Appendix

C. Replacement Ratios Comparison:
-Boston College Center for Retirement Research
-Mercer Consulting

CENTER *for* RETIREMENT RESEARCH *at* BOSTON COLLEGE

To: Connecticut Retirement Security Board

From: Center for Retirement Research at Boston College

Date: 12/11/2015

Re: Comments on Draft Report to Legislature

Replacement Rates

CRR believes replacement rates in excess of 100 percent – as presented in a portion of the appendix – may not be achieved by the program. These high replacement rates require making several assumptions that may not play out simultaneously. First, that real wages will not grow over an individual's life after age 25. Second, that the annuity rate will be 5 percent instead of the 4 percent existing today. Lastly, that the claiming age will be 65, which is generally higher than observed for many low-income workers.

While CRR is open to the possibility that annuity rates may be higher or that individuals may claim later in the future than they do today, we disagree with the assumption on real wage growth. In general, even though wages have grown economy-wide at the rate of inflation, within individual lives wages typically grow faster. To illustrate, Table 1 presents the average wage for workers uncovered by a pension plan at different ages starting in 1981;[1] people who were 25 in 1981, 30 in 1986, 35 in 1991, and so on. In this way, the table shows the average wage of individuals similar to those affected by the State's program at different points in their lives.

Table 1. *Average Wage of Workers not Covered by Employer Pensions, Cohort of Individuals Aged 25 in 1981*

Age	Year observed	Average income in 2014 dollars	Annual real wage growth since 25
25	1981	$21,707	--
30	1986	$27,676	4.9%
35	1991	$31,164	3.6%
40	1996	$31,445	2.5%
45	2001	$35,852	2.5%
50	2006	$39,546	2.4%
55	2011	$36,562	1.7%

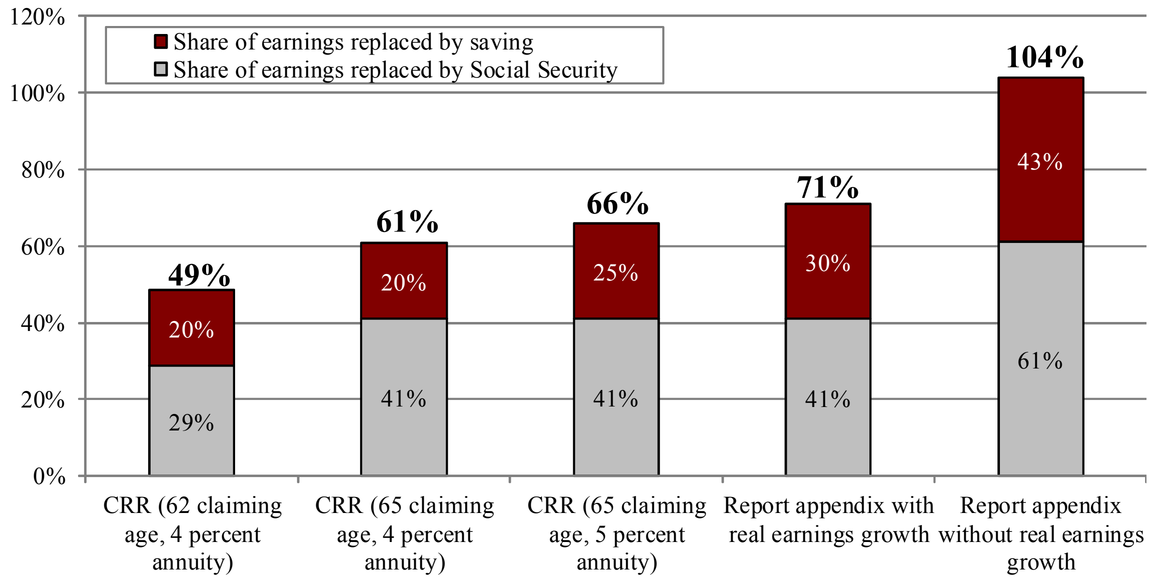
As the table shows, for this cohort of uncovered workers, wages grew in real terms between ages 25 and 55, hitting their peak in the mid-40s. Because wage growth slowed towards the end of the career, the average annual growth between age 25 and 55 was about 1.7 percent in real terms. This growth is more consistent with the "High Earnings Growth" scenario put forth by Mercer in

[1] Pension coverage information was first obtained in the 1980 CPS.

the appendix. Earnings growth decreases replacement rates because Social Security replaces less of high earners' income and because workers save a lower share of their lifetime income when young and the effect of compound interest is higher.

To see how these assumptions affect the replacement rates, consider Figure 1. The bars show the impact of increasing the claiming age from 62 to 65 and then the annuity rate from 4 to 5 percent. At this point, the replacement rate of 65 percent in CRR's model is similar to Mercer's results presented in the appendix that *do* assume real wage growth (presented on the last page). As the final bar shows, the most dramatic increase in the replacement rate seems to result from the assumption that wages do not grow at all in real terms.

Figure 1. *Replacement Rates for Median Individuals Starting Participation at 25 and Saving 6 Percent per Year, Under Various Assumptions*



Source: Authors' calculations from the *Current Population Survey March Supplement,* 2009-2013 and Report Income Replacement Rate Analysis.

1166 Avenue of the Americas
New York, NY 10036
www.mercer.com

MEMO

TO: Connecticut Retirement Security Board

DATE: December 7th, 2015

FROM: Mercer

SUBJECT: Follow-up – Income Replacement Ratio Analysis

This document is to provide further detail on the replacement ratio analysis provided on November 30th, and highlight some of the differences in assumptions between the Mercer analysis and the CRR report. We also provide historical replacement ratio calculations in response to the Board's request.

Replacement Ratios Comparison

The differences in income replacement ratio between Mercer and Boston College Center for Retirement Research (CRR) are due to the following:

1. CRR uses the following assumptions for starting salary and salary growth rate based on data from Census:

   The starting salary is $32,370, which is the average wage of uncovered workers in Connecticut aged 25-29 between 2009 and 2013.

   Salary growth rate:
   The wage path was assumed to follow the average trajectory of uncovered workers in CT between 2009 and 2013:
   Age 30-34: $38,883
   Age 35-39: $48,871
   Age 40-44: $39,432
   Age 45-49: $50,334
   Age 50-54: $50,929
   Age 55-62: $49,568

   On the other hand, Mercer assumptions are based on median wage for participants at their respective age range. For example, the wage of a 25 year old is determined using the median wage for an uncovered worker between the ages of 20-30. So, the use of median wage versus average as well as a wider age range (20 to 30 vs. 25 to 29 for CRR) leads to a lower starting wage assumptions. As opposed to using wage trajectory from the Census data, Mercer used wage growth assumptions consistent with our inflation assumptions for the model, 2.2%. For more details on this please see page two of Mercer's Income Replacement Ratio Memo which provides details around Mercer's wage growth assumptions. Lastly, Mercer's analysis divides each age cohort into low, medium, and high income to highlight the differences in income replacement ratio from Social Security for lower income workers compared to higher income workers. Below are the starting wage assumptions for various age cohorts:

Income Level		Age Cohort		
		Age 25	Age 40	Age 55
Income Level	Low	$20,000	$26,000	$30,750
	Mid	$24,000	$45,000	$55,000
	High	$31,000	$75,000	$99,000

2. CRR uses the Social Security Administration's projected replacement rate for the middle earner at age 62 to calculate the Social Security benefits. Mercer calculates Social Security benefits for each cohort described above using our modeling tool. This leads to a higher income replacement ratio for lower income workers.

3. CRR assumes that prospective participants would retire at age of 62 vs. Mercer's assumption of 65. The earlier retirement age reduces Social Security benefits and impacts the accumulated balance in the Program in CRR's analysis.

4. CRR assumes a 4% drawdown in retirement vs. Mercer's assumption of purchasing a life-annuity with cost of living adjustment whose yield is stochastically determined. In an alternative analysis CRR assumes an annuity is purchased at retirement. However, the analysis adds cost of living adjustments as well as survivor benefits, which leads to lower annuity payments than Mercer's single life assumption. Also, CRR uses current annuity pricing rate whereas Mercer uses long-term assumption for someone retiring in 40 years. In other words, CRR assumes that yield on annuities will stay where they are now for all participants, even if a 25 year old today retires in 37 to 40 from now. Mercer's assumptions adjust for changes in annuity yields as fixed income yields change in the future.

Historical Analysis

We estimate the replacement ratio for individuals reaching age 65 today with a 40 year career at various income levels. The results are shown in the table below:

		Replacement Ratios at Age 65		
	Salary	From Social Security	From TDF (assuming 6% contribution)	Total
Income Level	Low: $20,000	62%	39%	101%
	Mid: $24,000	58%	39%	97%
	High: $31,000	53%	39%	92%

Assumptions:

- Retirement age: 65
- Starting age of contribution: 25
- Historical wage inflation: 3%
- Contribution rate: 6%
- Returns: based on historical returns for MSCI World (Global Equity), Barclays Aggregate (US Aggregate – FI), and Merrill Lynch 90-day T-bill (Cash). Returns are net of estimated fees based on the financial feasibility analysis.
- Single life annuity conversion basis: RP 2014 mortality, 3.5% interest rate, 2.2% cost of living adjustment

The projected replacement ratios provided in Mercer's Income Replacement Ratio Memo (refer to November 30th Memo for assumptions) for a 25 year old retiring in 40 years are as follows:

		Replacement Ratios at Age 65		
	Salary *	From Social Security	From TDF (assuming 6% contribution)	Total
Income Level	Low: $20,000	65%	44%	109%
	Mid: $24,000	61%	44%	105%
	High: $31,000	56%	44%	100%

***This is the current salary at age 25 and it is also equivalent to the pay at retirement in today's dollars based on our future wage assumption being equal to inflation.**

The historical analysis is consistent with the forward looking projections which were based on the model assumptions described in the Income Replacement Ratio Analysis Memo.

Key differences between the data shown in Mercer's Memo and the CRR report are due to varying assumptions as highlighted in this document.

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