970-2060



Note: The dependency ratio is defined as the population ages 0-17 and 65 plus per 100 persons ages 18-64.

Sources: Kem C. Gardner Policy Institute analysis of U.S. Census Bureau Decennial Census data and Kem C. Gardner Policy Institute 2015-2065 State Projections

Households and Employment

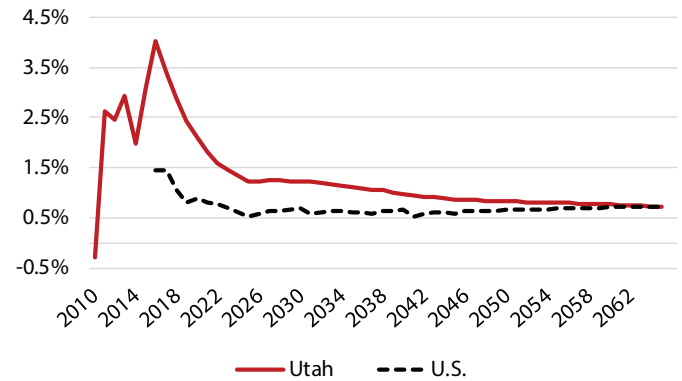
Utah’s increasing and aging population and decreasing fertility have direct implications for both the number of projected households into the future and household composition. Our projections show that the number of households will continue to grow steadily into the future while persons per household (PPH) decreases. Table 6 details household numbers, growth, and size.

In terms of employment, the projections indicate stable growth that mirrors population growth and a labor force whose median age increases almost five years over the projection period. See Table 6 for employment numbers and Figure 11 for a comparison between Utah and the U.S.

Employment by Major Sector

Figure 12 shows the expected average annual rate of change by major sector. Employment growth is expected to be especially strong in “Professional, scientific, and technical services,” and weak for “Farm,” “Military,” and “Natural Resources and Mining.”

Figure 11
Historical and Projected Total Employment Growth (%): Utah and U.S.



Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections; U.S. Bureau of Economic Analysis (BEA) & U.S. Bureau of Labor Statistics (BLS) historical employment data

Table 6
Utah's Projected Employment, Labor Force, Households, and Household Size

Year	Employment						Labor Force				Households			
	Total*			Covered Wage & Salary**			Total	Absolute Growth	Growth Rate	Median Age	Total	Absolute Growth	Growth rate	Average Size
	Total	Absolute Growth	Growth Rate	Total	Absolute Growth	Growth Rate								
2015	1,832,039	54,690	3.1%	-	-	-	1,447,041	17,751	1.2%	37.8	987,013	24,609	2.6%	2.99
2016	1,905,732	73,693	4.0%	1,366,426	-	-	1,477,361	30,320	2.1%	38.0	1,013,845	26,832	2.7%	2.97
2017	1,970,279	64,547	3.4%	1,397,870	31,444	2.3%	1,508,985	31,624	2.1%	38.2	1,042,366	28,520	2.8%	2.96
2018	2,026,725	56,446	2.9%	1,430,085	32,215	2.3%	1,540,738	31,753	2.1%	38.5	1,072,052	29,686	2.8%	2.94
2019	2,076,114	49,389	2.4%	1,463,092	33,007	2.3%	1,574,824	34,086	2.2%	38.8	1,101,623	29,571	2.8%	2.92
2020	2,119,490	43,377	2.1%	1,496,907	33,815	2.3%	1,608,839	34,014	2.2%	39.0	1,130,405	28,782	2.6%	2.91
2021	2,157,899	38,409	1.8%	1,531,558	34,651	2.3%	1,641,678	32,840	2.0%	39.2	1,158,184	27,779	2.5%	2.89
2022	2,192,386	34,486	1.6%	1,567,061	35,503	2.3%	1,672,916	31,238	1.9%	39.5	1,184,865	26,681	2.3%	2.87
2023	2,223,994	31,608	1.4%	1,603,440	36,379	2.3%	1,702,624	29,708	1.8%	39.7	1,210,406	25,541	2.2%	2.86
2024	2,253,768	29,774	1.3%	1,640,722	37,282	2.3%	1,730,713	28,089	1.6%	39.9	1,235,011	24,605	2.0%	2.84
2025	2,281,266	27,498	1.2%	1,668,027	27,305	1.7%	1,757,876	27,163	1.6%	40.0	1,258,729	23,719	1.9%	2.82
2026	2,309,388	28,122	1.2%	1,692,853	24,826	1.5%	1,783,734	25,858	1.5%	40.1	1,280,214	21,485	1.7%	2.81
2027	2,338,018	28,630	1.2%	1,715,628	22,775	1.3%	1,806,088	22,354	1.3%	40.2	1,301,718	21,504	1.7%	2.79
2028	2,367,043	29,025	1.2%	1,736,009	20,381	1.2%	1,827,505	21,418	1.2%	40.3	1,323,986	22,268	1.7%	2.78
2029	2,396,348	29,305	1.2%	1,756,708	20,699	1.2%	1,849,317	21,812	1.2%	40.5	1,346,688	22,702	1.7%	2.77
2030	2,425,818	29,470	1.2%	1,778,257	21,549	1.2%	1,871,292	21,975	1.2%	40.6	1,369,879	23,191	1.7%	2.75
2031	2,455,340	29,521	1.2%	1,799,045	20,788	1.2%	1,893,216	21,924	1.2%	40.7	1,393,881	24,001	1.8%	2.74
2032	2,484,798	29,458	1.2%	1,818,809	19,764	1.1%	1,915,141	21,924	1.2%	40.9	1,418,482	24,601	1.8%	2.73
2033	2,514,078	29,280	1.2%	1,838,528	19,719	1.1%	1,937,337	22,196	1.2%	41.0	1,443,262	24,780	1.7%	2.71
2034	2,543,066	28,988	1.2%	1,859,125	20,597	1.1%	1,959,423	22,086	1.1%	41.0	1,467,918	24,656	1.7%	2.70
2035	2,571,647	28,581	1.1%	1,880,597	21,472	1.2%	1,981,250	21,827	1.1%	41.0	1,492,124	24,206	1.6%	2.69
2036	2,599,707	28,060	1.1%	1,901,806	21,209	1.1%	2,002,840	21,590	1.1%	41.0	1,515,720	23,596	1.6%	2.68
2037	2,626,978	27,271	1.0%	1,922,231	20,425	1.1%	2,024,047	21,207	1.1%	41.0	1,538,911	23,191	1.5%	2.67
2038	2,654,544	27,566	1.0%	1,942,736	20,505	1.1%	2,044,621	20,574	1.0%	41.1	1,562,443	23,533	1.5%	2.67
2039	2,681,188	26,644	1.0%	1,962,691	19,955	1.0%	2,065,215	20,594	1.0%	41.2	1,585,821	23,377	1.5%	2.66
2040	2,707,339	26,150	1.0%	1,982,553	19,862	1.0%	2,085,263	20,048	1.0%	41.2	1,608,944	23,124	1.5%	2.65
2041	2,732,639	25,301	0.9%	2,001,019	18,466	0.9%	2,104,929	19,666	0.9%	41.3	1,631,770	22,826	1.4%	2.65
2042	2,757,624	24,984	0.9%	2,019,695	18,676	0.9%	2,124,112	19,183	0.9%	41.3	1,654,250	22,480	1.4%	2.64
2043	2,782,622	24,998	0.9%	2,038,518	18,823	0.9%	2,143,102	18,990	0.9%	41.4	1,676,607	22,357	1.4%	2.63
2044	2,807,492	24,870	0.9%	2,057,515	18,997	0.9%	2,162,165	19,063	0.9%	41.5	1,699,113	22,506	1.3%	2.63
2045	2,831,583	24,092	0.9%	2,076,014	18,499	0.9%	2,181,254	19,090	0.9%	41.6	1,721,135	22,023	1.3%	2.62
2046	2,855,875	24,291	0.9%	2,094,628	18,614	0.9%	2,199,932	18,677	0.9%	41.6	1,743,123	21,987	1.3%	2.62
2047	2,880,156	24,281	0.9%	2,113,232	18,604	0.9%	2,218,685	18,754	0.9%	41.7	1,765,193	22,070	1.3%	2.61
2048	2,904,431	24,275	0.8%	2,131,823	18,591	0.9%	2,237,413	18,728	0.8%	41.8	1,787,295	22,102	1.3%	2.61
2049	2,928,704	24,273	0.8%	2,150,408	18,585	0.9%	2,256,177	18,764	0.8%	41.9	1,809,571	22,276	1.2%	2.60
2050	2,952,978	24,274	0.8%	2,168,991	18,583	0.9%	2,274,940	18,764	0.8%	42.0	1,831,916	22,345	1.2%	2.59
2051	2,977,256	24,278	0.8%	2,187,572	18,581	0.9%	2,293,732	18,791	0.8%	42.0	1,854,096	22,181	1.2%	2.59
2052	3,001,540	24,284	0.8%	2,206,154	18,582	0.8%	2,312,645	18,913	0.8%	42.1	1,876,097	22,000	1.2%	2.58
2053	3,025,833	24,293	0.8%	2,224,741	18,587	0.8%	2,331,652	19,008	0.8%	42.1	1,898,116	22,020	1.2%	2.58
2054	3,050,138	24,304	0.8%	2,243,333	18,592	0.8%	2,350,711	19,059	0.8%	42.2	1,920,449	22,333	1.2%	2.57
2055	3,074,455	24,318	0.8%	2,261,932	18,599	0.8%	2,369,703	18,992	0.8%	42.2	1,942,977	22,527	1.2%	2.56
2056	3,098,787	24,332	0.8%	2,280,540	18,608	0.8%	2,388,617	18,914	0.8%	42.2	1,964,867	21,891	1.1%	2.56
2057	3,123,135	24,348	0.8%	2,299,157	18,617	0.8%	2,407,502	18,885	0.8%	42.2	1,986,452	21,584	1.1%	2.55
2058	3,147,501	24,366	0.8%	2,317,787	18,630	0.8%	2,426,306	18,805	0.8%	42.2	2,008,149	21,698	1.1%	2.55
2059	3,171,886	24,385	0.8%	2,336,429	18,642	0.8%	2,445,051	18,745	0.8%	42.1	2,030,038	21,888	1.1%	2.54
2060	3,196,354	24,469	0.8%	2,355,084	18,655	0.8%	2,463,781	18,730	0.8%	42.1	2,052,287	22,249	1.1%	2.54
2061	3,220,713	24,358	0.8%	2,373,756	18,672	0.8%	2,482,481	18,700	0.8%	42.1	2,074,667	22,380	1.1%	2.53
2062	3,244,778	24,066	0.7%	2,392,116	18,360	0.8%	2,501,102	18,621	0.8%	42.1	2,096,306	21,639	1.0%	2.53
2063	3,268,651	23,872	0.7%	2,410,309	18,193	0.8%	2,519,511	18,409	0.7%	42.1	2,117,638	21,332	1.0%	2.52
2064	3,292,536	23,885	0.7%	2,428,513	18,204	0.8%	2,537,730	18,219	0.7%	42.1	2,139,120	21,482	1.0%	2.52
2065	3,316,436	23,900	0.7%	2,446,726	18,213	0.7%	2,555,892	18,161	0.7%	42.1	2,160,512	21,392	1.0%	2.52

* The Bureau of Economic Analysis concept as "a count of jobs, both full-time and part-time. It includes wage and salary jobs, sole proprietorships, and individual general partners, but not unpaid family workers nor volunteers."

** The Bureau of Labor Statistics Quarterly Census of Employment and Wages concept of employment that is a count of jobs, both full-time and part-time, of "establishments covered by the Unemployment Insurance (UI) programs of the United States." "Major exclusions from UI coverage include self-employed workers, most agricultural workers on small farms, all members of the Armed Forces, elected officials in most states, most employees of railroads, some domestic workers, most student workers at schools, and employees of certain small nonprofit organizations."

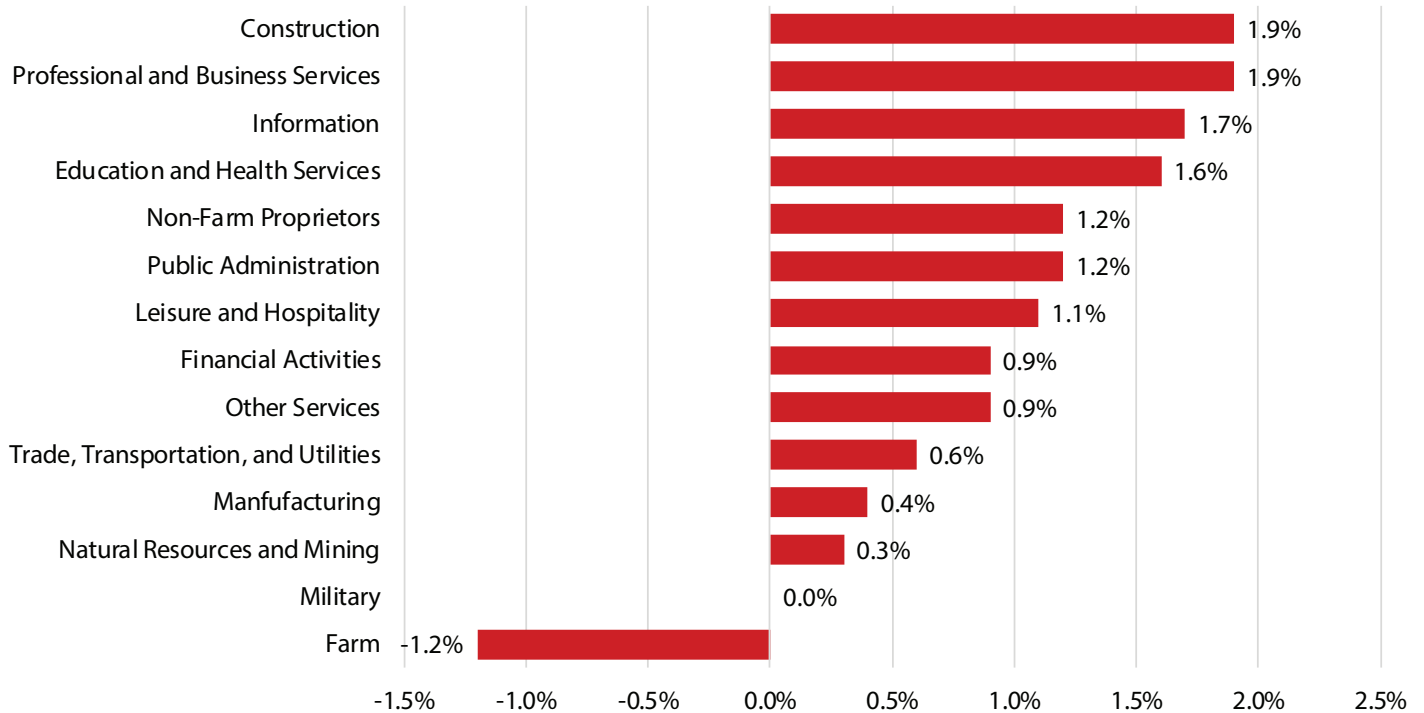
Source: Kem C. Gardner Policy Institute 2015-2065 State Projections

Table 7
Utah Employment Projections by Major Industry: 2010-2060

	2010		2020		2030		2040		2050		2060		Average Annual Growth 2010-2060
	Number of Jobs	Percent of Total	Number of Jobs	Percent of Total	Number of Jobs	Percent of Total	Number of Jobs	Percent of Total	Number of Jobs	Percent of Total	Number of Jobs	Percent of Total	
Natural Resources and Mining	11,050	0.7%	12,446	0.6%	13,545	0.6%	13,642	0.5%	13,486	0.5%	13,287	0.4%	0.37%
Construction	65,224	4.0%	96,968	4.6%	118,692	4.9%	140,683	5.2%	167,944	5.7%	197,519	6.2%	2.24%
Manufacturing	110,234	6.8%	134,101	6.3%	152,235	6.3%	155,413	5.7%	155,726	5.3%	154,014	4.8%	0.67%
Trade, Transportation, and Utilities	226,990	14.1%	286,045	13.5%	320,963	13.2%	333,797	12.3%	342,374	11.6%	351,564	11.0%	0.88%
Information	28,042	1.7%	36,717	1.7%	44,370	1.8%	54,201	2.0%	63,229	2.1%	71,835	2.2%	1.90%
Financial Activities	67,980	4.2%	87,090	4.1%	99,533	4.1%	110,090	4.1%	116,077	3.9%	121,318	3.8%	1.17%
Professional and Business Services	150,287	9.3%	223,764	10.6%	291,072	12.0%	348,766	12.9%	401,616	13.6%	454,135	14.2%	2.24%
Education and Health Services	140,703	8.7%	189,573	8.9%	233,470	9.6%	270,617	10.0%	306,787	10.4%	342,952	10.7%	1.80%
Leisure and Hospitality	110,553	6.9%	152,371	7.2%	179,207	7.4%	195,487	7.2%	208,731	7.1%	221,502	6.9%	1.40%
Other Services	31,060	1.9%	37,208	1.8%	43,062	1.8%	46,111	1.7%	48,877	1.7%	51,459	1.6%	1.01%
Government	204,747	12.7%	240,624	11.4%	282,108	11.6%	313,746	11.6%	344,144	11.7%	375,499	11.7%	1.22%
Non-Farm Proprietors	427,427	26.5%	590,257	27.8%	617,640	25.5%	696,537	25.7%	757,001	25.6%	815,192	25.5%	1.30%
Farm	20,007	1.2%	16,390	0.8%	13,986	0.6%	12,314	0.5%	11,050	0.4%	10,142	0.3%	-1.35%
Military	16,886	1.0%	15,936	0.8%	15,936	0.7%	15,936	0.6%	15,936	0.5%	15,936	0.5%	-0.12%
Non-Farm Payroll Employment	1,146,869	71.2%	1,496,908	70.6%	1,778,256	73.3%	1,982,552	73.2%	2,168,991	73.5%	2,355,084	73.7%	1.45%
Total Employment	1,611,189	100%	2,119,490	100%	2,425,818	100%	2,707,339	100%	2,952,978	100%	3,196,354	100%	1.38%

Sources: Kem C. Gardner Policy Institute 2015-2065 state projections; U.S. Bureau of Labor Statistics (BLS) and the U.S. Bureau of Economic Analysis (BEA) Historic Employment Counts

Figure 12
Employment by Major Industry: Average Annual Growth Rate from 2015-2065



Source: Kem C. Gardner Policy Institute 2015-2065 State Projections

Conclusion

Utah has a distinctive economic and demographic history. Our range of reasonable possibilities suggest these distinctive patterns are likely to persist into the future, albeit to a lesser degree. Utah will most likely continue to grow. At present, Utah has the youngest median age in the United States. It might still maintain that distinction into the future, but whether it does so will become less important for planning purposes. Of great importance is that Utah has seen a rising median age and this trend is likely to persist into the future. As Figure 1 clearly illustrates, Utah's population pyramid is expected to become less cone shaped and more beehive shaped. This projected age shift has substantial implications that planners should carefully consider.

Similar to the rest of the United States, death and birth rates will likely continue to decline. Improved personal and public health measures can keep an ever-increasing number of people alive into their 100s, and there are several reasons to suspect changing economic and social patterns will continue to lower birth rates in Utah and the United States. Into the future, if birth rates and natural increase rates decline, greater net in-migration will be needed to maintain historical population growth rates. We expect that employment growth will continue, especially given Utah's history of flexibility in adapting to new market opportunities and conditions. These projections assume that Utah will be able to attract enough labor migrants to meet market needs. Economic growth is projected to decelerate and, consequently, population growth rates will most likely decline, consistent with patterns observed throughout most the developed world.

Of course, this assumes that past and present patterns persist. Since we can't tell the future, our best predictor is the past. The patterns we have observed in Utah and the rest of the world, combined with our knowledge of demography, history, biology, sociology, economics, geography, and statistics, provide our most reliable roadmap for the future. Following this general method, we have projected Utah's future through our tailor-made UDEM model. And, to account for uncertainty, we have produced a range of high and low projections based upon assumptions derived from observed patterns. However, it is always possible for patterns to shift and this possibility becomes more likely the further we try to look into the future.

The Kem C. Gardner Policy Institute will release revised long-term projections by mid-summer 2017. The revised

figures will include county-level specificity and serve as the official projections for the state's four-year transportation planning process, as well as other long-term planning needs. We express our appreciation to our many partners in the community who have helped with this work. We share it with the hope that it will help policy makers, business leaders, and the public make informed decisions.

Appendix: Assumptions and Scenarios

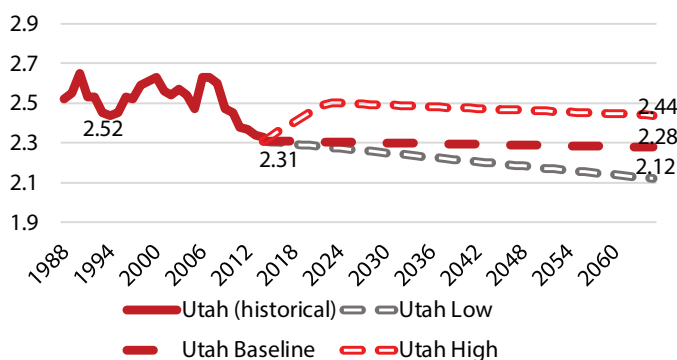
Fertility Scenarios

Fertility projections for the state of Utah are based on three potential scenarios. For each scenario we consider the historical relationships between Utah and U.S. fertility rates, and we anticipate that Utah rates will continue to slowly converge with the U.S. Census Bureau's projected 2060 fertility rates. Beginning with the ending point for each scenario, we first calculated the total fertility rate (TFR) for each year given a linear change over time. We then calculated age-specific rates (ASFRs) for each year for the ages 15-44, holding the proportional age distribution of these rates constant at the average of the proportional distribution for the years 2011-2014. Doing this ensured that our projected ASFRs would reflect Utah's proportional age structure of childbearing. We projected forward the average ASFRs of the past three years for ages 13-14 and 45-53, and we held fertility rates for ages 0-12 and 54-84 at 0 (largely consistent with rates from 2000-2014).

Under the high scenario, the TFR increases from 2.31 (2014) to 2.5 (2023-2024) and then declines, ending at 2.44 (2065). We would expect the initial increase in fertility as couples recoup births postponed during the recession. We would expect the subsequent decline as Utah continues to become more like the rest of the U.S. in family formation and childbearing norms, already reflected in Utah's long-term trend toward convergence.

Under the baseline scenario, the TFR decreases from 2.31 (2014) to 2.28 (2065). This is the TFR we would expect to see if Utah follows the rate of change for each age for each year of the projection period. To find this ending value we started with the TFR in 2014 (2.31) and followed

Figure A
Historical and Projected TFRs: Low, Baseline, and High Scenarios



Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections; Utah Department of Health

the rate of change from year to year in the ASFRs produced by the Census Bureau.

Under the low scenario, the TFR decreases from 2.31 (2014) to 2.12 (2065). This is the rate we would expect if Utah and the U.S. continued to converge at the same rate we see between 2000 and 2014. At this rate, Utah would converge with the U.S. (1.86, assuming the U.S. projections would continue to be nearly flat for all groups combined) in 2134.

Mortality Scenarios

Mortality and longevity were projected in two steps. First, we projected life expectancy, or the average number of years a newly-born person is expected to live, for each year. Second, we converted these into the rates of death or mortality for each single year of age and sex. High life expectancy and longevity are associated with low mortality, and vice versa. Projections were done separately for men and women in a way that the life expectancy for women is always higher, since women tend to live longer than men.

Under the low longevity (high mortality) scenario, life expectancy increases towards a maximum possible life expectancy of 83 years for women and 82 for men. Initially, it increases rapidly and then slows down near the high point. The high points are not selected beforehand and there is no time limit set for when they should be reached. Instead, the high points and the future pathway are calculated from patterns actually seen in Utah between 1968 and 2014. At 2065, the life expectancies under the low scenario are 82.8 for women and 81.1 for men.

Under the medium scenario, the same procedure for the low scenario is followed, except that the maximum possible life expectancy is preselected to be 100 for women and 95 for men. In this scenario, the data help determine the pathway taken, but not the high point. Gains in life expectancy have slowed lately, especially among women. After reviewing the actual patterns and the published research in the field, we determined this is likely a temporary setback. Therefore, the estimated high points of 83 and 82 became our low scenario. After consultation with the Census Bureau, we set our most likely projected maximum life expectancy for women at 100. We then set the high for men to 95, because this is the highest value they could attain without exceeding women at some point along the way. The projected life expectancy in 2065 under this scenario is 86.3 for women and 85.2 for men.

Under the high scenario, we do not assume a maximum possible life expectancy, but permit the life expectan-

cy for men (which has increased faster than women in recent years) to increase continually in a straight line. The life expectancy for women is then projected to increase at the same rate as men because giving women a slower rate of increase than men would cause their paths to cross. This yields 2065 life expectancies of 92.3 for women and 88.6 for men.

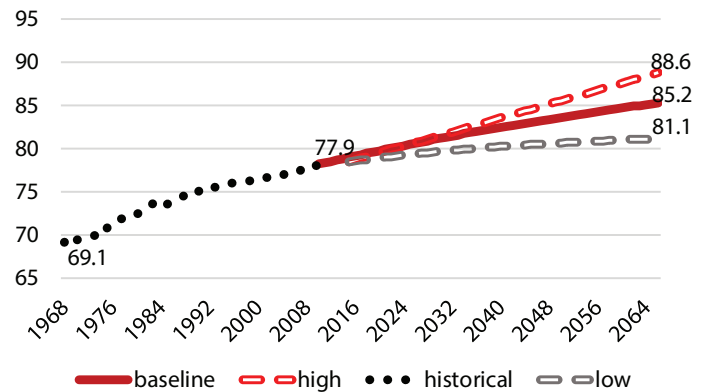
Converting life expectancies into mortality rates presents a significant challenge, especially since our high 2065 value of 92.3 has never been observed in an actual population. However, the United Nations maintains a database of life tables, constructed by top experts in the field, which describe what those patterns might look like. Referring to that database, we determined that the rates for Utah in 2065 might look like those in the Coale-Demeny West life tables for each projected life expectancy. Starting with the patterns we observed in Utah at the 2010 census, we then let the rate slowly move towards the Coale-Demeny pattern each year until it is reached in 2065. To make certain those intermediate rates matched the projected life expectancies as closely as possible, we wrote a program that made small adjustments to the rates until the life expectancies matched up.

Economic Scenarios

Projections of the statewide total count of jobs (all jobs—private and public; wage/salary and the self-employed) are the sum of individual industry projections. Each industry projection is based on a collection of 12 time-series regression models that relate historical statewide job counts in that industry to those of the nation. The use of multiple models is an effort to account, however imperfectly, for uncertainty in the relationship between Utah and U.S. employment. Industry projections of job counts were generated from these models by applying them to trend forecasts of nationwide jobs counts by industry published by IHS Global Insight (GI)—with the exception of farm employment, which was obtained from Regional Economic Models, Inc. (REMI), and military employment, which was held constant over the projection period.

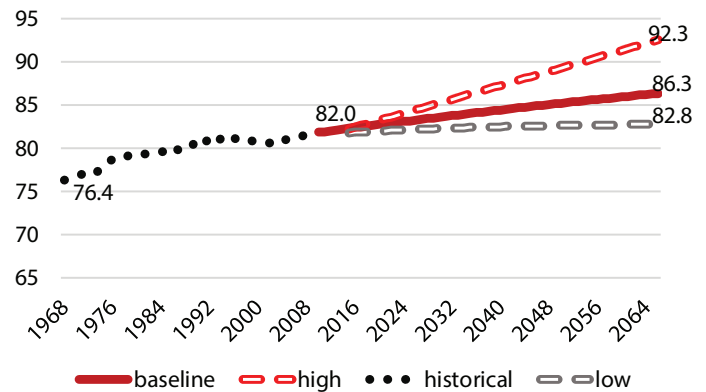
The Utah Department of Workforce Services (DWS) produces statewide 10-year-ahead job count projections by industry. The most recent DWS projection was for 2024. We incorporate the DWS projections by assuming that job counts by industry grow at the rate implied by the DWS projections, deriving growth rates for the intervening years (2015–2024) by interpolation. Thus, the data series on which the models are fit is the concatenation of the actual historical series (1990–2015) and the assumed series derived from DWS and IHS Global Insight (2016–2024). In other words, we assume that the DWS-projected and Global Insight-projected job counts through 2024 actually occur and treat them as “history.”

Figure B
Historical and Projected Male Life Expectancy: Low, Baseline, and High Scenarios



Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections; Utah Department of Health

Figure C
Historical and Projected Female Life Expectancy: Low, Baseline, and High Scenarios

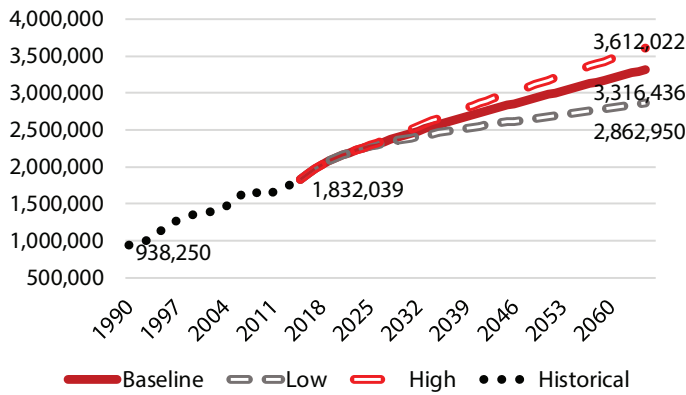


Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections; Utah Department of Health

Projections of statewide job counts by industry after 2024 are based on the estimated models and Global Insight nationwide projections. Since Global Insight national projections were only available through 2046, whereas projections were required through 2065, we extrapolated each Global Insight projection through 2065 by carrying forward the change in projected job counts between 2045 and 2046.

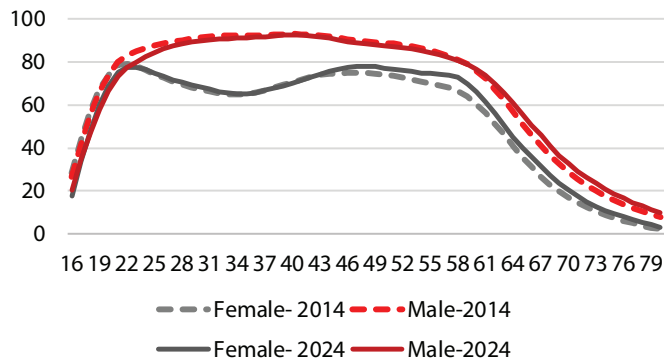
For each industry, 12 projections were produced—one for each model. In most cases, there were considerable differences in projected employment between the models. Final decisions about scenarios were based on the analyses just described, reviews of industry outlook research, consultations with regional experts at DWS, and evaluations by researchers at the Gardner Policy Institute. In some cases the mean projection served as the “medium” or baseline forecast. These “low,” “medium,” and “high” by-industry projections give rise, when totaled, to “low,” “medium,” and “high” projections of total employment.

Figure D
Economic Forecast: Low, Baseline, and High Scenarios



Sources: Kem C. Gardner Policy Institute 2015-2065 State Projections; U.S. Bureau of Economic Analysis (BEA) & U.S. Bureau of Labor Statistics (BLS) historical employment data

Figure E
Labor Force Participation Rates (per 100) by Age and Sex: 2014 & 2024



Sources: 2010-2014 American Community Survey Public Use Micro-Data Sample; U.S. Bureau of Labor Statistics

The validity and accuracy of these employment projections rest on two basic assumptions: (1) that the historical statistical relationship between Utah and U.S. employment, as measured by these models, continues to hold relatively far into the future; and (2) that the Global Insight national forecasts to which the Utah projections are tied are accurate. The projections provided here are only valid to the extent that these assumptions are met.

Historical (1990–2015) employment data were obtained from the U.S. Bureau of Economic Analysis (BEA) and the U.S. Bureau of Labor Statistics (BLS).

Projections of labor force participation rates (LFPR) by single year of age and sex are constructed in three steps. First, 2014 LFPR for Utah were estimated by single year of age and sex using data from the 2010–2014 American Community Survey Public Use Micro-Data Sample (ACS PUMS). Second, the LFPR for the period 2015–2024 are

based on the 2014 LFPR, with adjustments to reflect changes in nationwide LFPR over this period as projected by BLS. LFPR for years after 2024 are held constant at the rates projected for 2024.

The BLS projects increases in labor force participation rates for older age groups of males and females. As shown in Figure E, the 2014 LFPR and projected 2024 LFPR are similar for females until around age 44 and for males until around age 60. For females older than about age 44, and males older than about age 60, projected 2024 LFPR are higher than the corresponding 2014 LFPR. The projected LFPRs for younger ages for both males and females decline from 2014 to 2024. The projected LFPR for 2024 is lower for females younger than age 23 and for males younger than age 35 as compared to those of 2014.

Endnotes

1. In this set of projections, the initial population is determined from Census 2010 data as well as postcensal population estimates generated by the DemographyUTAH Population Committee.
2. See end of document for detailed explanations of scenarios and their assumptions.
3. Perlich, P. S. (2015). Three Million Utahns: Technical Memorandum. Kem C. Gardner Policy Institute, University of Utah. Available at http://gardner.utah.edu/wp-content/uploads/2015/10/20151025_three_million_tech_memo_gomb1.pdf
4. It is important to note that this annual accounting of contributions to population growth does not capture the cumulative contribution of in-migrants to population growth over time. Migrants bring children with them when they relocate and have additional children after they are established as Utahns. In the absence of migration to the state, the population would be smaller and have an older age structure. We explore this cumulative contribution of migrants, their children and grandchildren here http://gardner.utah.edu/wp-content/uploads/2016/03/20160316_3Million.pdf
5. Growth rates for Table 7 and Figure 12 differ due to differences in the years over which the averages are based: In Table 7, the average is calculated over the years 2010 - 2060, while in Figure 12 the average is calculated over the years 2015 - 2065.



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