

Memo

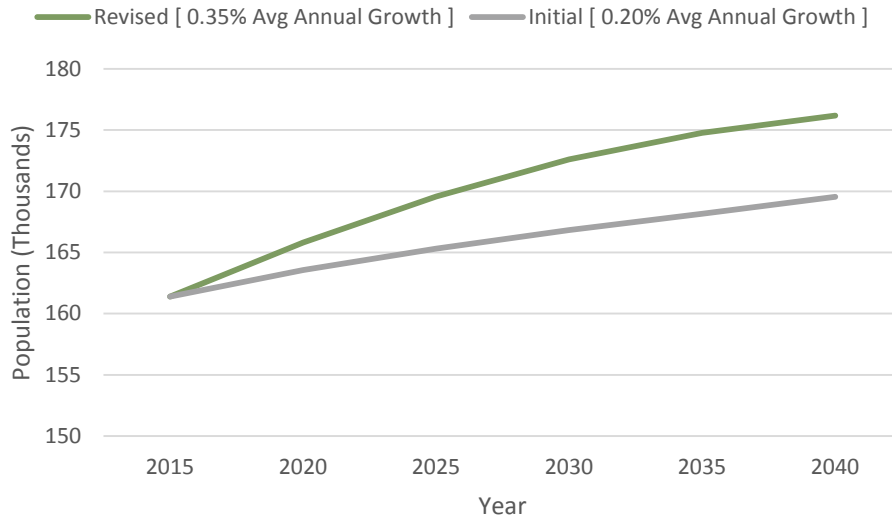


To: Charlie Baker, *CCRPC*
CC: Jonathan Slason, *RSG*
From: Robert A. Chase and John M. Dellipriscoli, *Economic & Policy Resources*
Date: December 2, 2016
Re: Revised Second Draft Chittenden County Population Forecast Estimates

After reviewing your memorandum dated November 21, 2016 and reviewing the relevant data sources, we have developed a second draft of the county level population forecasts that are intended to address your concerns with the initial baseline forecast. The main concern appeared to be a lower than expected projected population growth for both the State of Vermont and Chittenden County, as well as an additional concern (that was also shared by EPR) that some of the age cohorts growth in the relative immediate horizon (Year 2020).

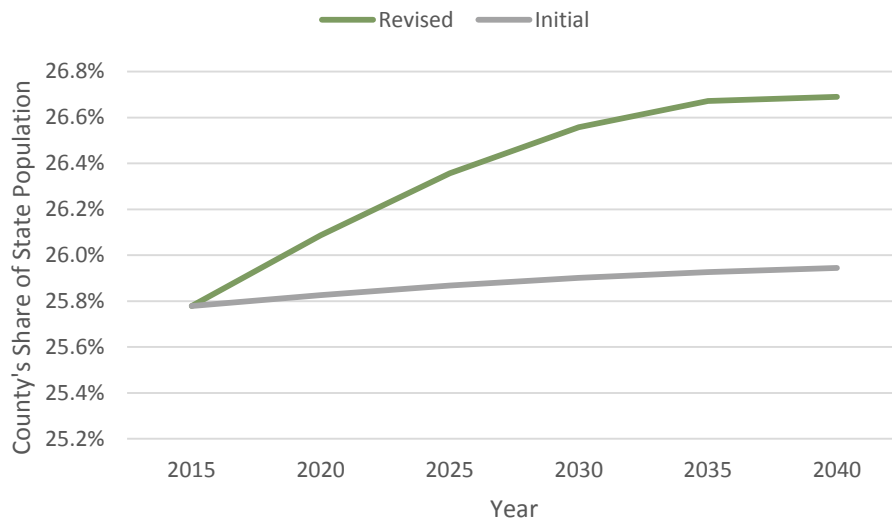
In order to address the first concern, while we cannot update the statewide consensus forecasts, we considered staff's comments in the November 21, 2016 memorandum. We took steps specifically to include in the forecast the historical average annual growth rates from 2000 through 2010 (which averaged 0.66% per year) and the period for the provisional estimates over the 2010 through 2015 (which averaged 0.61% per year). The historic growth from these periods were included in the initial forecast, however as we often see in unadjusted, initial demographic forecasts, the linear relationship characterizing the algorithm does not distribute the appropriate weight to more relative time periods. Our latest round of adjustments address these inconsistencies in the initial linear model by more heavily weighting these more recent time periods since we agree they are likely to be more predictive of future population growth relative to other time historical periods than would be the case in a more equal weighting of the past time periods. Since we realize the immediate past often is the best predictor of the near-term future, we can weight the growth from 2010 to 2015 more than we do the rest of the historical time periods and distribute that weighting scheme throughout the forecast. Figure 1 shows the updated forecast as well as the initial forecast for comparison purposes. Chart 1 below shows the comparison between the current, second draft forecast and the initial that was employed to begin the "discussion." As can be seen in the chart and the attached figure, the revised county-wide forecast projects an average annual growth rate of 0.35% from 2015 through 2040.

Chart 1: Chittenden County Population Forecasts



The revised forecast of Chittenden County’s population growth also translates into a larger projected share of the State of Vermont’s population from 2015 through 2040. Figure 2 shows the revised forecast’s share for the State of Vermont population total versus the initial forecast provided. Chart 2 below shows the change in State population share for Chittenden County in this second county-wide population forecast revision throughout the 2015-2040 time period, compared to the initial forecast.

Chart 2: Chittenden County’s Forecasted Share of State Population



In the revised forecast, the total share of the State’s population attributed to Chittenden County increases by 0.91 percentage points from 2015 to 2040. Figure 3 outlines the County’s share of the State’s total population by age cohort. The Under 65 age cohort is forecasted to increase its share by 3.16 percentage points from 2015 to 2040, with the fastest growing cohorts relative to the rest of the state predicted in the 20-24 age cohort (4.60 percentage point increase) and the 45-64 age cohort (9.36 percentage point increase).

An additional adjustment was also made in the revised forecast to smooth the 2015 to 2020 rates of growth in four age cohorts: (1) the Over 65 Years cohort, (2) the 20-24 Years age cohort, (3) the 25-44 Years age cohort, and (4) the 45-64 Years age cohort. This was done in order to bring the respective cohort growth rates more in line with their 2010-2015 growth rates and to prevent “splicing problems” between the historic actuals and the initial five years of the forecast. This smoothing process was done by attributing a share of the 2015 – 2020 growth in the older age cohorts (e.g. the aged 45-64 years and the aged 65+ years cohorts) to the younger cohorts (e.g. the aged 20-24 years cohort, and the aged 25-44 years cohort), and having that trend follow through to 2040. Please refer to Figure 1 to see the comparison of the revised forecast and the initial forecast.

We also would like to share our observations in terms of the specific questions asked by the Planning Advisory Committee (PAC) in the memorandum of November 21, 2016:

1. *“What length of time was used for the forecast?”* – We used the historical data provided by Moody’s Analytics from 1996 through 2015 to perform the forecast. A 20-year historical data set to project a 25-year time period is a common practice. In the revised forecast, we acknowledged the PAC’s point in the memorandum that the growth in the 2010 through 2015 period should be more heavily weighted in the County’s forecast. We agreed with that observation, and made that adjustment in the second draft of the county-wide population forecast.
2. *“Was a cohort-survival or cohort-component method used in the forecast? Understanding the births, deaths and net migration may help to understand the forecast.”* – The Moody’s Analytics model includes Net Migration-Domestic, Net Migration-International, Births, and Deaths as variables. These variables are considered in the wider demographic projections and are in fact included in our forecast approach. If there are additional fine-tuning adjustments in this regard that the PAC and/or the CCRPC staff would explicitly like to see, we can discuss and develop a consensus on those issues with the idea of making sure they are “fully-considered” in a prospective final county-wide population estimate to be developed over the next few weeks.

Like the initial population forecast provided earlier, this second revision of the Chittenden County Population forecast incorporates the June 2016 Vermont Statewide Population Consensus Forecast—Legislative Joint Fiscal Office–Shumlin Administration that was employed in the most recent VTrans Long-Range Transportation Plan update. This forecast has been adjusted to place a greater weighting on the growth in county-wide population as indicated by the provisional population estimates from the U.S. Census Bureau for the 2010-2015 period relative to the weighting used for the previous historical population estimates data. We also made additional adjustments, such as smoothing the data in four of the age cohorts discussed above.

Please let us know if you have any additional questions, or additional observations relative to this second round forecast of the county-wide population.

Figure 1: Revised Chittenden County Population Forecast (December 1, 2016) vs Initial Forecast (October 7, 2016)

Population--Chittenden County -- Weighted Moving Average Revised Forecast December 1, 2016										
Calendar Year	Weighted Total	Total Projected Population	Total Over 65 Years	Total Under 65 Years	Total 0-4 Years	Total 5-19 Years	Total 20-24 Years	Total 25-44 Years	Total 45-64 Years	Driving Age Population 16-84 Years
	Population Growth									
2015	0.61%	161,382	22,049	139,333	7,976	29,738	18,117	40,556	42,946	131,950
2020	0.54%	165,803	25,866	139,937	7,162	30,677	18,345	38,010	45,743	135,665
2025	0.45%	169,580	26,335	143,245	7,343	31,442	19,094	38,946	46,419	138,620
2030	0.35%	172,596	26,295	146,301	7,498	32,044	19,474	39,308	47,978	140,971
2035	0.25%	174,764	26,264	148,499	7,625	32,453	19,723	39,796	48,902	142,618
2040	0.16%	176,179	26,294	149,885	7,700	32,762	19,854	40,268	49,301	143,704

2015 - 2040 Average Annual Growth

0.35%

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Population--Chittenden County-- Initial Forecast October 7, 2016										
Calendar Year	Average Growth	Total Population	Total Over 65 Years	Total Under 65 Years	Total 0-4 Years	Total 5-19 Years	Total 20-24 Years	Total 25-44 Years	Total 45-64 Years	Driving Age Population 16-84 Years
	Total Population									
2015		161,382	22,049	139,333	7,976	29,738	18,117	40,556	42,946	131,950
2020	0.27%	163,569	30,271	133,298	7,066	30,264	14,915	32,729	48,325	133,838
2025	0.21%	165,326	30,479	134,847	7,159	30,653	15,398	33,149	48,487	135,143
2030	0.18%	166,837	30,266	136,570	7,248	30,975	15,577	33,133	49,639	136,267
2035	0.16%	168,175	30,162	138,013	7,338	31,229	15,706	33,393	50,347	137,241
2040	0.16%	169,537	30,230	139,307	7,410	31,527	15,806	33,807	50,757	138,286

2015 - 2040 Average Annual Growth

0.20%

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Figure 2: Revised State of Vermont Population Forecast (December 1, 2016) vs Initial Forecast (October 7, 2016)

Population--State of Vermont -- Weighted Moving Average Revised Forecast December 1, 2016										
Calendar Year	Weighted									
	Total Population Growth	Total Population	Total Over 65 Years	Total Under 65 Years	Total 0-4 Years	Total 5-19 Years	Total 20-24 Years	Total 25-44 Years	Total 45-64 Years	Driving Age Population 16-84 Years
2015		626,042	109,893	516,149	30,408	110,275	47,168	142,298	186,000	506,969
2020	0.30%	635,570	125,993	509,577	31,345	107,227	46,845	154,430	169,730	514,930
2025	0.24%	643,376	146,004	497,371	31,619	107,105	45,287	159,931	153,431	520,109
2030	0.20%	649,882	160,783	489,099	31,341	107,936	44,648	161,661	143,514	519,750
2035	0.16%	655,233	165,509	489,724	30,693	109,883	44,392	162,534	142,223	517,404
2040	0.15%	660,101	163,018	497,083	30,587	110,237	46,166	158,169	151,924	515,494

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Population--State of Vermont -- Consensus Population Forecast--Legislative Joint Fiscal Office-Adminstration. June 2016.										
Calendar Year	Average Growth									
	Total Population	Total Population	Total Over 65 Years	Total Under 65 Years	Total 0-4 Years	Total 5-19 Years	Total 20-24 Years	Total 25-44 Years	Total 45-64 Years	Driving Age Population 16-84 Years
2015		626,042	109,893	516,149	30,408	110,275	47,168	142,298	186,000	506,969
2020	0.23%	633,337	130,399	502,939	31,248	106,814	43,414	149,150	172,312	513,103
2025	0.18%	639,122	150,149	488,973	31,434	106,316	41,590	154,134	155,499	516,632
2030	0.16%	644,123	164,754	479,368	31,091	106,866	40,751	155,486	145,175	515,045
2035	0.14%	648,644	169,407	479,237	30,405	108,659	40,375	156,131	143,667	512,027
2040	0.15%	653,458	166,954	486,504	30,297	109,001	42,117	151,709	153,380	510,076

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Figure 3: Chittenden County's Share of Total State Population – Revised Forecast December 1, 2016

Population--Chittenden County's Share of Vermont Total									
Calendar Year	Total Projected Population	Total Over 65 Years	Total Under 65 Years	Total 0-4 Years	Total 5-19 Years	Total 20-24 Years	Total 25-44 Years	Total 45-64 Years	Driving Age Population 16-84 Years
2015	25.8%	20.06%	26.99%	26.23%	26.97%	38.41%	28.50%	23.09%	26.03%
2020	26.1%	20.53%	27.46%	22.85%	28.61%	39.16%	24.61%	26.95%	26.35%
2025	26.4%	18.04%	28.80%	23.22%	29.36%	42.16%	24.35%	30.25%	26.65%
2030	26.6%	16.35%	29.91%	23.92%	29.69%	43.62%	24.31%	33.43%	27.12%
2035	26.7%	15.87%	30.32%	24.84%	29.53%	44.43%	24.48%	34.38%	27.56%
2040	26.7%	16.13%	30.15%	25.18%	29.72%	43.01%	25.46%	32.45%	27.88%

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