Milliman

April 30, 2015

PERSONAL & CONFIDENTIAL

Ms. Julie R. Goucher, Treasurer
Town of Bristol
Town Hall
10 Court Street
Bristol, RI 02809

Re: 2014 Experience Study – Town of Bristol, RI Police Retirement Plan

Dear Julie:

We are pleased to present the results of the 2014 Experience Study for the Town of Bristol, RI Retirement Plan.

The enclosed study reviews experience through June 30, 2014 and summarizes the results of the following economic experience: Consumer Price Inflation, Salary Scale, Amortization Growth Rate, Cost of Living Adjustment, and Investment Return.   Due to the small population size of the Plan, insufficient data exists to evaluate the following demographic experience of the Plan: Turnover, Retirement, Healthy Mortality, Disabled Mortality, Disability, and Percent Married.   The following actuarial methods are also reviewed: Asset Valuation Method (Actuarial Value), and the Actuarial Cost Method. Section II contains a discussion of the economic assumptions used in the actuarial valuation. Section III reviews the actuarial methods.

Proposals for new assumptions are included in this report, as well as the estimated impact of the proposed assumptions on the funded ratio and Actuarially Determined Contribution.

In preparing this study, we relied without audit on employee census data and financial information from July 1, 2010 through June 30, 2014, furnished by the Town of Bristol. This information includes, but is not limited to, plan provisions, employee data, and financial information.   In our examination of these data, we have found them to be reasonably consistent and comparable with data used for other purposes.   Since the valuation results are dependent on the integrity of the data supplied, the results can be expected to differ if the underlying data is incomplete or missing. It should be noted that if any data or other information is inaccurate or incomplete, our calculations may need to be revised.   If there are material defects in the data, it is possible that they would be uncovered by a detailed, systematic review and comparison of the data to search for data

values that are questionable or for relationships that are materially inconsistent. Such a review was beyond the scope of our assignment.

The calculations reported herein have been made on a basis consistent with our understanding of the plan provisions of the Town of Bristol, RI Police Retirement Plan. Furthermore, the calculations were determined in conformance with generally recognized and accepted actuarial principles and practices, which are consistent with the Actuarial Standards of Practice promulgated by the Actuarial Standards Board and the applicable Guides to Professional Conduct, amplifying Opinions, and supporting Recommendations of the American Academy of Actuaries.

Milliman's work is prepared solely for the internal business use of the Town of Bristol. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exception(s): (a) the Town may provide a copy of Milliman's work, in its entirety, to the Town's professional service advisors who are subject to a duty of confidentiality and who agree to not use Milliman's work for any purpose other than to benefit the Town; and (b) the Town may provide a copy of Milliman's work, in its entirety, to other governmental entities, as required by law. No third party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their own specific needs. If these results are distributed to other parties, we request that it be copied in its entirety and distributed along with a copy of the July 1, 2014 actuarial valuation report in its entirety as well, because this document provides background information that is important in understanding the basis for these results.

The calculations reported herein have been made on a basis consistent with our understanding of ERISA and the related sections of the tax code. Additional determinations may be needed for other purposes, such as judging benefit security at plan termination or meeting employer accounting requirements. On the basis of the foregoing, we hereby certify that, to the best of our knowledge, this report is complete and accurate and all costs and liabilities were determined in conformance with generally accepted actuarial principles and practices. We further certify that, in our opinion, each actuarial assumption, method and technique used is reasonable taking into account the experience of the Plan and reasonable expectations or would, in the aggregate, result in a total contribution equivalent to that which would be determined if each such assumption, method, or technique were reasonable. Differences between our projections and actual amounts depend on the extent to which future experience conforms to the assumptions made for this analysis. Actual experience will not conform exactly to the assumptions

made for this analysis. Actual amounts will differ from projected amounts to the extent that actual experience deviates from expected experience.

The consultants who worked on this assignment are pension actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

The signing actuary is independent of the plan sponsor. We are not aware of any relationship that would impact the objectivity of our work.

I am a member of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Please let me know if you have any questions.

Respectfully submitted,

Rebecca A. Sielman, FSA
Consulting Actuary

Michelle R. Sicilia, ASA, EA, MAAA
Enrolled Actuary

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TOWN OF BRISTOL, RI
POLICE RETIREMENT PLAN

2014 EXPERIENCE STUDY

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SECTION I
EXECUTIVE SUMMARY

The following is a discussion of the key findings of the 2014 Experience Study for the Town of Bristol, RI Police Retirement Plan.

Consumer Price Inflation

Current Basis	2.75% per year.
Recommendation	No change.

Salary Scale

Current Basis	4.25% per year.
Comment	Average annual salary increases from 2010 - 2014 were generally consistent with the current basis.
Recommendation	No change.

Amortization Growth Rate

Current Basis	3.00%
Recommendation	No change.

Cost of Living Adjustment

Current Basis	3.00% per year.
Comment	The current assumption matches the applicable fixed rate cost of living adjustment.
Recommendation	We recommend maintaining the use of 3.00%.

Investment Return

Current Basis	6.75% per year, net of investment expenses.
Comment	Based on updated capital market assumptions (Milliman, December 2014) and your asset mix, we propose that the investment return assumption be unchanged.
Recommendation	No change.

Turnover

Current Basis	No turnover assumed.
Comment	Due to the small population size of the Plan, insufficient data exists to evaluate demographic experience.

SECTION I
EXECUTIVE SUMMARY

Recommendation	No change.

Retirement

Current Basis	50% of members will retire at the completion of 20 years of service, 50% will retire the year after, 40% will retire the next year, and 5%each year thereafter. 100% will have retired upon attaining 29 years of service.
Comments	Due to the small population size of the Plan, insufficient data exists to evaluate demographic experience.
Recommendation	No change.

Healthy Mortality

Current Basis	RP-2000 Combined Healthy Mortality table with generational projection per Scale AA, separate tables for males and females.
Comments	Due to the small population size of the Plan, insufficient data exists to evaluate demographic experience.
Recommendation	No change.

Disabled Mortality

Current Basis	RP-2000 Disabled Mortality table with separate tables for males and females.
Comments	Due to the small population size of the Plan, insufficient data exists to evaluate demographic experience.
Recommendation	No change.

SECTION I
EXECUTIVE SUMMARY

Disability

Current Basis	50% of the 1985 Pension Disability Table (DP-85 Table) Class 4 rates.
Comments	Due to the small population size of the Plan, insufficient data exists to evaluate demographic experience.
Recommendation	No change.

Percent Married

Current Basis	100% of active members are assumed to be married at retirement, with husbands 3 years older than their spouses.
Comment	Due to the small population size of the Plan, insufficient data exists to evaluate demographic experience.
Recommendation	No change.

Asset Valuation Method (Actuarial Value)

Current Basis	The current smoothing method recognizes market value gains or losses in equal installments over a five-year period.
Comment	The current asset smoothing basis provides for an adequate level of smoothing within a reasonable period.
Recommendation	We recommend the continued use of this asset valuation method.

Actuarial Cost Method

Current Basis	The current method is the Entry Age Normal Cost Method. It is used for determining the future rates of contributions needed for funding service retirements. This method is designed to provide "percentage of payroll" Normal Actuarial Costs which will remain stable as long as the average entry age of the group remains stable. It recognizes experience gains and losses immediately.
Recommendation	We recommend the continued use of this funding method.

SECTION I
EXHIBIT A - CURRENT AND PROPOSED ACTUARIAL ASSUMPTIONS

The current actuarial assumptions used in the 2014 Town of Bristol, RI Police Retirement Plan valuation plus the proposed changes in actuarial assumptions are compared as follows:

	Current Assumption	Proposed Assumption
Consumer Price Inflation	2.75% per year.	No change.
Salary Scale	4.25% per year.	No change.
Amortization Growth Rate	3.00% per year.	No change.
Cost of Living Adjustment	3.00% per year.	No change.
Investment Return	6.75% per year, net of investment expenses.	No change.
Turnover	None assumed.	No change.
Retirement	50% of members will retire at the completion of 20 years of service, 50% the year after, 40% the next year, and 5% at each year thereafter. 100% will have retired upon attaining 29 years of service.	No change.
Healthy Mortality	RP-2000 Combined Healthy with generational projection per Scale AA, with separate male and female tables.	No change.
Disabled Mortality	RP-2000 Disabled Mortality Table with separate male and female tables.	No change.
Disability	50% of the 1985 Pension Disability Table (DP-85 Table) Class 4 rates.	No change.
Percent Married	100% of active members are assumed to be married at retirement, with husbands 3 years older than their spouses.	No change.
Asset Valuation Method (Actuarial Value)	The current smoothing method recognizes market value gains or losses in equal installments over a five-year period.	No change.
Actuarial Cost Method	Entry Age Normal actuarial cost method.	No change.

SECTION I
EXHIBIT B - ESTIMATED IMPACT OF PROPOSED ASSUMPTIONS

		Current Assumptions	Proposed Assumption Changes
		July 1, 2014 Valuation	**July 1, 2014 Valuation**
Funded Ratio*			
1.	Actuarial Value of Assets at July 1, 2014	**$13,838,972**	**$13,838,972**
2.	Actuarial Liability as of July 1, 2014	**27,686,705**	**27,686,705**
3.	Unfunded Accrued Liability (UAL) as of July 1, 2014	**13,847,733**	**13,847,733**
4.	Funded Ratio at July 1, 2014: (1) / (2)	**50.0%**	**50.0%**
Annual Town Cost for 2015-2016*			
1.	Net Normal Cost	**$71,752**	**$71,752**
2.	Past Service Cost (15 year amortization of UAL)	**1,171,739**	**1,171,739**
3.	Interest on (1) + (2) to the end of the fiscal year	**83,936**	**83,936**
4.	Actuarially Determined Contribution: (1) + (2) + (3)	**1,327,427**	**1,327,427**

* Note: The estimated impact on the July 1, 2014 funded ratio and Actuarially Determined Contribution for 2015-2016 is for illustrative purposes only. We understand that any adopted changes in the actuarial assumptions would first be <u>required</u> to be included in the July 1, 2015 actuarial valuation (which develops the Actuarially Determined Contribution for 2016-2017).

SECTION II
ECONOMIC ASSUMPTIONS

A. OVERVIEW OF ECONOMIC ASSUMPTIONS

Actuarial Standard of Practice (ASOP) No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, provides guidance to actuaries on selecting economic assumptions for measuring obligations under defined benefit plans. Because no one knows what the future holds, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes. These estimates are based on a mixture of past experience, future expectations, and professional judgment. The actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. However, the Standard explicitly advises the actuary not to give undue weight to recent experience.

Recognizing that there is not one "right answer", the Standard calls for the actuary to develop a best estimate range for each economic assumption, and then recommend a specific point within that range. Each economic assumption should individually satisfy the Standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period.

In our opinion, the economic assumptions set forth in this report have been developed in accordance with ASOP No. 27.

The remainder of this section contains the study results for the following economic assumptions:

- Consumer Price Inflation (CPI)
- Salary Scale and Payroll Growth Rate
- Amortization Growth Rate
- Cost of Living Adjustment
- Investment Return

SECTION II
ECONOMIC ASSUMPTIONS

B. CONSUMER PRICE INFLATION (CPI)

Current Assumption: 2.75% per year

Use in the Valuation: Future price inflation has an indirect impact on the results of the actuarial valuation through the development of the assumptions for investment return, Cost of Living Increase, and salary scale.

Consumer Price Index
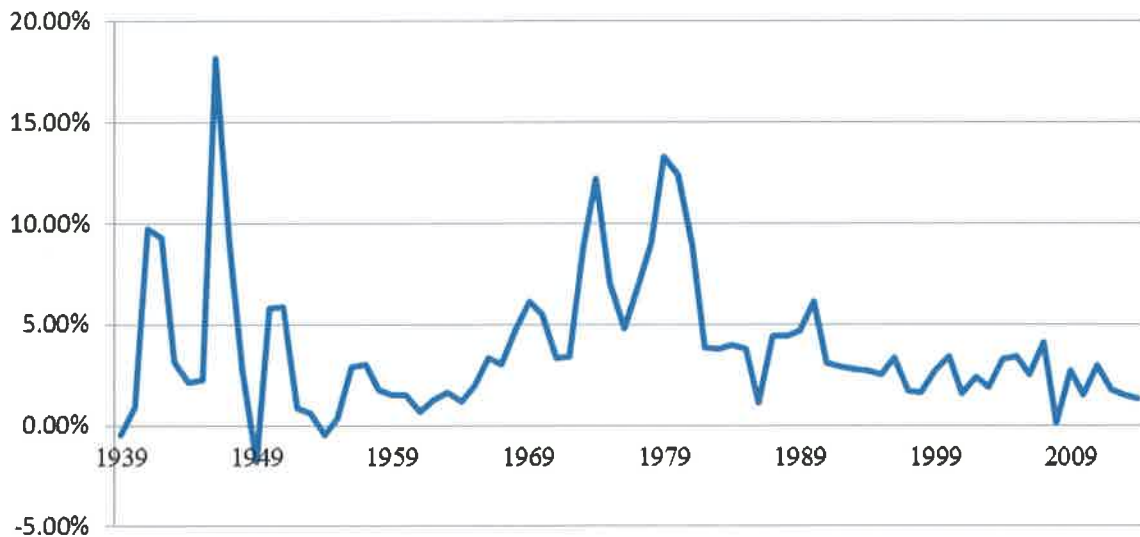
Historical Perspective: We have used certain published economic statistics that have been accumulated on a monthly basis over the last 75 years. The data for price inflation is based on the Consumer Price Index, US City Average, All Urban Consumers (CPI). The data for periods ending in December of each year is shown graphically above.

There are numerous ways to review this data. The table below shows the compounded annual price inflation rate for various 10 year periods and for longer periods ended in December 2014. Standard Deviation is a measure of the extent to which inflation varied from the Mean, or average, for the period.

SECTION II
ECONOMIC ASSUMPTIONS

B. CONSUMER PRICE INFLATION (CPI)

Period	Mean	Standard Deviation
2004-2014	2.18%	1.11%
1994-2004	2.43%	0.69%
1984-1994	3.58%	1.31%
1974-1984	7.34%	3.31%
1964-1974	5.20%	2.97%
2004-2014	2.18%	1.11%
1994-2014	2.31%	0.93%
1984-2014	2.73%	1.23%
1974-2014	3.86%	2.82%
1964-2014	4.13%	2.90%
75 years	3.84%	3.41%
25 years	2.54%	1.13%

Many economists forecast that future price inflation will be lower than the current assumption of 2.75%, but they may be looking at shorter periods than are appropriate for a pension valuation. To find an economic forecast with a long enough time frame to suit our purpose, we looked at the expected increase in the CPI by the Office of the Chief Actuary for the Social Security Administration. In the 2014 Trustees Report, the projected average annual increase in the CPI over the next 30 years under the intermediate cost assumptions was 2.7%. The reasonable range was stated as 2.0% to 3.4%.

Recommended Assumption: Based on the history over the last 75 years, and future expectations, we recommend that the long-term assumed price inflation rate continue at 2.75%. This rate will be used to build the net investment return, cost of living adjustment, and salary scale assumptions.

Consumer Price Inflation	
Current Assumption	2.75%
Recommended Assumption	2.75%

SECTION II
ECONOMIC ASSUMPTIONS

C. SALARY SCALE AND AMORTIZATION GROWTH RATE

Current Assumption: The current salary scale assumption is 4.25% per year. The current amortization growth rate assumption is 3.00% per year.

Study Design: We looked at the impact of age on annual salary increases for each individual in our study. The results indicate the combined impact of general wage growth, merit increases, and longevity increases.

Results: Experience shows that the median actual salary increases have been approximately 4.28%, which is only slightly higher than the current salary scale assumption of 4.25% per year.

Salary Scale Recommendation: We recommend maintaining the salary scale assumption of 4.25%.

Amortization Growth Rate Recommendation: We recommend that the current amortization growth rate assumption of 3.00% be maintained. Based on our judgment, the current assumption is reasonable, and credible experience does not exist that would suggest a change in this assumption.

SECTION II
ECONOMIC ASSUMPTIONS

D. COST OF LIVING ADJUSTMENT (COLA)

Use in the Valuation: Retired members receive an annual fixed percentage benefit increase of 3.00%.

Recommendation: No change.   The COLA is a fixed percentage increase and the current assumption is equal to the fixed percentage.

SECTION II
ECONOMIC ASSUMPTIONS

E. INVESTMENT RETURN

Current Assumption: 6.75% (net of investment-related administrative expenses).

Recommendation: Maintain the assumption to 6.75% (net of investment-related administrative expenses).

Analysis and Results:

The investment return assumption is one of the primary determinants in the allocation of the expected cost of the Fund's benefits, providing a discount of the estimated future benefit payments to reflect the time value of money. The valuation investment return assumption should represent the expected long-term rate of return on the actuarial value of assets, considering the Fund's asset allocation policy, expected long-term real rates of return on specific asset classes, the underlying inflation rate and investment-related expenses.

ASOP No. 27 provides guidance to actuaries on selecting assumptions for measuring obligations under defined benefit pension plans. Because the future cannot be accurately predicted, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes. These estimates are based on a combination of past experience, future expectations, and professional judgment. The actuary should consider a number of factors including the purpose and nature of the measurement and appropriate recent and long-term historical economic data. However, ASOP No. 27 explicitly advises the actuary not to give undue weight to recent experience.

ASOP No. 27 calls for the actuary to develop a single best estimate for each economic assumption. Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period.

The Fund's long-term rate of return on its investments will be mostly determined by its allocation to various asset classes. According to the Fund's Investment Policy Statement, the Fund's target asset allocation is composed of 22.5% domestic large cap equity, 9.5% domestic small/mid cap equity, 15% international equity, 6% emerging markets equity, 32% core fixed income, 5% short-term fixed income, 3% high yield fixed income, 5% real estate and 2% cash.

SECTION II
ECONOMIC ASSUMPTIONS

We use capital asset pricing theory to develop expected returns for asset classes. The theory holds that the expected return for an asset class is based on its contribution to the risk of the total market portfolio containing all assets. Assets that bring high risk to the market portfolio have higher expected returns than assets that bring low risk. Risk is measured by covariance. The level of expected return associated with the amount of risk is calibrated by the expected returns developed above for large cap equity and core fixed income.

The expected returns for the portfolio's asset classes are shown in the table below for the current policy asset mix. We show both the expected annualized rate of return and the expected arithmetic average return for each asset class and the total portfolio. The expected arithmetic average return for each asset class is a necessary input to determine the expected annualized return on the total portfolio. The expected arithmetic average return is the best estimate of the return in any single year, and is always higher than the expected annualized return. The annualized return over a multiple-year period is less than the arithmetic average return due to volatility and the process of compounding. The expected annualized rate of return is based on a 75-year horizon. We also show the expected standard deviation of annual returns for each asset class. The standard deviations and the correlations between each pair of assets (not shown) are estimated based on actual returns over the last 45 years (or longest time period available).

Asset Class	Policy Target Weight	Expected 75-Year Annualized Return	Expected Arithmetic Average Annual Return	Expected Annual Standard Deviation
Domestic Large Cap Equity	22.50%	6.84%	8.09%	16.65%
Domestic Small/Mid Cap Equity	9.50	7.34	9.19	20.53
International Equity	15.00	7.80	9.52	19.79
Emerging Markets Equity	6.00	7.93	11.34	28.45
Short-Term Fixed Income	5.00	4.44	4.47	2.74
Core Fixed Income	32.00	5.17	5.27	4.68
High Yield Fixed Income	3.00	7.11	7.60	10.28
Real Estate	5.00	5.83	6.49	12.00
Cash	2.00	3.33	3.34	1.72
Total Portfolio	100.00%	6.89%*	7.33%*	9.86%*

* The derivation of the portfolio's annualized rate of return and standard deviation are complicated and cannot be calculated by what is provided in the above table.

SECTION II
ECONOMIC ASSUMPTIONS

Using the current allocation policy, our best estimate assumption for the long-term annualized rate of return on the Fund's policy portfolio is 6.89% before investment management fees. Our best estimate for the long-term arithmetic average return is 7.33% before investment management fees.

Since the Fund's assets accumulate at the long-term annualized rate of return, this is the expected rate of return that should be used as the basis for selecting the investment return assumption.

Most funds pay considerable fees to active investment managers. If active management fails to outperform an index fund by at least the amount of the difference between active management fees and index fund fees, the Fund always has the option to use index funds. So, over the long run, we would expect the Fund's long-term rate of return, net of fees, to be the same or higher than that which could be earned using index funds. For a Fund this size, index fees are estimated to be about 15 basis points, or 0.15%.

Our best estimate assumption for the long-term annualized rate of return on the Fund's policy portfolio is 6.74% after reflecting investment management fees. Our best estimate assumption for the long-term arithmetic average return on the Fund's policy portfolio is 7.18% after reflecting investment management fees.

Recommended Assumption: Based on the ASOP No. 27 guidelines, we conclude that the reasonable assumption for the annualize rate of return over the next 75 years, less investment-related administrative expenses is 6.75%.

	Investment Return
Current Assumption	6.75%
Recommended Assumption	6.75%

SECTION III
ACTUARIAL METHODS

A. ASSET VALUATION METHOD (ACTUARIAL VALUE)

Current Method: You are using a smoothing method which is designed to stabilize the investment yield credited for actuarial valuation purposes. The method does not distinguish investment yield by source such as interest, dividends or realized or unrealized capital gains. Investment yield variances from the expected yield, the valuation interest rate applied to market value, are spread over five years.

Recommendation: We recommend the continued use of this asset valuation method. It is a widely-used method for public sector pension plans and provides an excellent degree of smoothing of investment gains and losses.

SECTION III
ACTUARIAL METHODS

B. ACTUARIAL COST METHOD

Current Method: The current method is the Entry Age Normal Cost Method. It is used in determining the contributions required for funding future benefits by determining two pieces: the Normal Cost of each individual's benefit accrued during the year and any prior service costs amortized as a level percentage of payroll over a 20 year period (starting with the 2010-2011 fiscal year). The amortization period will not be less than ten years.

Recommendation: We recommend the continued use of this actuarial cost method and amortization method. It is a widely-used method used in funding public plans and is the method used to disclose the plan's funded status for financial reporting purposes per GASB 67/68.

APPENDIX
SELECTED ECONOMIC ASSUMPTIONS FROM THE
2014 OASDI TRUST FUNDS ANNUAL REPORT
(SOCIAL SECURITY ADMINISTRATION, JULY 28,2014)

THE 2014 ANNUAL REPORT OF THE BOARD OF TRUSTEES OF THE FEDERAL OLD-AGE AND SURVIVORS INSURANCE AND FEDERAL DISABILITY INSURANCE TRUST FUNDS

COMMUNICATION

FROM

THE BOARD OF TRUSTEES, FEDERAL OLD-AGE AND SURVIVORS INSURANCE AND FEDERAL DISABILITY INSURANCE TRUST FUNDS

TRANSMITTING

THE 2014 ANNUAL REPORT OF THE BOARD OF TRUSTEES OF THE FEDERAL OLD-AGE AND SURVIVORS INSURANCE AND FEDERAL DISABILITY INSURANCE TRUST FUNDS

July 28, 2014.—Referred to the Committee on Ways and Means and ordered to be printed

Table V.B1.—Principal Economic Assumptions

Calendar year	Annual percentage change[a] in—						Real-wage differ-ential[b]
	Productivity (Total U.S. economy)	Earnings as a percent of compensation	Average hours worked	GDP price index	Average annual wage in covered employment	Consumer Price Index	
Historical data:							
5-year periods:							
1960 to 1965 ...	3.27	-0.18	0.16	1.36	3.22	1.24	1.98
1965 to 1970 ...	2.06	-0.31	-0.68	4.03	5.84	4.23	1.61
1970 to 1975 ...	2.07	-0.50	-0.87	6.60	6.62	6.76	-0.18
1975 to 1980 ...	0.95	-0.32	-0.17	7.19	8.87	8.91	-0.06
1980 to 1985 ...	1.74	-0.33	0.02	5.21	6.53	5.22	1.29
1985 to 1990 ...	1.37	-0.19	-0.08	3.11	4.75	3.83	0.92
1990 to 1995 ...	1.26	-0.11	0.41	2.44	3.57	3.03	0.54
1995 to 2000 ...	2.34	0.28	0.14	1.67	5.31	2.43	2.88
2000 to 2005 ...	2.64	-0.41	-0.82	2.35	2.69	2.49	0.21
2005 to 2010 ...	1.61	-0.09	-0.48	1.93	2.55	2.30	0.26
Economic cycles:[c]							
1966 to 1973 ...	2.27	-0.29	-0.71	4.60	6.10	4.61	1.48
1973 to 1979 ...	1.10	-0.43	-0.56	7.52	8.55	8.54	0.01
1979 to 1989 ...	1.39	-0.28	0.00	4.68	5.80	5.31	0.45
1989 to 2000 ...	1.79	0.05	0.15	2.20	4.52	2.96	1.57
2000 to 2007 ...	2.15	-0.23	-0.64	2.50	3.23	2.65	0.60
2007 to 2013 ...	1.36	0.01	-0.15	1.51	1.89	2.08	-0.19
Single years:							
2003	3.31	-0.66	-1.49	2.00	2.51	2.22	0.30
2004	2.66	-0.27	0.02	2.74	4.67	2.61	2.06
2005	1.84	-0.22	-0.23	3.21	3.70	3.52	0.18
2006	0.84	0.49	-0.04	3.07	4.72	3.19	1.53
2007	1.06	-0.05	-0.38	2.66	4.50	2.88	1.62
2008	0.77	-0.06	-0.62	1.92	2.47	4.09	-1.62
2009	2.88	-0.66	-1.89	0.80	-1.52	-0.67	-0.85
2010	2.52	-0.17	0.57	1.22	2.69	2.07	0.62
2011	0.28	0.34	0.99	1.96	3.16	3.56	-0.39
2012	1.04	0.31	-0.07	1.75	2.69	2.10	0.59
2013[d]	0.73	0.30	0.11	1.39	1.92	1.43	0.49
Intermediate:							
2014	1.57	-0.14	0.17	1.44	3.78	1.61	2.18
2015	1.92	-0.17	0.08	1.55	4.92	1.95	2.97
2016	1.87	0.09	0.08	1.78	5.01	2.18	2.84
2017	1.82	0.15	0.07	1.98	4.95	2.38	2.57
2018	1.61	0.06	0.05	2.18	4.70	2.58	2.12
2019	1.58	-0.18	0.02	2.29	4.28	2.69	1.58
2020	1.55	-0.19	[e]	2.30	4.12	2.70	1.42
2021	1.63	-0.17	-0.03	2.30	4.11	2.70	1.41
2022	1.66	-0.13	-0.05	2.30	4.02	2.70	1.32
2023	1.68	-0.12	-0.05	2.30	3.85	2.70	1.15
2020 to 2025 ...	1.67	-0.13	-0.05	2.30	3.92	2.70	1.22
2025 to 2088 ...	1.68	-0.11	-0.05	2.30	3.83	2.70	1.13

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Table V.B1.— Principal Economic Assumptions (Cont.)

Calendar year	Annual percentage change[a] in —						Real-wage differential[b]
	Productivity (Total U.S. economy)	Earnings as a percent of compensation	Average hours worked	GDP price index	Average annual wage in covered employment	Consumer Price Index	
Low-cost:							
2014..........	1.88	·0.14	0.31	1.71	4.79	1.79	3.00
2015..........	2.21	-0.15	0.24	2.52	6.70	2.82	3.88
2016..........	2.12	0.12	0.22	3.05	7.01	3.35	3.66
2017..........	1.92	0.18	0.17	3.09	6.43	3.39	3.04
2018..........	1.64	0.11	0.09	3.08	5.58	3.38	2.20
2019..........	1.92	-0.12	0.07	3.10	5.34	3.40	1.94
2020..........	2.00	-0.12	0.06	3.10	5.38	3.40	1.98
2021..........	1.93	-0.10	0.05	3.10	5.31	3.40	1.91
2022..........	1.98	-0.06	0.05	3.10	5.38	3.40	1.98
2023..........	1.98	-0.03	0.05	3.10	5.20	3.40	1.80
2020 to 2025 ...	1.96	-0.04	0.05	3.10	5.23	3.40	1.83
2025 to 2088 ...	1.98	-0.02	0.05	3.10	5.16	3.40	1.76
High-cost:							
2014..........	1.00	-0.14	-0.05	1.23	2.29	1.48	0.81
2015..........	1.63	-0.18	-0.13	0.96	3.16	1.46	1.71
2016..........	1.75	0.07	-0.06	0.98	3.58	1.48	2.10
2017..........	1.69	0.11	-0.03	1.18	3.75	1.68	2.07
2018..........	1.43	0.02	-0.03	1.38	3.55	1.88	1.68
2019..........	1.39	-0.23	-0.04	1.49	3.24	1.99	1.25
2020..........	1.38	-0.25	-0.05	1.50	3.22	2.00	1.22
2021..........	1.30	-0.24	-0.06	1.50	3.10	2.00	1.10
2022..........	1.24	-0.22	-0.08	1.50	2.96	2.00	0.96
2023..........	1.31	-0.21	-0.11	1.50	2.70	2.00	0.70
2020 to 2025 ...	1.32	-0.21	-0.11	1.50	2.75	2.00	0.75
2025 to 2088 ...	1.38	-0.19	-0.15	1.50	2.52	2.00	0.52

[a] For rows with a single year listed, the value is the annual percentage change from the prior year. For rows with a range of years listed, the value is the compound average annual percentage change.

[b] For rows with a single year listed, the value is the annual percentage change in the average annual wage in covered employment less the annual percentage change in the Consumer Price Index. For rows with a range of years listed, the value is the average of annual values of the differential. Values are rounded after all computations.

[c] Economic cycles are shown from peak to peak, except for the last cycle, which is not yet complete.

[d] Historical data are not available for the full year. Estimated values vary slightly by alternative and are shown for the intermediate assumptions.

[e] Greater than -0.005 and less than 0.005 percent.

5. Labor Force and Unemployment Projections

The Office of the Chief Actuary at the Social Security Administration projects the civilian labor force by age, sex, marital status, and presence of children. Projections of the labor force participation rates for each group reflect disability prevalence, educational attainment, the average level of Social Security retirement benefits, the state of the economy, and the change in life expectancy. The projections also include a "cohort effect," which reflects a shift upward in female participation rates across cohorts born through 1948.

The annual rate of growth in the size of the labor force decreased from an average of about 2.4 percent during the 1966-73 economic cycle and