

# Memo



**To:** Regina Mahoney, *CCRPC* and Melanie Needle, *CCRPC*  
**CC:** Charlie Baker, *CCRPC* and Jonathan Slason, *RSG*  
**From:** Robert A. Chase and John M. Dellipriscoli, *Economic & Policy Resources*  
**Date:** January 6, 2017  
**Re:** Response to Forecast Comments & Next Steps

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The purpose of this memo is to respond to your email dated December 22, 2016, specifically addressing your questions and comments on the revised population forecast submitted on December 2, 2016. Prior to that however, we believe it is important to provide more context to the revised forecast and why we chose to use the particular methodology.

The underlying method of using a weighted average statistical technique followed by an age cohort smoothing re-allocation technique has economic and demographic context to it, as well as the statistical contexts that we will describe below. With the input of the Planning Advisory Committee (“PAC”) after the initial population forecast for Chittenden County, we agreed that there should be revisions made to reflect more recent population trends in Chittenden County – both in absolute terms but also relative to the rest of the State of Vermont. What we have increasingly seen is a clear core-periphery relationship between Chittenden County and the rest of Vermont, where Chittenden County serves as the growth pole that is forecasted to increase its “growth shares” in population and employment relative to the rest of the state. This concept was at the heart of adjusting the initial forecast using a weighted average to increase the projected population growth in Chittenden County and having that growth then pass through and drive the revised growth in the population forecast for the state. If we were going to revise the population forecast for the entire state to show an increase in projected population growth, it adheres to the core-periphery concept to have Chittenden County drive that additional growth.

The reallocation of the age cohort share was also made to: 1) become more statistically reliable or “smooth” and 2) to frame some of the demographic and socioeconomic factors that are at play from cohort to cohort. In the sections below in which we address each question/comment from your December 22, 2016 email, we try to weave the statistical explanations with the demographic and socioeconomic contexts. The broad message is this: there is no doubt that economic and non-economic factors are in play depending upon the age cohort, and in Chittenden County there is a demographic churning of people moving in from elsewhere in Vermont (core-periphery relationship) which is a net positive for some cohorts, and people moving out to other parts of Vermont (very minimal) or out of Vermont (more significant). This broad concept of migration, along with other socioeconomic factors specific to each age cohort, serves as an underlying justification for performing the statistical technique that we used when it came to smoothing out particular age cohorts.

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With that brief description of the basis for the methodology employed in the revised forecast of December 2, 2016, below, we have re-phrased each question in your December 22, 2016 email and provided a response:

1. *"If you look at Figure 1, there are two tables, one with revised numbers and the other with the original. In the revised table, they show the county population growing faster, but they have revised the over 65 numbers downwards significantly. We'd like to understand the logic there."*

The Over 65 Years cohort projected population was revised downward because of the methodology we used to adjust the consensus forecast. Since we gave a heavier consideration to the cohort growth trends as a share of the total county population in the 2010 to 2015 time period in order to smooth the 2015 to 2020 projected growth trends, this led us to reduce the initially projected population growth in the Over 65 Years cohort.

In the initial forecast of October 7, 2016, the share of Chittenden County's population that was Over 65 Years in 2010 was 11.37%. In 2015 this share grew to 13.66%, a 2.29 percentage point increase. In 2020, the share of the total county population in the Over 65 Years cohort was projected to increase 4.85 percentage points, to 18.51%.

Since the revised forecast of December 2, 2016 follows a methodology that incorporates a re-allocation of population in different age cohorts, we distributed some of the projected population growth from the Over 65 Years cohort to other age cohorts (specifically to the 20 – 24 Years and 25 – 44 Years cohorts). This was done to smooth growth in all cohorts as well as maintain consistency with the initial forecast with respect to the share of each age cohort. For example, in the initial forecast, in 2040 the total population of Chittenden County was projected to be 169,537. Of that population total, 77.03% were in the Over 65 Years cohort, 20 – 24 Years cohort, 25 – 44 Years cohort, and 45 – 64 Years cohort. For the revised forecast, we increased the total county population by using a weighted average growth technique and in 2040 the total population is estimated to be 176,179. In those four cohorts mentioned, we wanted to maintain that 77.03% combined share of total population in 2040 in the revised forecast (and the corresponding share in 2020, 2025, 2030, and 2035) while also smoothing the growth trends in those four cohorts. This means that we reallocated population from the Over 65 Years cohort and the 45 – 64 Years cohort and distributed it to the 20 – 24 Years cohort and 25 – 44 Years cohort. As it turned out, the rate in which we decreased the Over 65 Years cohort and the 45 – 64 Years cohort was greater than the total growth in population as a result of the weighted average adjustment, which was realized in an actual decrease in those particular cohorts' populations in all periods when compared with the initial forecast.

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Figure 1 compares the initial forecast (October 7, 2016) to the revised forecast (December 2, 2016) and how the age cohort shares of the total county population change for the four cohorts mentioned above.

2. *“Why does the 0-5 population decrease by about 800 from 2015-2020? According to ACS data, the 0-5 age cohort’s share of the population remains steady with only tiny fluctuations that are within the margin of error.”*

The fact that this decrease is projected outside of the 2015 American Community Survey (ACS) Under 5 Years margin of error is not necessarily surprising. It is true that from *year to year* there are tiny fluctuations in the cohort’s share of the population that may stay within the margin of error from the year prior. While in the ACS data, 2010 to 2015 only shows an approximate 0.1 percentage point increase in population share, if we look at 2005 to 2010, there is an approximate 0.9 percentage point decrease in population share. In both the initial and revised forecast we are projecting a 0.6 percentage point decrease in the total population share. Following from 2020 to 2040, that share holds fairly steady around 4.3%.

We would point specifically to the declining trend in fertility rates and household size in the state to justify the decline in this age cohort.

3. *“For the age cohort 25-44, we’d like to understand why it decreases until 2030 and then increases until 2040.”*

Assuming that this is in reference to Figure 3 of the December 2, 2016 memo, this can be explained by the population growth in the 25 – 44 Years age cohort in other counties of Vermont relative to the population growth for the same cohort in Chittenden County. From 2015 to 2030, the State of Vermont is projected to increase the population in the 25 – 44 Years cohort at an average annual rate of 0.85%. Comparatively, from 2015 to 2030, Chittenden County is projected to see its 25 – 44 Years cohort population decline at an average annual rate of 0.21%. Conversely, from 2030 to 2040, the State of Vermont as a whole is estimated to see a decrease in the 25 – 44 Years cohort population at an annual average rate of 0.22%. From 2030 to 2040, Chittenden County is forecasted to see an increase in the 25 – 44 Years cohort population at an average annual rate of 0.24%.

It should be noted that we are opting to continue to use the July 2016 consensus estimates for 2015 population as a baseline, rather than using the 2015 estimates from the American Community

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Survey. Furthermore, we are not adjusting our baseline in light of the Census Bureau's release of 2016 state population estimates. This decision was made for consistency purposes as well as practical purposes – the consensus estimates are within the ACS margins of error for each cohort, so we believe it is appropriate considering this.

We hope that this further explanation of the methodology behind the revised population forecast for Chittenden County and the answers to your questions and comments are satisfactory. As of this time, we believe that there is no need to adjust the revised population forecast of December 2, 2016 and we can move on to the full forecast and municipal breakouts. We of course are open to more suggestions or requests to revise the county forecast from the PAC; however, to continue apace we will need confirmation from the CCRPC that the revised December 2 forecast is final.

As we understand the schedule going forward, we are targeting January 31, 2017 as the date for a complete deliverable for final review. Prior to the end of the month we will be in contact with CCRPC staff to review any interim forecasts that are developed regarding countywide employment and also municipal level population, household size, and employment. This iterative process will provide a better product to everyone and hopefully catch any issues in advance of the January 31st target.

Thank you and please let us know if there are any questions or if there is a request to further revise the Chittenden County population forecast.

**Figure 1: Comparison of Age Cohort Share of Total County Population – Initial (10/7/2016) vs. Revised (12/2/2016)**

<b>Population and Share of Population --Chittenden County-- Initial Forecast October 7, 2016</b>																		
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	
	2010	156,805	100.00%	17,824	11.37%	138,981	88.63%	7,882	5.03%	31,219	19.91%	16,535	10.54%	40,419	25.78%	42,926	27.38%	126,127
2015	161,382	100.00%	22,049	13.66%	139,333	86.34%	7,976	4.94%	29,738	18.43%	18,117	11.23%	40,556	25.13%	42,946	26.61%	131,950	81.76%
2020	163,569	100.00%	30,271	18.51%	133,298	81.49%	7,066	4.32%	30,264	18.50%	14,915	9.12%	32,729	20.01%	48,325	29.54%	133,838	81.82%
2025	165,326	100.00%	30,479	18.44%	134,847	81.56%	7,159	4.33%	30,653	18.54%	15,398	9.31%	33,149	20.05%	48,487	29.33%	135,143	81.74%
2030	166,837	100.00%	30,266	18.14%	136,570	81.86%	7,248	4.34%	30,975	18.57%	15,577	9.34%	33,133	19.86%	49,639	29.75%	136,267	81.68%
2035	168,175	100.00%	30,162	17.93%	138,013	82.07%	7,338	4.36%	31,229	18.57%	15,706	9.34%	33,393	19.86%	50,347	29.94%	137,241	81.61%
2040	169,537	100.00%	30,230	17.83%	139,307	82.17%	7,410	4.37%	31,527	18.60%	15,806	9.32%	33,807	19.94%	50,757	29.94%	138,286	81.57%

*Prepared by Economic & Policy Resources, Inc.*

<b>Population and Share of Population --Chittenden County-- Revised Forecast December 2, 2016</b>																		
Calendar Year	Total Projected Population		Adjusted Total Over 65 Years		Total Under 65 Years		Total 0-4 Years		Total 5-19 Years		Adjusted Total 20-24 Years		Adjusted Total 25-44 Years		Adjusted Total 45-64 Years		Driving Age Population 16-84 Years	
	2010	156,805	100.00%	17,824	11.37%	138,981	88.63%	7,882	5.03%	31,219	19.91%	16,535	10.54%	40,419	25.78%	42,926	27.38%	126,127
2015	161,382	100.00%	22,049	13.66%	139,333	86.34%	7,976	4.94%	29,738	18.43%	18,117	11.23%	40,556	25.13%	42,946	26.61%	131,950	81.76%
2020	165,803	100.00%	25,866	15.60%	139,937	84.40%	7,162	4.32%	30,677	18.50%	18,345	11.06%	38,010	22.92%	45,743	27.59%	135,665	81.82%
2025	169,580	100.00%	26,335	15.53%	143,245	84.47%	7,343	4.33%	31,442	18.54%	19,094	11.26%	38,946	22.97%	46,419	27.37%	138,620	81.74%
2030	172,596	100.00%	26,295	15.23%	146,301	84.77%	7,498	4.34%	32,044	18.57%	19,474	11.28%	39,308	22.77%	47,978	27.80%	140,971	81.68%
2035	174,764	100.00%	26,264	15.03%	148,499	84.97%	7,625	4.36%	32,453	18.57%	19,723	11.29%	39,796	22.77%	48,902	27.98%	142,618	81.61%
2040	176,179	100.00%	26,294	14.92%	149,885	85.08%	7,700	4.37%	32,762	18.60%	19,854	11.27%	40,268	22.86%	49,301	27.98%	143,704	81.57%

*Prepared by Economic & Policy Resources, Inc.*