UNITED NATIONS JOINT STAFF PENSION BOARD

ASSET AND LIABILITY MANAGEMENT STUDY REPORT

PREPARED AS OF 31 DECEMBER 2013

25 June 2015

Joint Staff Pension Board
United Nations Joint Staff Pension Fund
P.O. Box 5036
New York, New York   10017

Ladies and Gentlemen:

Buck Consultants, LLC is pleased to submit our asset and liability management (ALM) study at the request of the Assets and Liabilities Monitoring Committee and the United Nations Joint Staff Pension Fund (UNJSPF). This ALM study is prepared based on data from the actuarial valuation as of 31 December 2013, with certain updates through 31 December 2014, and is based on the provisions of the Fund as in effect from 1 January 2014.

The ALM study contains the forecast future funded status under the current strategic asset allocation, reflecting the Fund's required real rate of return of 3.5%. In addition, it will provide the Fund with suggested investment strategies that will have a high probability of attaining or exceeding the Fund's 3.5% real return objective with the risk appetite approved by the Board and the corresponding risk tolerance.

The methodologies and assumptions used for the ALM study have been approved by the Committee of Actuaries and the Assets and Liabilities Monitoring Committee.

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SECTION I - EXECUTIVE SUMMARY

Key Results and Observations:

1.1.   This Asset-Liability Management (ALM) study was prepared as of 31 December 2013. Certain information known as of 31 December 2014, including the asset amount and asset allocation as of that date, as well as actual inflation during 2014, has been incorporated into the analysis.

1.2.   The results of this ALM study are driven to a significant degree by the capital market assumptions used, as well on the investment constraints for each asset class. The use of different capital market assumptions and/or constraints could produce materially different results and conclusions.

1.3.   Seven candidate asset allocations are evaluated, tested and discussed in detail in Section III of this Report:
  a) Asset Allocation 1: Current Strategic Asset Allocation (CSAA)
  b) Asset Allocation 2: Current Asset Allocation as of 2 January 2015 (CAA)
  c) Asset Allocation 3: Minimum volatility asset allocation that lies on the efficient frontier. Three percent alternative asset allocation maximum constraint.
  d) Asset Allocation 4: Portfolio with 3.5% expected real return. Five percent alternative asset allocation maximum constraint.
  e) Asset Allocation 5: Asset Allocation that lies on the efficient frontier with 4.25% expected real return. Three percent alternative asset allocation maximum constraint.
  f) Asset Allocation 6: Asset Allocation that lies on the alternative efficient frontier (using more conservative set of capital market assumptions or Alternative 2 assumptions) with a 3.5% expected real return. Five percent alternative asset allocation maximum constraint.
  g) Asset Allocation 7: Asset Allocation that lies on the efficient frontier with the same expected return as the Current Asset Allocation as of 2 January 2015 (Asset Allocation 2) but with less risk. Five percent alternative asset allocation maximum constraint.

1.4.   Based on the Buck capital market assumptions in use for this study, the key findings are:

   a)   It is highly probable that a 3.5% compound real rate of return can be achieved over the long term.

   b)   A range of efficient asset allocations can be used to minimize risk for a given level of return. In all cases, exposure to equities can be reduced from the level in the current Strategic Asset Allocation and still maintain an expected long-term return of 3.5% real.

   c)   Under the more pessimistic capital market assumptions outlined in Appendix D of this Report, it is possible to maintain an expected long-term real return of 3.5% by increasing exposure to return focused asset classes.

d)   Exposure to alternative assets such as private equity and absolute return can improve the risk/reward profile of the asset portfolio. It is possible to achieve (on an expected basis) a 3.5% real return without exposure to these alternative asset classes, albeit with added portfolio volatility.

e)   We have observed the following with respect to Asset Allocations 6 and 7:

i.   Asset Allocation 6 and 7 offer better risk adjusted expected returns than the Current Asset Allocation.

ii.   The risk levels for Asset Allocation 6 and 7 are consistent with the Fund's risk budget.

iii.   It is reasonable to transition from the current asset allocation to the chosen strategic asset allocation over up to four years to create opportunities to minimize transaction costs and to give the IMD time to identify appropriate investments in alternative asset classes.

f)   The likelihoods that the actuarial valuation as of 31 December 2022, 2032 and 2042 will disclose a required contribution rate under 23.7% of Pensionable Remuneration (PR) are:

Date	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 6	Asset Allocation 7
31 December 2022	67%	67%	68%
31 December 2032	76%	75%	77%
31 December 2042	80%	81%	82%

g)   The likelihoods that the actuarial valuation as of 31 December 2022, 2032 and 2042 will disclose that the assets exceed the termination liabilities are:

Date	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 6	Asset Allocation 7
31 December 2022	73%	74%	75%
31 December 2032	80%	80%	81%
31 December 2042	83%	84%	85%

h)   The Monte Carlo simulation confirms what the regular actuarial valuations have concluded over the past several valuation cycles, that while current contributions are approximately sufficient to cover benefit payments, soon the payments are expected to exceed contributions. Investment earnings on the Fund's assets will then be needed to make up the difference. Note the following:

         i.   During the 30-year time horizon over which this ALM study was conducted, benefits are projected to increase to approximately 41% of PR, well in excess of the 23.36%[1] of PR available to fund benefits.

         ii.   It should be noted that the Fund continues to grow in size; assets as a percentage of Pensionable Remuneration are expected to grow from five times PR to approximately 15 times PR in the median case at the end of 30 years.

         i)   Despite the fact that investment earnings from the principal of the Fund will be required to make up the gap between contributions and benefit payments, there are no liquidity concerns for the Fund. This is due to: 1) a sufficient Fund asset level when compared to benefit disbursements and, 2) the relatively modest exposure to illiquid assets. In the event of a market correction, the liquid assets in the Fund are more than sufficient to cover benefit payments for a significant period of time. Liquidity should not be a factor in considering whether to increase exposure in Real Assets, Absolute Return and Private Equity.

         j)   The selection of a long-term strategic asset allocation does not preclude the execution of a shorter-term tactical asset allocation (TAA) with an appropriate-size corridor around the strategic allocation.

         k)   Note that the asset allocation being considered and latest minimum/maximum constraints would be expected to become effective 1 January 2019. A gradual move to the asset allocation over up to a four year period (i.e. a "glide path") is appropriate, to allow for an orderly restructuring of the asset portfolio. Further detail on the "glide path" used to model the transition from the Current Asset Allocation to the candidate Strategic Asset Allocations can be found in Section III of this Report.

Analysis of Two Track Adjustment System

1.5.   The updated long-term cost of the Two-Track Adjustment System, which has been estimated for several years to be approximately 1.9% of Pensionable Remuneration, is now estimated to be approximately 2.1% of Pensionable Remuneration. This is based on the same model used to conduct the rest of this ALM study. These findings were discussed with the Committee of Actuaries during its June 2015 meeting.

Sensitivity Analysis of Alternative Participant Growth Scenarios

1.6.   There were four alternative participant growth scenarios tested in the ALM study:

a) Scenario 1: Current assumption of 0.5% growth for 10 years, then level thereafter (baseline case)

b) Scenario 2: 0% growth for all years

c) Scenario 3: 1% decline for 10 years, then level thereafter

d) Scenario 4: 2% decline for 10 years, then level thereafter

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[1] The Fund contribution rate is 23.70% of pensionable remuneration. Of this amount, 0.34% of PR is used for administrative expenses; thus 23.36% of PR remains available to fund benefits.

1.7.   If the relative growth in future participants under the alternative growth scenarios is lower than the "baseline" case, then the relative weight given to the current participant contribution rate will be higher, and therefore the total contribution rate will increase.

1.8.   Based on the current environment, the estimated effect on future required contribution rates under the alternative growth scenarios are:
- a)   Scenario 2: increased by 0.15%
- b)   Scenario 3: increased by 0.47%
- c)   Scenario 4: increased by 0.75%

1.9.   However, in future years, the increase in contribution rates will depend on the relationship between the then prevailing current and future participants' contribution rates.

Sequencing Analysis

1.10.   There were two sequencing analysis performed in the ALM study:
- a) Sequencing 1: Real portfolio returns are assumed to grow at 0% real from 2015 to 2017
- b) Sequencing 2: Lowest fixed income real return from 2015 to 2017

1.11.   The funded ratios in both sequencing analysis are affected by poor performances over the first three years, but in the long run, the solvency of the Fund is not materially affected. In addition, for the first sequencing scenario, within about eight years, the probabilities of assets exceeding accrued liabilities are not materially different than the baseline results.

Conditional Tail Expectation Analysis

1.12.   The increases in conditional correlations for the 5% and 1% tail appear to occur among sub-asset classes, but not across broad asset classes. For example, equity sub-classes show increased correlations moving into the tails, but equity and fixed income correlations do not particularly exhibit that behavior. For this reason, we believe the portfolio diversification benefits would largely be maintained even in extreme down markets.

SECTION II - INTRODUCTION AND BACKGROUND

Background of UNJSPF Structure

2.1.   The UNJSPF ("Fund") is a defined benefit pension plan with a collective arrangement that pools contributions, assets and risks to meet benefit obligations.

2.2.   There are 23 member organizations that participate in the Fund. The Fund provides retirement, disability, death and withdrawal benefits to their staff. The benefits are calculated using a "defined formula" that includes period of contributory service, specified benefit accumulation rates and pensionable remuneration in final years of service. Benefits are generally paid as annuities during lifetimes of retirees and surviving beneficiaries with annual cost of living adjustments.

2.3.   As of 31 December 2013, there were 190,274 participants, including 120,294 active participants and 69,980 retirees, beneficiaries and deferred vested participants entitled to future benefits. Additional detail on the composition of the population modeled can be found in the Report on the Thirty-Second Actuarial Valuation of the Fund, prepared as of 31 December 2013.

2.4.   As of 31 December 2014, the Investment Management Division of the Fund reported, on a preliminary basis, that the Fund had assets of $52,713,652,260. This asset value was used as the starting point for the ALM study.

Purpose of Study

2.5.   Buck Consultants has performed this Asset Liability Modeling Study in order to assist the Secretary-General and Pension Board with the management of investments, funding obligations and liabilities. The objectives of this study were to:

        a.   Assess the impact of key investment and solvency related decisions upon the long-term financial condition and performance of the UNJSPF

        b.   Recommend long-term asset allocation strategies to optimize UNJSPF growth in the context of the Fund's liability, risk appetite and risk tolerance

        c.   Identify suitable assets for the UNJSPF in a global context and specify a long-term target weight for each asset class

        d.   Analyze the adequacy of the Fund's contribution rate and the potential risks of under and over funding within the long-term asset allocation strategies recommended as well as under the current investment strategy

2.6.   This report is intended to provide the UNJSPF with an investment, risk management and funding framework that is responsive to the Fund's growth goals, risk budget and tolerances, plan design and time horizon for achieving their goals.

2.7.   The report is being provided to the Assets and Liabilities Monitoring Committee ("ALM Committee") of the UNJSPF in order to provide guidance with respect to:

a.   Understanding and monitoring the long-term solvency of the Fund

b.   Guiding the Representative of the Secretary-General in determination of an appropriate strategic asset allocation (SAA)

c.   Assisting the ALM Committee with understanding asset liability management and investment policy so that they may make observations to the Board

Investment and Solvency Decisions

2.8. Key risk factors to consider in evaluating the solvency of the Fund are:

a.   Will the Fund's investments meet the return objectives of 3.5% real and 6.5% nominal?

b.   What with be the emerging benefit pattern of the Fund as it matures?

c.   What will the funding pattern of the Fund be? How sensitive is it to different levels of active staff in the future?

d.   As the plan matures and the benefits increase relative to the size of the active population, benefit financing will increasingly rely on the portfolio earnings. Does this present any solvency risk?

2.9.   The ability of the Fund to meet its return objectives will be influenced to a significant degree by asset allocation selected, which in turn reflects investment constraints. In evaluating different asset allocations one of the selection criteria for including an asset allocation was meeting one or both of the return objectives, but primarily the 3.5% real rate of return criterion.   Thus, by virtue of investment strategy design, this criterion is being addressed.

2.10.   Currently, benefits are funded by the 23.7% of Pensionable Remuneration (PR) annual contribution, of which 15.8% is paid by member organizations and the remaining 7.9% comes from active participants' payroll deductions. Administrative expenses of the Fund are subtracted from this contribution rate. Based on the current estimate for expenses of 0.34% of PR, this leaves contributions of 23.36% available to fund benefits. Over time, as the Fund matures, the retirement rolls will increase relative to the growth in PR, and thus the benefits as a percentage of PR will increase.

2.11.   During the 30-year time horizon over which this ALM study was conducted, benefits are projected to increase to approximately 41% of PR, well in excess of the 23.36% of PR available to fund benefits. Thus, benefits will no longer be covered by current contributions and investment returns from assets held by the Fund will increasingly be needed to pay the difference. It should be noted that the Fund continues to grow in size and that assets as a percentage of Pensionable Remuneration are expected to grow from five times PR to approximately 15 times PR in the median case at the end of 30 years.

2.12.   Solvency and liquidity are discussed in greater detail later in this report.

Financial Metrics for Ongoing Oversight

2.13.   Ongoing monitoring of key risk and performance measures will identify any situations that need to be addressed to keep the Fund on the proper course. Over the course of this study a number of metrics have been discussed. Some were identified prior to retaining Buck to perform this study. Others have been identified, discussed and agreed to through our interactions with the project's Working Group, the Investment Management Division (IMD), the ALM Committee, the Committee of Actuaries and the Investments Committee.

2.14.   The risk and performance metrics generally fall in to one of four categories. The categories are Assets / Portfolio, Values at Risk, Accrued Liability and Actuarial Valuation. They are summarized in the following table.

Asset / Portfolio	Accrued Liability
− Expected Geometric Return − Volatility (Standard Deviation) − Correlation − Skew − Kurtosis − Conditional Correlation for 5% worst results	− Termination Liability Surplus/(Deficit) − Termination Liability Basis Funded Ratio
Values at Risk	**Actuarial Valuation**
− Value at Risk or VaR *(Asset Only)*: Using 95th %ile − Value at Risk or VaR *(Surplus basis):* Using 95th %ile − Conditional VaR or cVaR / Expected Shortfall *(Surplus basis)* using average over 5% tail − Conditional VaR or cVaR / Expected Shortfall *(Asset Only)* using average over 5% tail	− Contribution rate − Probability that the 23.70% of Pensionable Remuneration (PR) will be sufficient − Benefit Payments as a % of Pensionable Remuneration − Benefit payments less contributions as a percentage of assets − Frequency that Valuation results remain within +/- 2% Pensionable Remuneration Corridor − Market Value of Assets as a Multiple of PR − Net Cash Flow as % of Market Value

2.15.   The asset / portfolio metrics describe and compare the risk, return, and other key characteristics of various potential asset allocations. Some of the asset metrics were the key inputs into the **efficient frontier** (discussed in detail later) model that was used to identify the asset allocations for further study.

2.16.   The Value at Risk metrics are a short-term (i.e. 1-year) measure of portfolio risk and funded status (assets less liabilities) risk. The VaR metrics quantify the worst 5% of outcomes (a.k.a. 5th percentile) in one year. For this project, 5,000 scenarios (stochastic paths) were run, so the 5th percentile outcome in one year is the 250th worst outcome out of the 5,000 scenarios.   The Conditional Value at Risk, or cVaR metric, identifies the worst 5 percent of outcomes--in this case the worst 250 scenarios of the 5,000-and takes the arithmetic average of the outcomes for this 250 scenario subset of the results.

2.17.   The Accrued Liability metrics measure the extent to which the termination liabilities at a given point in time are covered by the Fund assets.

2.18.   The Actuarial Valuation metrics focus on contribution rates, contribution sufficiency and liquidity. Regular biennial valuations disclose the theoretical contribution rate that would be required to keep the Fund in actuarial balance. The Board has expressed a desire to maintain this theoretical contribution rate within a plus or minus 2% corridor of the actual 23.7% contribution rate. Should the Fund fall outside the corridor, measures could be considered to bring the Fund back into actuarial balance.

2.19.   One of the original metrics proposed for this study was the frequency with which forecast theoretical contribution rates remain within the aforementioned 2% corridor. As discussed in paragraph 4.25, within an ALM study, the variability around asset performance has an increasing effect on the valuation results over time, causing the range of possible valuation outcomes to increase over time. Therefore, we believe the frequency of remaining within the corridor metric is not ideal for use as a basis for determining the long-term strategic asset allocation. Of course, this metric continues to have strong merit for the ongoing administration and long-term planning of the Fund, and for purposes of the biennial deterministic actuarial valuations.

2.20.   Nevertheless, it was desired to identify a metric that would measure the adequacy of the contribution rate. A new funding metric was defined for this study to be the probability, for a given asset allocation, that the emerging theoretical contribution rate in future valuations would be less than the 23.7% of Pensionable Remuneration contribution rate.

ALM Approach

2.21.   The key steps of the ALM study approach are listed below.

    a.   Confirmed in consultation with IMD the investment asset classes to be considered.

    b.   Defined the assumptions used to project the Fund's assets and liabilities.

    c.   Established risk metrics and tolerances.

    d.   Compared several asset allocations with the intent of identifying the optimal asset allocation that met the risk tolerance metrics and maximized Fund asset growth.

    e.   The asset allocation comparisons were performed using stochastic modeling analysis. In this analysis, asset values under each asset allocation and fund liabilities are forecast for the next 30 years under 5,000 different economic and capital market environments per year.

    f.   Note that even though actuarial valuations are performed every other year, in actuality, for purposes of this ALM study, these forecasts were performed each year for 30 years.

    g.   Thus, effectively 30 times 5,000 or 150,000 actuarial valuations are performed for this study.

        Path 1 - Valuation time 1, valuation time 2,,, valuation time 30
        Path 2 - Valuation time 1, valuation time 2,,, valuation time 30
                …
                …
                …
        Path 5,000 - Valuation time 1, valuation time 2,,, valuation time 30

h.   Key financial results for each of the 150,000 valuations are summarized and ranked
in terms of percentiles
   –   95th percentile: 4,750th highest ranked value[5] for a given metric in a given year
   –   75th percentile: 3,750th highest ranked value for a given metric in a given year
   –   50th percentile: 2,500th highest ranked value for a given metric in a given year
   –   25th percentile: 1,250th highest ranked value for a given metric in a given year
   –   5th percentile: 250th highest ranked value for a given metric in a given year

Actuarial Valuation Methods and Assumptions

2.22.   The methods and assumptions used for the ALM analysis are consistent with those used for
the biennial actuarial valuations. The section of the 31 December 2013 actuarial valuation report
describing this method is reprinted below.

The methodology employed in determining the rates of contribution required to obtain actuarial
balance involves balancing the present value of benefits with the present value of assets, and
utilizes the following steps:

A.   Determining the total present value of prospective benefits, as the total of those:
   1.   Payable to or on behalf of retired participants and beneficiaries
   2.   Expected to be paid on behalf of:
      a.   Present participants
      b.   Future participants

B.   Determining the value of present assets of the Fund [in accordance with the
actuarial smoothing method described earlier in that report]

C.   Determining the present value of all future contributions which would be required
to be paid into the Fund to keep the Fund in balance, before allowing for
administrative expenses at the rate of 0.34 per cent for this valuation, on behalf of:
   1.   Present participants
   2.   Future participants

D.   The amount in C is equal to the difference between A and B. When the amount in
C is expressed as a percentage of the total present value of future Pensionable
Remuneration of present and future participants, the preliminary percentage
contribution rate, before allowing for administrative expenses, is obtained. The
percentage contribution rate required to attain the actuarial balance of the Fund is
then obtained by adding the allowance for expenses to the preliminary percentage
contribution rate.

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[5] Technically, the 95th percentile is an interpolated value between the 250th and 251st observed value, the median value
is the average of the 2500th and 2501st observed value, and so forth.

2.23.   As described above, the actuarial valuations for UNJSPF valuation and for this study are open group valuations that take into account both current and future pension plan participants. The baseline future participant growth assumption (defined as the "Regular" valuation basis by the Committee of Actuaries) is 0.5% arithmetic growth for 10 years and then a level population thereafter. Alternative growth assumptions were also incorporated into this analysis to test the sensitivity of any conclusions to changes in the population assumption.

2.24.   In projecting the mortality of participants the current 2007 UN Mortality Tables were used with current mortality improvement scales. At each future valuation year, mortality improvements for the next 20 years (a rolling 20 years) were used.

2.25.   This ALM study assumed that the current contribution rate of 23.7% of Pensionable Remuneration will be continued indefinitely. No additional contributions were assumed to be required on account of Article 26 of the Fund regulations.

2.26.   Other methods and assumptions, including the assumed rates of turnover, retirement and disability, are the same as those used in the most recent actuarial valuation as of 31 December 2013.

2.27.   The 0.34% of pensionable remuneration administrative expense load reflected in the 31 December 2013 actuarial valuation was applied throughout this study.

Actuarial Value of Assets

2.28.   The actuarial value of assets is equal to market value of asset that is averaged over a four year period preceding the valuation date. The adjustments to the market value of assets are weighted by the average of the excess/deficiency in investment earnings over the expected nominal long-term return assumption.

2.29.   The results of the averaging methodology are subject to a 15% limiting corridor. Hence, the actuarial value of assets has an 85%/115% minimum/maximum value of market value of assets as of the valuation date.

2.30.   The primary reason of the actuarial value of assets is to reduce volatility of contribution rate required to attain actuarial balance of the Fund. It is also used to calculate the termination liability funded ratios.

SECTION III – ECONOMIC, CAPITAL MARKET AND ASSET CLASS MODELING

3.1.   Capital market assumptions for the asset classes evaluated in this study were developed by modeling economic and capital markets conditions over 5,000 scenarios, computing asset class returns using asset class specific models utilizing the modeled economic and capital market conditions, and summarizing the resulting asset class means, standard deviations, correlations, skew and kurtosis. To do this Buck used GEMS[®], an award-winning[3] software model leased from Conning and Company.

3.2.   There are a number of primary financial and macroeconomic variables that define the simulations in GEMS. This is done through a cascading structure that centers to a great extent around interest rates. Interest rates are the input into a number of other "primitive processes" that are basis for asset class returns.
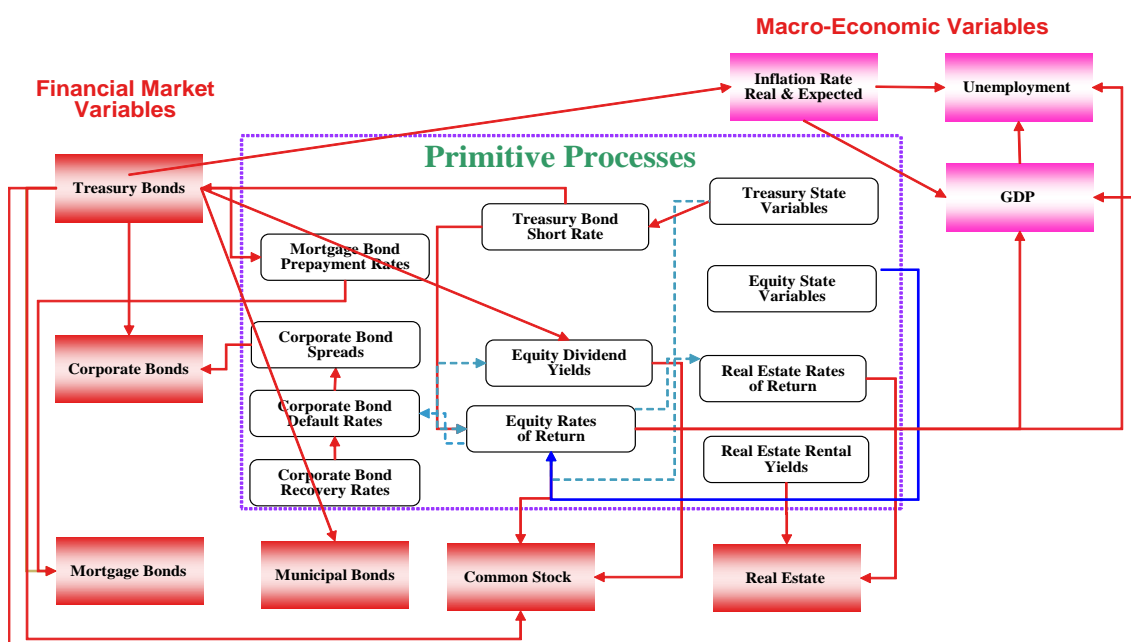
3.3.   GEMS is calibrated to the current economic and capital market environment and trends to a long-term equilibrium economic environment. In doing so, it recognizes current conditions and trends, as well as other longer-term plausible economic and capital market environments. The GEMS used by Buck currently covers the U.S., Eurozone, U.K., Switzerland, and Canada. These economies cover roughly 95% of the liabilities of the UNJSPF.

3.4.   GEMS is recalibrated on a quarterly basis. The calibration of the model focuses on a several key economic variables and on several key asset classes across the economies modeled.

3.5.   Key long-term interest rate calibration targets that are: 1) key determinants of the economic environments, and 2) determine global bond returns are historical values for such variable as:

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[3] From the Conning web site, https://www.conning.com/aboutconning/news-detail.aspx?id=11580: *Conning, a leading global provider of risk and capital management software and advisory solutions for the insurance industry and pension plans, received the award for Best Economic Scenario Generator (ESG) from Insurance Risk magazine. Conning's GEMS[®] Economic Scenario Generator software was selected as best in class for the third time, including recognition in 2011, 2013 and 2014.*

a. Economy specific inflation and wage growth measures

b. Economy specific government bond yields (e.g. Treasuries, Munis, High Yield, defaultable sovereign debt, Pfandbriefe, and Schuldschein Pools)

3.6. Key long-term asset return targets are that drive long term global equity returns are historical returns to indices such as:

a. U.S. large, mid and small cap equities
b. Non-US global developed nation equity returns (e.g. MSCI)

3.7. Over the course of time, GEMS will model different economic conditions such as:

a. Different levels of inflation
b. Variations in the term structure of interest rates
c. Variations in credit spreads
d. Different levels of economic growth

3.8. The GEMS recalibration used for this project was as of 31 December 2014, the most recent available at the time of the forecasting exercise.

Asset Classes Modeled

3.9. For the UNJSPF, global developed and emerging market public equities as well as private equity were modeled. Returns for non-US equities were calibrated to U.S. equities based on MSCI EAFE and MSCI Emerging market benchmarks. Global developed market equites were then modeled based on global market cap weighting as of 31 December 2014. Private equity was modeled as global public equity with an illiquidity risk premium.

3.10. In addition to being a key driver of the economic simulations and other resultant processes, interest rates directly affect fixed income asset class returns. In GEMS, bonds with specified characteristics (quality, maturity, sector, etc.) are extracted from the GEMS bond library and their price and coupon return components are modeled explicitly. There are adjustments to returns for downgrades and defaults.

3.11. The real asset portfolio of the UNJSPF is primarily in global real estate. As a result, the benchmark used to calibrate GEMS is global NCREIF. However, real assets can also include inflation protected securities, timber, commodities, and infrastructure.

Absolute Return

3.12.   Absolute returns strategies are modeled by regressing historical returns for a variety of hedge fund strategies against various market indices.

Cash

3.13.   Reflecting the cash management practices of the Fund, the Cash asset class has been computed using a benchmark based on 50% cash return on US Dollars, and 50% cash return on Euros, measured in US Dollars (so that the return is unhedged).

Capital Market Assumptions

3.14.   The capital market assumptions that were produced by the GEMS model for asset classes under consideration are shown in the table below. The assumptions shown are for a 10-year investment horizon.

Asset Class	Expected Geometric Return	Standard Deviation
Global Equity	8.82%	16.25%
Global Fixed Income	2.46%	4.37%
Real Assets	8.84%	6.81%
Private Equity	9.13%	27.71%
Absolute Return	6.39%	8.70%
Cash	1.95%	5.80%
Inflation	2.43%	2.38%

Correlation Matrix – 10 Years							
Asset Class	**Global Equity**	**Global Fixed Income**	**Real Assets**	**Private Equity**	**Absolute Return**	**Cash**	**Inflation**
Global Equity	1.000						
Global Fixed Income	-0.003	1.000					
Real Assets	0.134	0.071	1.000				
Private Equity	0.928	0.082	0.132	1.000			
Absolute Return	0.574	0.042	0.086	0.566	1.000		
Cash	0.037	0.137	0.041	0.044	0.024	1.000	
Inflation	0.037	0.100	0.318	0.039	0.028	0.088	1.000

The expected geometric returns for other periods of time, as well as statistics on skew and kurtosis (which describe how the distribution of results deviates from the normal "bell curve"), are shown in Appendix A.

3.15.   The benchmarks used in connection with the portfolio modeling are as follows:

- Global Equity: MSCI ACWI (All-Country World) Investable Market Index.   The country weights in the ACWI benchmark are shown in Appendix C.
- Global Fixed Income: Barclays Global Aggregate
- Real Assets: Global NCREIF
- Private Equity: Based on returns on Global Equity, plus an illiquidity premium that varies by time horizon
- Absolute Return: Based on an average of benchmark returns for Fund of Funds for the following six styles/strategies: Debt, Equity, Event, Macro/Systematic, Multistrategy, Relative Value
- Cash: Based on 50% 90-Day US Treasuries and 50% 90-Day Euro Bonds

3.16.   The expected return shown is the average annual compound return over the 10 year period, based on the 5,000 random trials modeled. The standard deviation (a measure of risk) of the return is computed over those 5,000 trials. The greater the value of the standard deviation, the greater the volatility. Correlations measure the degree to which assets move in synchronization with one another, and range from 1.0 to -1.0. Perfectly correlated assets have a correlation of 1.0. Perfectly independent asset classes have a correlation of 0, while perfectly negatively correlated asset classes have a correlation of -1.0. Combining assets that are not perfectly correlated diversifies the portfolio.

Identification of Suitable Portfolios

3.17.   In establishing suitable asset classes and portfolios a number of factors were considered.

        a.   Current investment trends among large non-corporate pension funds. We felt that corporate plan information would be inappropriate with respect to two investment trends that are not applicable to the UNJSPF. The first is investing that is influenced by marking liabilities (measured using corporate bond yields) to market assets, and the second is the use of de-risking glide paths found among frozen defined benefit plans that are not applicable to the UN.

        b.   Current asset exposures and whether we saw any significant gaps in the current asset classes in which the Fund is invested.

        c.   Suitability of asset class minimum and maximum allowable investments.

        d.   The nominal and real return targets of 6.5% and 3.5%, respectively, and whether either of them could or should be relaxed.

3.18.   The current strategic asset allocation (CSAA), actual asset allocation as of 2 January 2015, and strategic allocation constraints are summarized in the table below.

Asset Class	Strategic Target	Current 02-January-2015	Strategic Minimum	Strategic Maximum
Global Equities	60%	63.4%	50%	70%
Global Fixed Income	31%	24.6%	24%	38%
Real Assets	6%	5.3%	3%	9%
Alternative Investments	0%	3.0%	To Be Determined	
Cash	3%	3.7%	0%	6%
Notes: **Real assets currently consists of real estate investments but could also include inflation protected securities, timber, commodities, and infrastructure.**				

3.19.   We believe that the breadth of assets within the current strategic asset allocation provides the Fund with sufficient coverage of the investible global universe. We also believe that for strategic asset allocation purposes, assets should be defined broadly. Decisions about geography, economy, sub-asset classes, etc. should be viewed as tactical decisions and left to the IMD based on their views of risks and opportunities.

3.20.   One point of considerable discussion during this project was the private equity and absolute return target and constraints. In evaluating the target, there are a number of key considerations.

| Arguments For a Higher Target	Arguments For a Lower Target
• Portfolio diversification • Return potential	• The distribution of performance from top to bottom is great and the ability to source the top managers is imperative • Resources needed to source and oversee investments • Fees can be excessive relative to performance • Various qualitative risks that cannot be modeled, including headline risk • Need for liquidity as the Fund matures • Counterparty risk • Private equity J-curve

3.21.   Based on our views, and taking into consideration the various parties' views on the risks associated with these asset classes, we believe that targets for absolute return and private should be relatively low - fairly close to the current levels of investment.

Efficient Frontier Analysis

3.22.   In identifying potential suitable asset allocations, we began by using efficient frontier analysis. In general terms, an efficient frontier is that set of portfolios that maximizes the ability to meet a certain objective while minimizing the risk of not achieving that objective. We used efficient frontier analysis to identify asset allocations taking into account the current nominal and real return objectives of the Fund of 6.5% and 3.5%, respectively.   In general, asset allocation constraints were maintained.   However, we tested one asset allocation that eliminated the minimum constraint on equity and the maximum constraint on fixed income, to determine whether doing so was beneficial to the Fund's risk/reward profile and whether it would better satisfy the Fund's objectives.

3.23.   For purposes of this Efficient Frontier Analysis, additional constraints were added to the strategic allocation constraints shown in Section 3.18. Alternative Investments were limited to a maximum of 5%. Cash was limited to a minimum of 1.5% (assumed to be required for operations) and a maximum of 3.0%. Note that based on results obtained in preliminary versions of this analysis, if allocations to Alternative Investments were allowed to exceed 5%, additional returns and/or reduced risks could be achieved.

Asset Only Efficient Frontier - GEMS 2014Q4 Constrained
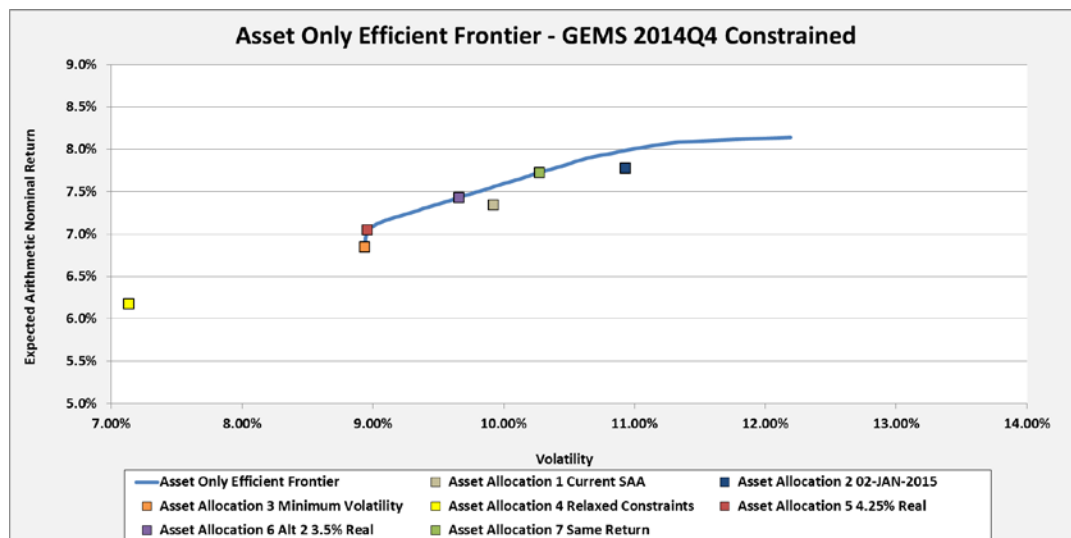
3.24. The asset mixes selected are summarized in the table below followed by a discussion of the rationale for their inclusion. The table shows the ultimate strategic asset allocations after a suitable four-year transition period to allow for the orderly restructuring of the portfolio. Additional detail on the transition is provided later in this Section of the report.

Asset Class	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Global Equities	60.0%	63.4%	50.0%	37.0%	50.0%	54.0%	58.0%
Global Fixed Income	31.0%	24.6%	38.0%	47.5%	36.5%	30.5%	26.5%
Real Assets	6.0%	5.3%	6.0%	9.0%	9.0%	9.0%	9.0%
Alternative Investments	0.0%	3.0%	3.0%	5.0%	3.0%	5.0%	5.0%
Cash & Short Term	3.0%	3.7%	3.0%	1.5%	1.5%	1.5%	1.5%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Expected Nominal Geometric Return – 10 years	6.94%	7.28%	6.52%	5.96%	6.72%	7.04%	7.29%
Expected Real Geometric Return– 10 years	4.47%	4.81%	4.05%	3.50%	4.25%	4.58%	4.82%
Volatility (Nominal Returns) – 10 years	9.92%	10.93%	8.94%	7.14%	8.96%	9.66%	10.27%

3.25. Asset Allocations 1 and 2 are the current Strategic Asset Allocation and the actual asset allocation as of 2 January 2015, respectively. Neither of them lies on the efficient frontier defined by the capital market assumptions in use, but are included in the study as the baseline of comparison to other potential allocations.

3.26. Asset Allocation 3 is the minimum volatility asset allocation that lies on the efficient frontier.

3.27.   Asset Allocation 4 targets the 3.5% real return objective. However, achieving the target necessitated relaxing the equity allocation constraint and in doing so de-risking the portfolio by increasing the global fixed income and real asset exposures. We believe that this is a reasonable action to the extent that the return objectives can be met because it reduces risk. Asset allocation 4 is not on the efficient frontier because it reflects asset allocation constraints that are different than those used in Asset allocations 3, 5, 6 and 7. It would be considered efficient if the asset allocation constraints were relaxed to allow for this allocation to be used.

3.28.   Asset Allocations 5 and 6 also lie on the efficient frontier; however they have higher risk and return expectations. The inclusion of asset allocation 6 is noteworthy in that it was identified earlier in the project as a mix that would be expected to achieve a 3.5% real return over 10 years under a more conservative set of capital market assumptions. It is worth noting that for a given desired level of asset return, using a more conservative set of assumptions leads to greater exposure to riskier assets, because achieving the desired return level would not be possible without higher exposures to risky assets.

3.29.   Asset Allocation 7 lies on the efficient frontier with the same expected return as the Current Asset Allocation 2 but with less risk. Note that this asset allocation has a five percent alternative asset allocation maximum constraint.

3.30.   To develop the optimized portfolio for Asset Allocation 4, the minimum exposure to Global Equities was eliminated. At the same time, the maximum exposure to Global Fixed Income was eliminated; this allowed the model to have an asset class to reallocate the amounts formerly in equities.   A revised Efficient Frontier was thus determined, and the point on that curve corresponding to a 10-year real geometric average return of 3.50% was selected.

3.31. "Asset only" efficient frontier analysis is a useful starting point for developing asset allocations to model. However, in general it is also important to recognize the role of Fund liabilities in the analysis by with surplus efficient frontier analysis, in which the return and risk incorporate pension liabilities into the analysis. Return is defined as return to surplus, which is the change in the degree to which assets exceed liabilities. Risk is the volatility of the surplus return.

Surplus Efficient Frontier - GEMS 2014Q4 Constrained
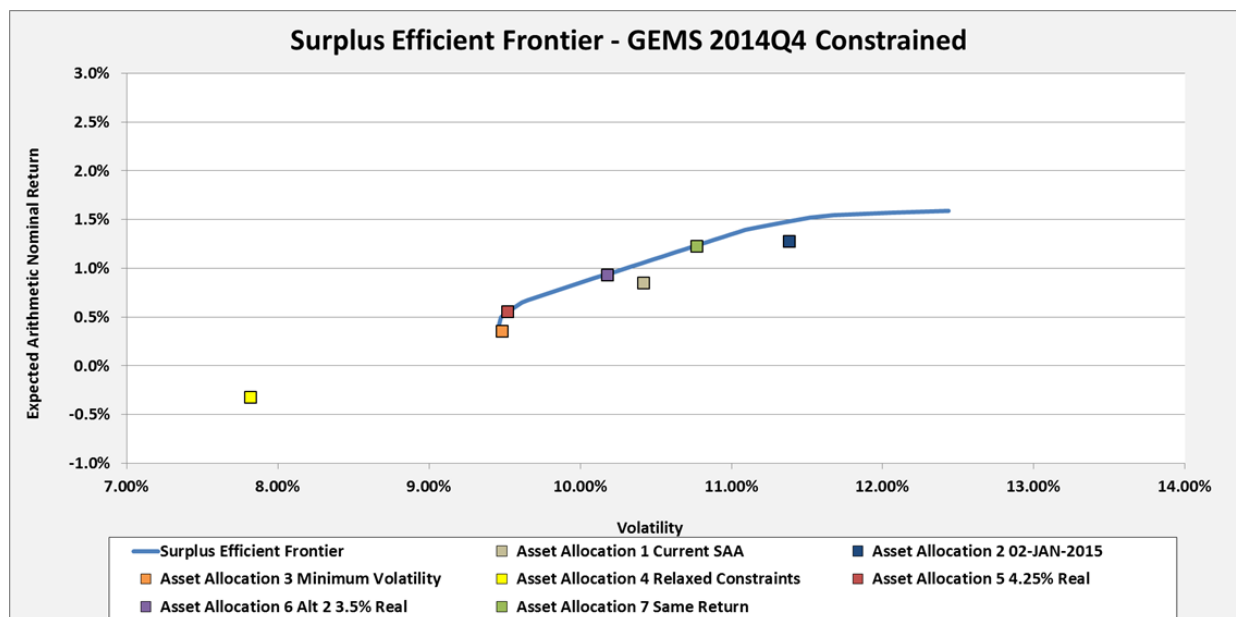
3.32.   It should be noted that for Allocations 3 through 7 below, it is expected that the asset allocation will transition from the Current Asset Allocation (as shown in Allocation 2) to the ultimate allocation over up to a four-year period ending 1 January 2019. The following tables illustrate the change in the strategic asset allocation that would be expected over this four-year period.

Glide Path for Asset Allocation 3 – Minimum Volatility					
Asset Class	Allocation as of 01-JAN-2015	Allocation as of 01-JAN-2016	Allocation as of 01-JAN-2017	Allocation as of 01-JAN-2018	Allocation as of 01-JAN-2019
Global Equities	63.4%	60.1%	56.8%	53.4%	50.0%
Global Fixed Income	24.6%	27.9%	31.2%	34.6%	38.0%
Real Assets	5.3%	5.5%	5.7%	5.9%	6.0%
Alternative Investments	3.0%	3.0%	3.0%	3.0%	3.0%
Cash & Short Term	3.7%	3.5%	3.3%	3.1%	3.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Glide Path for Asset Allocation 4 – Relaxed Constraints					
Asset Class	Allocation as of 01-JAN-2015	Allocation as of 01-JAN-2016	Allocation as of 01-JAN-2017	Allocation as of 01-JAN-2018	Allocation as of 01-JAN-2019
Global Equities	63.4%	56.8%	50.2%	43.6%	37.0%
Global Fixed Income	24.6%	30.3%	36.0%	41.7%	47.5%
Real Assets	5.3%	6.3%	7.2%	8.1%	9.0%
Alternative Investments	3.0%	3.5%	4.0%	4.5%	5.0%
Cash & Short Term	3.7%	3.1%	2.6%	2.1%	1.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Glide Path for Asset Allocation 5 – 4.25% Real

Asset Class	Allocation as of 01-JAN-2015	Allocation as of 01-JAN-2016	Allocation as of 01-JAN-2017	Allocation as of 01-JAN-2018	Allocation as of 01-JAN-2019
Global Equities	63.4%	60.1%	56.8%	53.4%	50.0%
Global Fixed Income	24.6%	27.5%	30.4%	33.4%	36.5%
Real Assets	5.3%	6.3%	7.2%	8.1%	9.0%
Alternative Investments	3.0%	3.0%	3.0%	3.0%	3.0%
Cash & Short Term	3.7%	3.1%	2.6%	2.1%	1.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Glide Path for Asset Allocation 6 – Alt 2 3.5% Real

Asset Class	Allocation as of 01-JAN-2015	Allocation as of 01-JAN-2016	Allocation as of 01-JAN-2017	Allocation as of 01-JAN-2018	Allocation as of 01-JAN-2019
Global Equities	63.4%	61.1%	58.7%	56.4%	54.0%
Global Fixed Income	24.6%	26.0%	27.5%	28.9%	30.5%
Real Assets	5.3%	6.3%	7.2%	8.1%	9.0%
Alternative Investments	3.0%	3.5%	4.0%	4.5%	5.0%
Cash & Short Term	3.7%	3.1%	2.6%	2.1%	1.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Glide Path for Asset Allocation 7 – Same Return as 2 January 2015 Portfolio

Asset Class	Allocation as of 01-JAN-2015	Allocation as of 01-JAN-2016	Allocation as of 01-JAN-2017	Allocation as of 01-JAN-2018	Allocation as of 01-JAN-2019
Global Equities	63.4%	62.0%	60.6%	59.3%	58.0%
Global Fixed Income	24.6%	25.1%	25.6%	26.0%	26.5%
Real Assets	5.3%	6.3%	7.2%	8.1%	9.0%
Alternative Investments	3.0%	3.5%	4.0%	4.5%	5.0%
Cash & Short Term	3.7%	3.1%	2.6%	2.1%	1.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Surplus Efficient Frontier

3.33.   Surplus efficient frontier analysis combines assets with liabilities to determine a set of optimal portfolios that maximize the net of assets and liabilities (or "surplus") for a given level of surplus volatility. The surplus efficient frontier analysis supported the conclusions of the asset-only analysis with respect to the asset classes modeled. This is not a surprising result. Because of the way the liabilities are defined under UN actuarial valuation and accounting methodologies, the liabilities are not sensitive to the interest rate fluctuations. Thus the surplus efficient frontier analysis does not contradict the choices of asset allocations to consider.

Asset Class	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Global Equities	60.0%	63.4%	50.0%	37.0%	50.0%	54.0%	58.0%
Global Fixed Income	31.0%	24.6%	38.0%	47.5%	36.5%	30.5%	26.5%
Real Assets	6.0%	5.3%	6.0%	9.0%	9.0%	9.0%	9.0%
Alternative Investments	0.0%	3.0%	3.0%	5.0%	3.0%	5.0%	5.0%
Cash & Short Term	3.0%	3.7%	3.0%	1.5%	1.5%	1.5%	1.5%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Expected Geometric Return on Surplus – 10 years	0.84%	1.27%	0.35%	-0.32%*	0.55%	0.92%	1.22%
Surplus Volatility – 10 years	10.42%	11.38%	9.48%	7.82%	9.52%	10.18%	10.77%
* Positive return over longer time horizons							

3.34.   At the request of IMD, Buck prepared ALM analyses on two other capital market bases, reflecting alternative viewpoints on the overall direction of capital markets. These supplementary analyses are found in the Appendix D to this Report.

SECTION IV—PRESENTATION OF BASELINE RESULTS

ALM Analysis – Baseline Population Growth Scenario

4.1.   The ALM was performed and evaluated in terms of the three sets of metrics identified earlier, namely: Value at Risk, Accrued Liability, and Actuarial Valuation Results.

Value at Risk Metrics

4.2.   The Value at Risk is a risk metric related to short-term extreme outcomes because it measures risk over a one year period with respect to the 5 percent of results in the unfavorable "tail" of the range of results.   Not surprisingly the asset allocation with the lowest volatility, Asset Allocation 4, has the lowest Value at Risk and Conditional Value at Risk results.   This does not however mean that it is the lowest risk portfolio over the long term for the Fund because the lowest Value at Risk comes at the cost of lower returns than the other portfolios. The Fund needs to balance the need to manage the short-term risk exposure with the longer term need to earn sufficient returns to grow asset to the desired level.

4.3. The Value at Risk metrics are shown in the table below.

Metric	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Value at Risk or VaR *(Asset Only)*	-6.66%	-7.52%	-6.03%	-4.35%	-5.80%	-6.19%	-6.59%
Value at Risk or VaR *(Surplus basis)*	-10.31%	-11.13%	-9.85%	-8.15%	-9.56%	-9.92%	-10.35%
Conditional VaR or cVaR / Expected Shortfall *(Surplus basis)*	-14.66%	-15.93%	-13.66%	-11.26%	-13.40%	-14.12%	-14.82%
Conditional VaR or cVaR / Expected Shortfall *(Asset Only)*	-10.93%	-12.24%	-9.87%	-7.36%	-9.61%	-10.37%	-11.10%

Conclusion – Value at Risk

While no definitive conclusions can be drawn around this metric, it is a useful filter to eliminate asset allocations that have undue short-term risk relative to their long-term potential benefits.

Asset Allocation 4, with its lower equity allocation has the lowest value at risk measure. Whether a given asset allocation is ideal needs to be evaluated in the context of the performance of all of the asset allocations across all of the performance metrics.

Accrued Liability Metric (Termination Liability)

4.4.   The termination liability (which includes cost-of-living increases) referred to in this report is equivalent to the actuarial present value of accrued benefits presented in the actuarial valuation reports. These liabilities may have financial significance for member organizations under Article 26 of the Fund's Regulations. The termination liability disclosed by the actuarial valuation as of 31 December 2013 was $50.641 billion. The actuarial value of assets as of that date was determined to be $46.205 billion. The termination liability funded ratio was therefore determined to be 91.2 percent.

4.5.   The graph below shows the change in the liability over the next 30 years. On the leftmost side of the graph is the termination liability as of 31 December 2013 of $50.6 billion. It can be seen that this liability grows over time. The path that its growth takes will vary, depending on the emerging pattern of inflation over the period. The liability is shown growing as high as $342 billion at the 95th percentile. This generally represents protracted high inflation. In slightly lower inflation scenarios, the liability can grow to about $224 billion at the 75th percentile. At the median (50th percentile), liability is approximately $175 billion. The last two results, at the 25th and 5th percentiles projected liabilities to be approximately $143 billion and $113 billion, respectively.
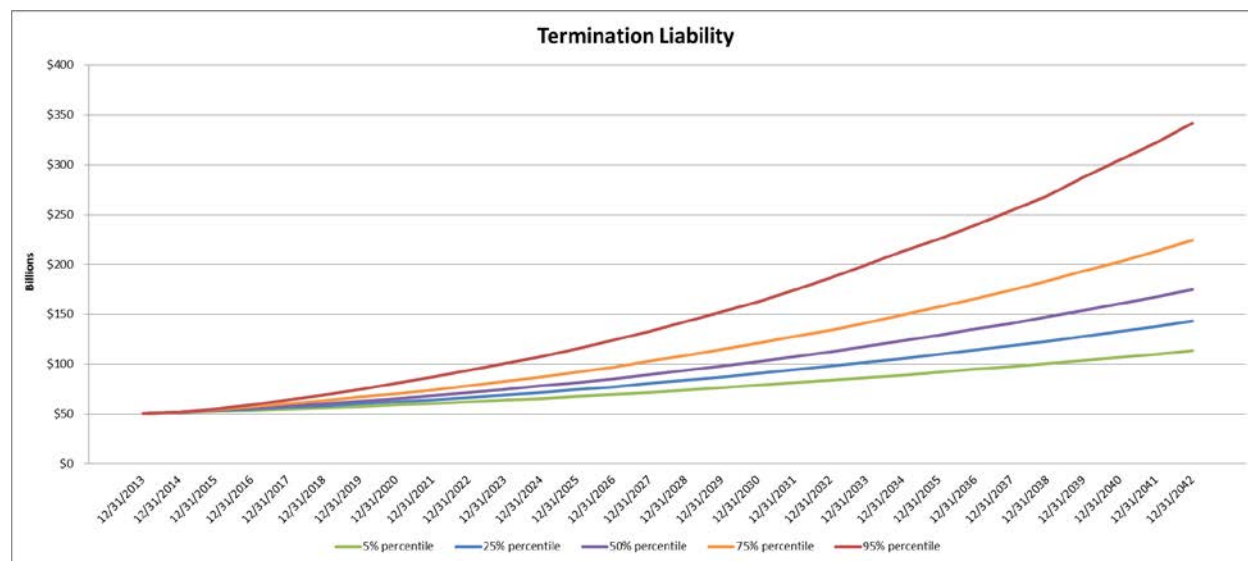
4.6.   Understanding the magnitude of the liabilities is important, but it must be put in the context of the assets by calculation the termination liability funded ratio, which is equal to the actuarial value of assets divided by the liability.

4.7.   Forecasts of the funded ratio will vary by asset allocation. Results will vary in two ways. First, they will vary by the funded ratio level achieved. Second, they will vary by the amount of dispersion from the highest (best) to the lowest (worst) result. The more volatile that asset mix, the more dispersion in the funded ratio.

Termination Liability Funded Ratio

4.8.   What follows are the 30-year forecasts of the termination liability funded ratios for all seven asset allocations that were analyzed. For each graph the initial results shown is the termination liability funded ratio of 91.2% as of 31 December 2013. Over time the ratios diverge as the impact of the 5,000 different economic environments result in different asset and liability values that produce a range of potential outcomes. The lines show the 95th, 75th, 50th, 25th and 5th percentile outcomes.

Termination Liability Funded Ratio for Portfolio Current SAA

Asset Allocation 1

Termination Liability Funded Ratio for Portfolio 02-Jan-2015

Asset Allocation 2

Termination Liability Funded Ratio for Portfolio Minimum Volatility

Asset Allocation 3

Termination Liability Funded Ratio for Portfolio Equity Constraint

Asset Allocation 4

Termination Liability Funded Ratio for Portfolio 4.25% Real

Asset Allocation 5

5% percentile — 25% percentile — 50% percentile — 75% percentile — 95% percentile

Termination Liability Funded Ratio for Portfolio Alt 2 3.5% Real

Asset Allocation 6

5% percentile — 25% percentile — 50% percentile — 75% percentile — 95% percentile

Termination Liability Funded Ratio for Portfolio Same Return

Asset Allocation 7

5% percentile — 25% percentile — 50% percentile — 75% percentile — 95% percentile

4.9.   The forecast termination liability funded ratio may increase dramatically, increase slightly, or decline. This is dependent on the forecast economic environment and portfolio returns. It is important to keep in mind that some of the more extreme outcomes, good and bad, are the result of having a static model in which design changes to the Fund are not contemplated that would occur in reality as part of the ongoing management of the Fund to keep it in the desired balance.

4.10.   The table below shows the funded ratios from the above graphs at the end of year 30.

	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
95th percentile	531.06%	621.48%	468.31%	367.81%	485.67%	540.54%	588.32%
75th percentile	300.41%	338.58%	276.91%	231.59%	286.82%	311.39%	331.19%
50th percentile	198.57%	217.01%	186.39%	165.21%	193.85%	206.58%	217.19%
25th percentile	122.00%	128.54%	117.02%	109.90%	123.00%	128.59%	132.21%
5th percentile	49.55%	47.52%	50.39%	54.00%	53.29%	52.36%	53.02%
Dispersion (95th minus 5th percentile)	481.51%	573.96%	417.94%	313.81%	432.38%	488.18%	535.30%

4.11.   The forecast 50th percentile funded ratio in 30 years is 165% to 217%, depending on the asset allocation. The worst 25 percent outcome has a funded ratio range of 109% to 132%. In other words, over 75% of the time the Fund is forecast to have sufficient assets to cover emerging termination liabilities. In the worst 5 percent outcome, the funded ratio drops to 47% to 54%. This is an unlikely outcome due to the low likelihood of a more extreme and protracted weak performing market, and because if this were to occur there would likely be intervention to keep the Fund in balance.

4.12.   The dispersion is a measure of the range of outcomes. Asset allocation 4 has the lowest dispersion due to its relatively low equity exposure and related lower volatility.

Conclusion – Termination Liability Funded Ratio
The results are very similar across the various mixes so there is no definitive conclusion that can be drawn about the Asset Allocation choice solely on the basis of this metric. However, since Asset Allocation 4 a) is over 100% funded over 75% of the time, b) has the best funded ratio outcome at the worst 5 percent result (54%), and c) has the lowest dispersion, it is slightly better than the other mixes.

Likelihood of Shortfall

4.13.   In addition to forecasting a range of funded ratios it is also useful to measure and compare the likelihood of shortfall. Shortfall in this context is defined as the termination liability being greater than the actuarial value of assets. As of 31 December 2013, by definition there was a shortfall since the termination liability funded ratio was 91.2%.
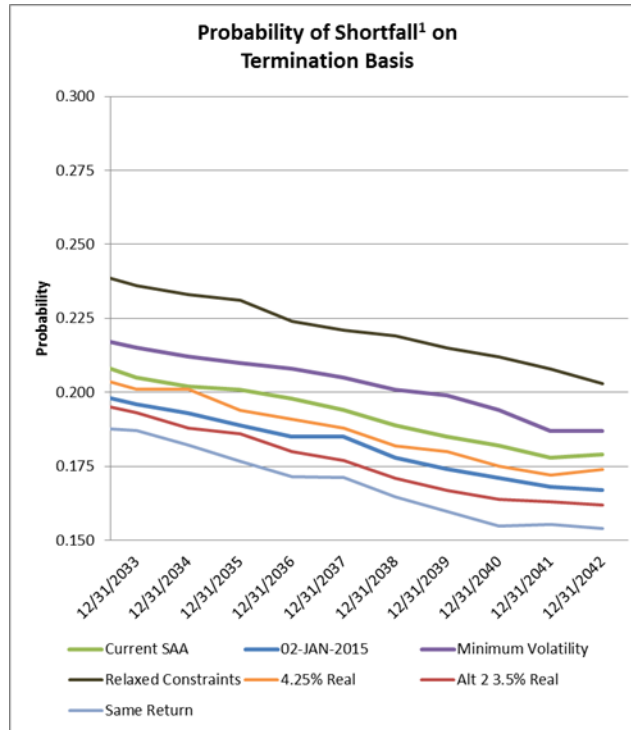
4.14.   The two graphs that follow show the probability of shortfall for each asset allocations. A value of 1.0 represents a 100% likelihood of shortfall.

4.15.   The first graph shows the progression of the shortfall over the entire 30 years. The second graph in 4.17 magnifies the last ten (10) years to better differentiate among the asset allocations.

Probability of Shortfall[1] on Termination Basis
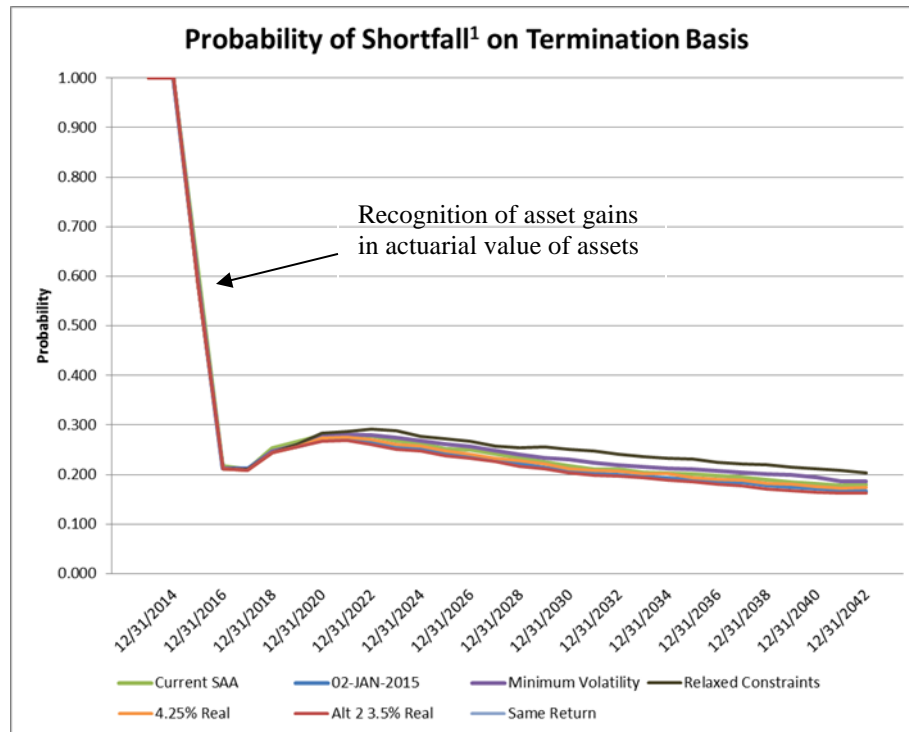
4.16.   It will be noted that the probability of shortfall is 100% at the beginning of the forecast period on the leftmost part of the graph. The rapid drop in the probability of shortfall in the first few years is due to the effect of actuarial smoothing of asset values. In those first few years, the favorable asset performance during the years immediately before the 31 December 2013 actuarial valuation is being recognized, which is favorable to the funded ratio. Subsequently this effect diminishes and the likelihood of a shortfall levels out and remains between approximately 16%-30%, dependent on the asset allocation and the time period chosen. We view this as a positive indicator for the future overall health of the Fund.

4.17.   The graph of the last ten (10) years better differentiates the results by asset allocation. It is observed that the various asset allocations produce different outcomes.

Probability of Shortfall[1] on Termination Basis

	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Likelihood of shortfall (1.00 = 100%)	0.179	0.167	0.187	0.203	0.174	0.162	0.154
Likelihood of surplus	0.821	0.833	0.813	0.797	0.826	0.838	0.846

4.18.   At the end of the thirty year forecast, the likelihood of shortfall is in the range of 15.4% to 20.3% (0.154 to 0.203) with 1.00 equal to 100% likelihood. This means that the likelihood of the termination liability funded ratio exceeding 100% at the end of the forecast period is in the range of 79.7% to 84.6% (0.797 to 0.846), which is a very strong outcome regardless of asset allocation.

Conclusion – Probability of Shortfall on a Termination Basis

The results are very similar across the various mixes. The probability of shortfall is quite low once the recent asset gains are recognized in the actuarial value of assets. This is a strong outcome. The Asset Allocation that has the lowest probability of shortfall is Asset Allocation 7. While Asset Allocation 7 has higher expected return and higher annual volatility than Asset Allocation 6, the likelihood of higher average returns is forecast to have more beneficial effect on funded ratios in the long term, even considering the additional risk.

Valuation Results

4.19.   Valuation based metrics can provide useful information in a number of areas. One such area is solvency.

4.20.   The fundamental balance equation of pension funding is:

$$\text{Benefits} + \text{Expenses} = \text{Contributions} + \text{Investment Earnings}$$

4.21.   Currently the 23.7% contribution is approximately sufficient to cover the benefit payments being paid from the Fund.   As the graph below illustrates and the Fund matures, benefits will increase as a percentage of Pensionable Remuneration to about 41%.

Benefit Payments as a Percentage of Pensionable Remuneration
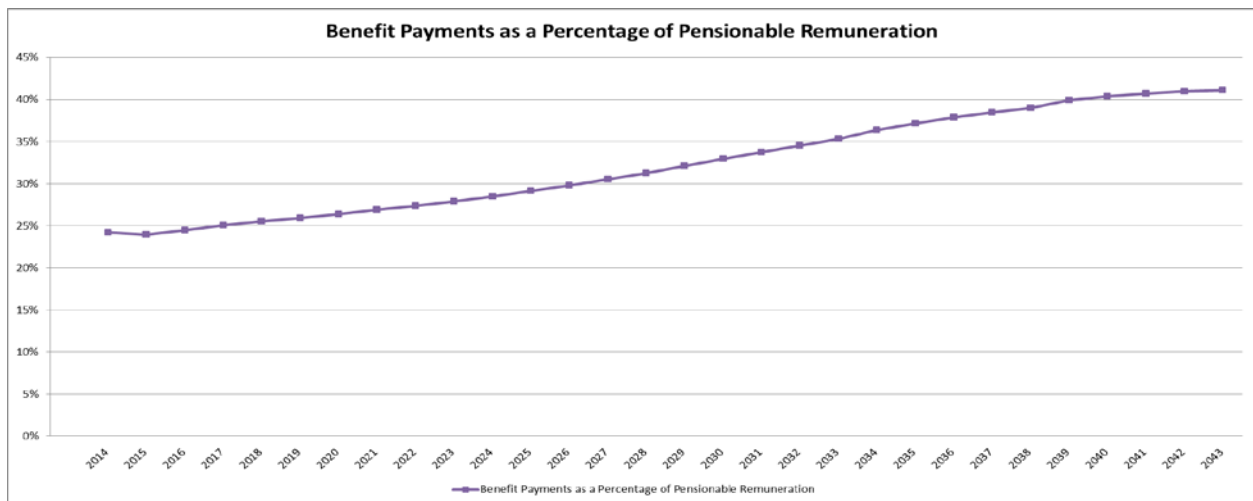
4.22.   As a result, over time, investment earnings will need to play a greater role in maintaining the balance, and as the Fund grows, this will become increasingly the case.   One indication of the degree of leverage that Fund assets will provide is by measuring the assets as a percentage of Pensionable Remuneration. Currently, Fund assets are approximately five (5) times Pensionable Remuneration. Over time this will increase to a multiple of 8.5 or greater 75% of the time, and a multiple of 15 nearly half the time.

Market Value of Assets as a Multiple of Pensionable Remuneration
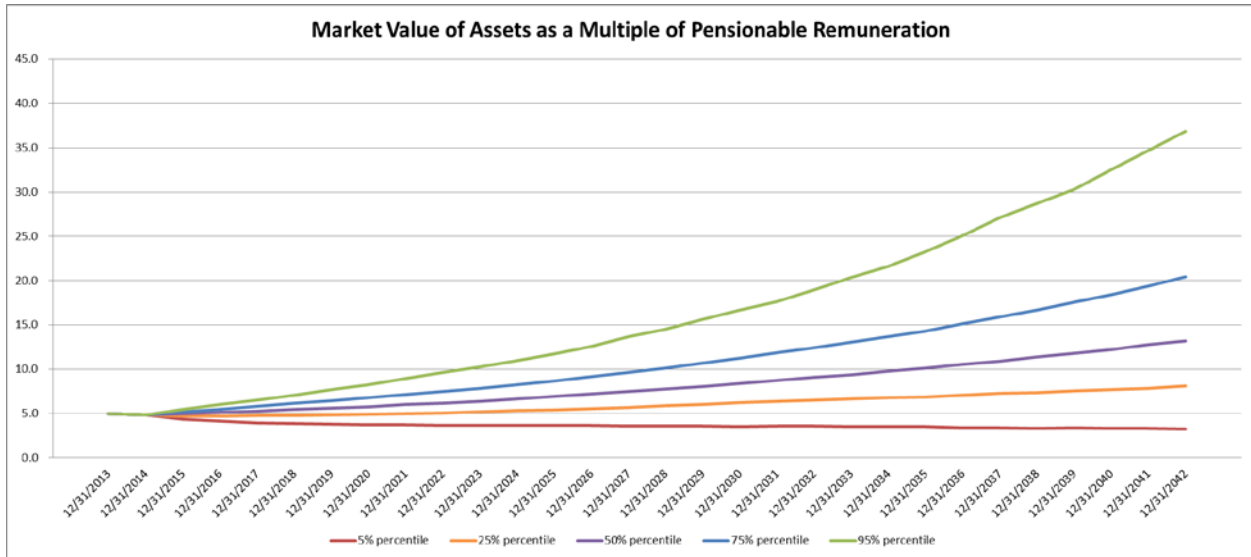
4.23. If the Fund management wishes to avoid forced asset sales at unfavorable prices to meet liquidity needs, then contributions plus investment earnings, along with other gains from asset sales resulting from normal operations will need to be sufficient to fund benefits and expenses. The following graphs illustrate the expected gap between contributions and disbursements, expressed as a percentage of expected assets determined at market value.

Annual Cash Flow/MVA under different Asset Allocations

Annual Cash Flow/MVA for Portfolio Current SAA

Asset Allocation 1

Annual Cash Flow/MVA for Portfolio Minimum Volatility

Asset Allocation 2

Annual Cash Flow/MVA for Portfolio 02-Jan-2015

Asset Allocation 3

Annual Cash Flow/MVA for Portfolio Relaxed Constraints

Asset Allocation 4

Annual Cash Flow/MVA for Portfolio 4.25% Real

Asset Allocation 5

Annual Cash Flow/MVA for Portfolio Alt 2 3.5% Real

Asset Allocation 6

4.24. The table below summarizes the graphic results of this net cash flow analysis, showing the annual benefit payments expected to be needed from investment earnings, computed as annual benefits less annual contributions as a percentage of plan assets. Over the 30 year period the highest that net benefit payment grow to as a percentage of assets at the worst 95th percentile (the worst 5% of results) is 5.58%. Thus even in unfavorable markets, we believe there will not be undue strain on the Fund from this source. The 2013 financial statements show income (interests, dividend and income from real assets) equal to approximately 2.3% of market value assets as of 31 December 2013.

	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
95th percentile	5.42%	5.58%	5.34%	4.96%	5.02%	4.96%	4.97%
75th percentile	2.15%	2.04%	2.24%	2.39%	2.13%	2.05%	1.99%
50th percentile	1.32%	1.20%	1.40%	1.59%	1.35%	1.27%	1.21%
25th percentile	0.85%	0.75%	0.94%	1.12%	0.90%	0.83%	0.77%
5th percentile	0.47%	0.40%	0.53%	0.69%	0.51%	0.46%	0.42%

Frequency that Valuation Results Remain within 2% Corridor

4.25. The graph below shows the frequency that the contribution rate remains within the +/-2% of 23.7% corridor. As the graph shows, the frequency is relatively high in the early years of the projections, but decreases to below 10% at year 30. During the longer periods covered by the study, the variability around asset performance has an increasing effect on the valuation results, and thus the range of outcomes of future valuations widens over time. Therefore, we believe the

frequency of remaining within the 2% corridor is not ideal for use as a basis for determining the long-term strategic allocation.

Frequency that Valuation results remain within +/- 2% Pensionable Remuneration Corridor
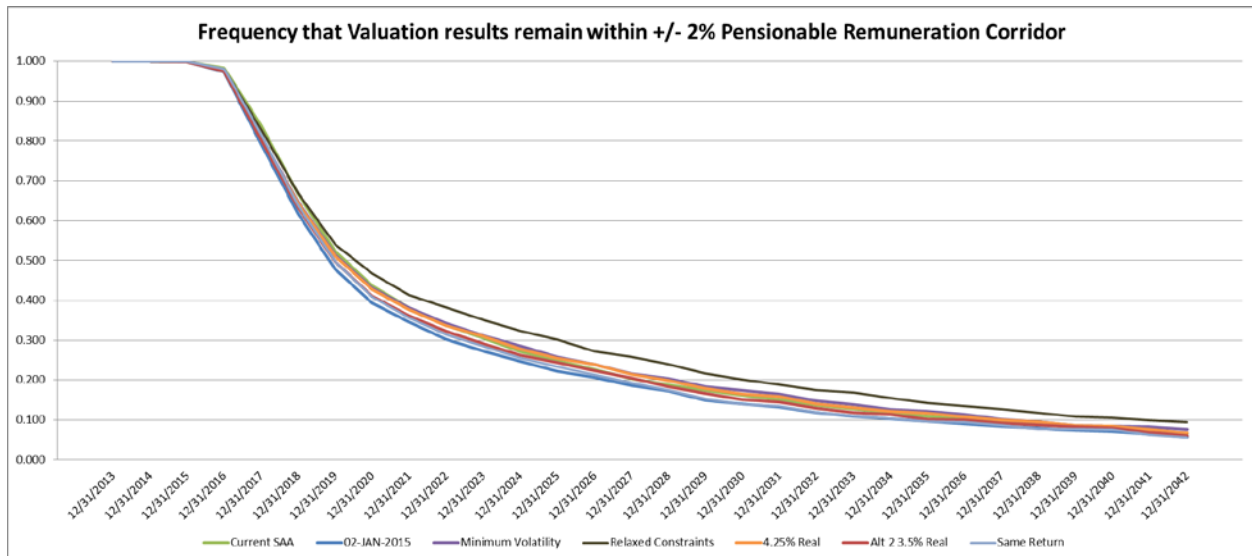
Conclusion – Frequency that Valuation Results Remain within 2% Corridor
This metric is not an ideal basis for determining the long term strategic asset allocation.

Probability of Contribution Sufficiency

4.26.   A more useful metric is provided by comparing the theoretical contribution required to achieve actuarial balance relative to the current 23.7% contribution rate. The two graphs that follow show the probability that the contribution rate of 23.7% is sufficient for each asset allocation. A value of 1.0 represents a 100% likelihood of sufficiency.

4.27.   The first graph shows the progression of the sufficiency over the entire 30 years. The second graph magnifies the last ten (10) years to better differentiate among the asset allocations.
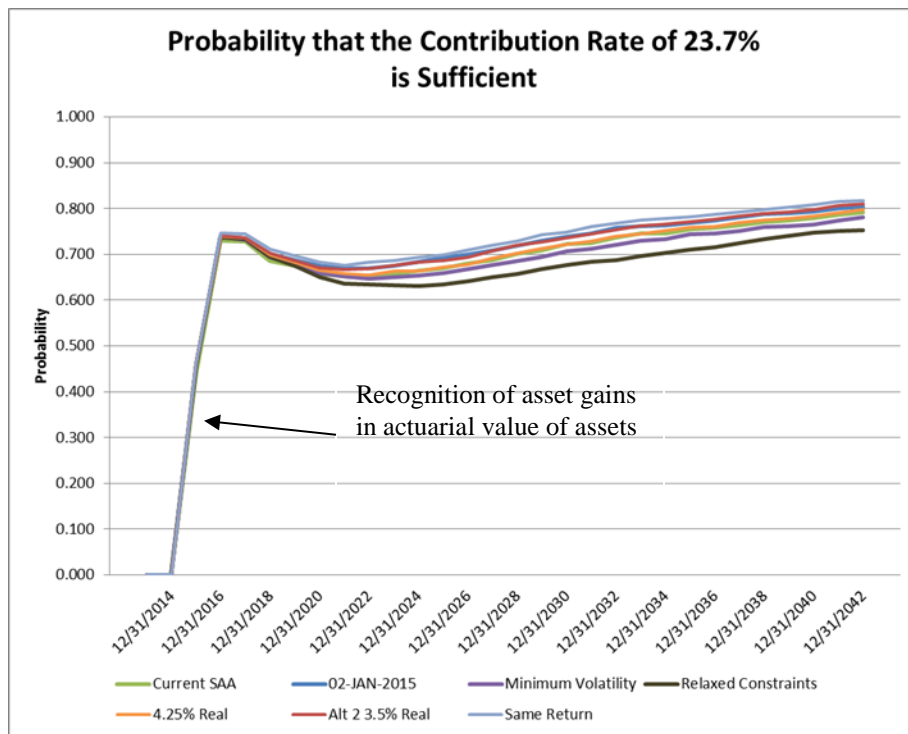
4.28.   Since the actuarial valuation as of 31 December 2013 disclosed a small actuarial imbalance, the probability of sufficiency as of that date is shown as 0%. As recent investment gains emerge into the actuarial value of assets, then if all valuation assumptions were met, it would be expected that the next valuation as of 31 December 2015 will disclose improved results.

4.29.   Over time, contribution rates across the asset allocations show greater differentiation, but in all cases the likelihood of sufficiency are relatively high regardless of the asset allocation. This can be seen in the following graph showing results over the last 10 years.

Probability that the Contribution Rate of 23.7% is Sufficient
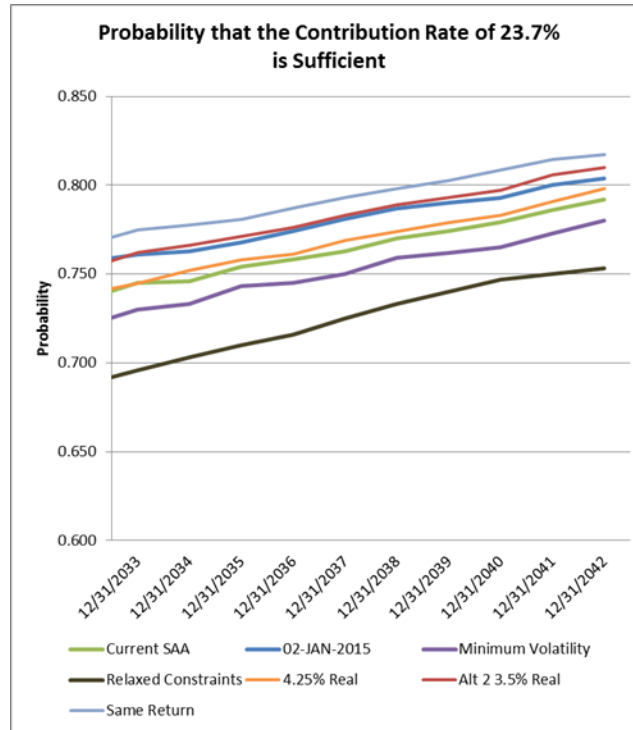
4.30. The table below summarizes the results at the end of 30 years.

	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Likelihood of sufficiency (1.00 = 100%)	0.79	0.80	0.78	0.75	0.80	0.81	0.82

4.31. Each asset allocation shows a high likelihood of sufficiency. The best outcome is produced by Asset Allocation 7.

Conclusion – Probability of Contribution Sufficiency
The results are very similar across the various mixes initially. However over time Asset Allocation 7 is the best performer among the asset allocations tested in terms of contribution sufficiency.

Summary and Conclusions

4.32.   In this analysis, we have focused on Accrued Liability metrics (both the Funded Ratio and the probability of the Funded Ratio exceeding 100%), cash flow, and the probability that emerging required contribution rates will not exceed the actual contribution rate of 23.7% of pensionable remuneration. On each of these metrics, Asset Allocation 6 and 7 provide the two best long-term results for the Fund. In order to allow for the orderly restructuring of the portfolio, it is beneficial to the Fund if it transitions to the new strategic asset allocation over up to a four-year period, as described in the tables below.

Glide Path - Asset Allocation 6					
Asset Class	Allocation as of 01-JAN-2015	Allocation as of 01-JAN-2016	Allocation as of 01-JAN-2017	Allocation as of 01-JAN-2018	Allocation as of 01-JAN-2019
Global Equities	63.4%	61.1%	58.7%	56.4%	54.0%
Global Fixed Income	24.6%	26.0%	27.5%	28.9%	30.5%
Real Assets	5.3%	6.3%	7.2%	8.1%	9.0%
Alternative Investments	3.0%	3.5%	4.0%	4.5%	5.0%
Cash & Short Term	3.7%	3.1%	2.6%	2.1%	1.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Glide Path - Asset Allocation 7					
Asset Class	Allocation as of 01-JAN-2015	Allocation as of 01-JAN-2016	Allocation as of 01-JAN-2017	Allocation as of 01-JAN-2018	Allocation as of 01-JAN-2019
Global Equities	63.4%	62.0%	60.6%	59.3%	58.0%
Global Fixed Income	24.6%	25.1%	25.6%	26.0%	26.5%
Real Assets	5.3%	6.3%	7.2%	8.1%	9.0%
Alternative Investments	3.0%	3.5%	4.0%	4.5%	5.0%
Cash & Short Term	3.7%	3.1%	2.6%	2.1%	1.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

4.33.   Our suggestions regarding the minimums and maximums for each asset class are shown below. We believe that a corridor of 15-16% around both Global Equity and Global Fixed income will be adequate to avoid frequent rebalancing, as well as to provide adequate leeway for tactical deviations from the strategic allocation when market conditions warrant.

4.34.   We note that the current exposure to Global Equities, which was 63.4% as of 2 January 2015, is in excess of the corridor limit of 62% for Asset Allocation 6. Just as it is reasonable to arrive at the strategic asset allocation over a period of four years, we believe it is also reasonable for the upper and lower bounds for each asset class to transition over four years. The following limits would represent a reasonable transition approach.

Glide Path - Asset Allocation 6

Asset Class	Corridor as of 01-JAN-2015	Corridor as of 01-JAN-2016	Corridor as of 01-JAN-2017	Corridor as of 01-JAN-2018	Corridor as of 01-JAN-2019
Global Equities	50%-70%	49%-68%	48%-66%	47%-64%	46%-62%
Global Fixed Income	24%-38%	24%-38%	24%-38%	24%-38%	23%-38%
Real Assets	3%-9%	3%-9%	4%-9%	4%-9%	5%-10%
Alternative Investments	Not Defined	0%-10%	0%-10%	0%-10%	0%-10%
Cash & Short Term	0%-6%	0%-6%	0%-6%	0%-6%	0%-5%

Glide Path - Asset Allocation 7					
Asset Class	Corridor as of 01-JAN-2015	Corridor as of 01-JAN-2016	Corridor as of 01-JAN-2017	Corridor as of 01-JAN-2018	Corridor as of 01-JAN-2019
Global Equities	50%-70%	50%-69%	50%-68%	50%-67%	50%-66%
Global Fixed Income	24%-38%	22%-37%	21%-36%	20%-35%	19%-34%
Real Assets	3%-9%	3%-9%	4%-9%	4%-9%	5%-10%
Alternative Investments	Not Defined	0%-10%	0%-10%	0%-10%	0%-10%
Cash & Short Term	0%-6%	0%-6%	0%-6%	0%-6%	0%-5%

SECTION V – ANALYSIS OF TWO-TRACK ADJUSTMENT SYSTEM

Introduction

5.1.   The two-track pension adjustment system consists of three features: (i) a provision whereby pensions can be determined in local currency, subject to proof of local residence; (ii) the 1 April 1992 modification to the system which provides for application of an improved schedule of cost-of-living differential (COLD) factors in establishing, in high-cost countries (i.e., higher than New York), the initial local currency pension; and (iii) payment of the higher of the dollar track amount and local currency track amount in each quarter, subject to a "cap" provision limiting payment to no more than 110 per cent of the local track amount (120 per cent for separations before 1 July 1995). The retiree's initial local currency payment is determined by applying any COLD factors and the average exchange rate for the 36 consecutive months up to and including the month of separation.

5.2.   Effective in 1995, the Committee of Actuaries recommended that the cost of the two-track adjustment system be explicitly recognized in the periodic actuarial valuations. The estimated long-term actuarial cost assumption has been set at 1.90 per cent of pensionable remuneration. Based on the 1995 analysis, the theoretical long-term cost of the two track system was estimated to range from 1.8 per cent of pensionable remuneration based on an assumed utilization rate of 25 per cent for future retirees, to 2.2 per cent of pensionable remuneration based on an assumed utilization rate of 30 per cent, and 2.5 per cent of pensionable remuneration based on an assumed utilization rate of 35 per cent.

5.3.   At that time, based on actual two-track data for calendar years 1990 through 1994, the emerging cost of the two-track system showed costs ranging from 1.5 per cent of pensionable remuneration to 1.8 per cent of pensionable remuneration.

5.4.   The estimated 1.9 per cent of pensionable remuneration cost of the two-track system currently reflected in the actuarial valuations reflects a blend between the theoretical actuarial long-term cost and the emerging cost of the system.

5.5.   The emerging cost of the two-track system reflecting the actual cost experience to date is also assessed on the occasion of each of the actuarial valuations. The most recent such assessment as of 31 December 2013 (based on data since 1990) indicated a cost of 2.10 per cent of pensionable remuneration.

5.6.   The purpose of this section of the report is to review the estimated long-term cost of the two-track adjustment system developed using the GEMS foreign exchange forecasts.

Background

5.7.   The currencies available for the ALM study in the GEMS model were used for this analysis. These currencies are the US Dollar, Euro, Canadian Dollar, Swiss Franc and UK Pound Sterling. These currencies represent approximately 89.7% of the pensions paid in currencies other than the US Dollar. Currency conversion rates for the three-year period prior to the 1 January 2015 observation date (required to compute the initial ratios of 36-month average exchange rates to spot rates) were obtained from UNJSPF.org.

5.8.   Future exchange rates relative to the US Dollar, as well as local inflation for the subject currencies, were taken from the GEMS model over the same 5,000 stochastic paths as used in the main portion of this ALM study. Results over the next thirty years were used, and then year over year exchange rate changes were repeated in 30-year cycles thereafter.

5.9.   The average annual exchange rate volatility versus the US Dollar produced by the GEMS model, based on the 5,000 stochastic paths, is as follows:

- Canadian Dollar: 8.51%
- Swiss Franc: 10.33%
- Euro: 11.04%
- UK Pound Sterling: 8.08%

This is important because much of the value to Fund participants of the Two-Track system derives from the initial conversion of the pension using the 36-month average of spot rates. The greater the volatility of currency exchange, the greater the expected difference between average and spot. Option Pricing Theory (for example, the Black-Scholes model) confirms that the greater the volatility of the underlying financial instrument, the greater the value to the holder of the option.

Postretirement Simulation

5.10.   To simplify the analysis, life contingencies were eliminated from this model. It was assumed that a retiree approximately age 60 (who is about 75% likely to have a beneficiary eligible for a contingent benefit) would receive a (joint) benefit for 30 years. We do not believe that this simplification affects the model adversely.

5.11.   For each of the 5,000 simulated lifetimes in each of the 4 non-US Dollar currencies, the GEMS exchange rates and local COLA were computed. Based on the simulated change in currency and COLA, the new dollar track and local track pensions were computed, compared to the 110% of local track cap and the 80% of dollar track floor, and then the emerging pension in the new year was determined. This process was repeated for the simulated 30-year lifetime of the retiree.

5.12.   The net present value of the pension payments (based on the nominal interest rate of 6.5% used in the current actuarial valuation) was determined and compared to the net present value of payments that would have been paid to a retiree on the dollar track. This process was repeated for the 5,000 simulated paths and an average was determined. The result varied from currency to currency because of the underlying volatility differences. A table was then prepared that converted an average-to-spot ratio to an ultimate effect (reflecting the impact of postretirement fluctuations).

Final Steps

5.13.   Returning to the original modeling process, each of the 5,000 paths' average-to-spot ratios was mapped to an ultimate payout ratio as described above. In cases where it was predicted that the participant would not benefit from two-track it was assumed the participant would elect the dollar track.

5.14.   A table of results was prepared. A weighted average result was computed by weighting each of the four modeled currencies in accordance with their current pension payroll (annuities in force). The relative weights are:

- Euro 60%
- Swiss Franc 32.5%
- Pound Sterling 5.0%
- Canadian Dollar 2.5%

5.15.   The average relative advantage of two-track to dollar track was computed, and the results were then adjusted for an assumed utilization rate of 35% for future retirees.

5.16.   To account for additional value of the financial options in soft currencies that were not part of the modeling universe, the ultimate cost of the Two-Track option was increased by 8% of itself.

5.17.   The results so obtained were then increased by 15% to provide a confidence interval that would take into account sample bias (which should be low with 5,000 scenarios run), general model bias and error, and a suitable margin for conservatism.

5.18.   Based on the foregoing, the long-term cost of the Two-Track Adjustment System is estimated at 2.14%, rounded to **2.10%,** of Pensionable Remuneration, as compared to the 1.90% estimate currently used in the actuarial valuations.

5.19.   This estimate was reviewed by the Committee of Actuaries at its June 2015 meeting.

SECTION VI – SENSTIVITY ANALYSIS

Sensitivity Testing

6.1.   An important part of this ALM study was analyzing whether the size of the active staff population will have a material effect on the emerging scenarios. This issue has been evaluated by performing analysis under different staffing scenarios.

The scenarios tested were:

a. Scenario #1 - Current assumption of 0.5% growth for 10 years, then level thereafter (baseline case)
b. Scenario #2 - 0% growth for all years
c. Scenario #3 - 1% decline for 10 years, then level thereafter
d. Scenario #4 - 2% decline for 10 years, then level thereafter

6.2.   For each of the workforce scenarios the preceding analysis described in this report was replicated. Key results for each are summarized below without reproducing all of the graphs.

6.3.   The valuation results of the biennial actuarial valuations are determined using the Aggregate Funding Methodology. Under this methodology, as current participants leave the active workforce they are assumed to be replaced by new (future) participants. For the 31 December 2013 actuarial valuation, the "baseline" assumption was that the number of new participants would grow by 0.5% for 10 years followed by zero growth thereafter.

6.4.   As shown in Table VII of the 31 December 2013 valuation report, the contribution rate required to maintain actuarial balance is 24.42% of pensionable remuneration. The Table also shows that the required contribution rate for only current participants is 34.74% of pensionable remuneration, and the required contribution rate for only future participants is 20.88% of pensionable remuneration. The table below shows how the current and future participant contribution rates are blended to produce the all participant contribution rate of 24.42%.

Population	Required Contribution Rate	Weighting of Present Value of future Pensionable Remuneration
Current Plan Participants	34.74%	0.255
Future Plan Participants	20.88%	0.745
Total = Weighted Average	24.42%	1.000

6.5.   As the table on the previous page indicates, the effect of future plan participants has a substantially positive effect on the required contribution rate. If the relative growth in future participants is lower than the "baseline case" the relative weighting (present value of future pensionable remuneration) associated with future participants will decrease and the relative weighting for current participants will therefore increase. Therefore, since the contribution rate for current participants is greater than the rate for future participants, the total contribution rate will increase. Based on the current environment, we forecast that future required contribution rates would increase by approximately 0.15% under the Scenario 2 participant growth assumptions, by approximately 0.47% under the Scenario 3 participant growth assumptions and by approximately 0.75% under the Scenario 4 participant growth assumptions. The increase in contribution rates in future years will depend on the relationship between the then prevailing current and future participant's contributions rates.

ALM Results – Alternative Growth Scenarios

6.6.   The table below compares 30th year termination liabilities of the baseline forecast to those of the three alternative population scenarios.

(billions)	Baseline	0% growth	-1% growth	-2% growth
95th percentile	$341.9	$330.4	$308.7	$288.8
75th percentile	$224.1	$216.6	$202.3	$189.3
50th percentile	$174.8	$168.9	$157.8	$147.6
25th percentile	$143.0	$138.2	$129.1	$120.8
5th percentile	$113.4	$109.6	$102.4	$95.8

6.7.   The difference between the baseline population forecast (0.5% growth) and the 0% growth forecast is about a 3.5% reduction in the long-term liability. Then each 1% reduction in population growth lowers the long term liability by about 7%-10%.

Funded Ratio Plan Termination Basis: Alternative Population Growth Scenarios

6.8.   The effects of the impact of the population growth scenarios on the termination liability funded ratios at the end of year 30 are shown below:

Termination Liability Funded Ratio - Baseline							
	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
95th percentile	531.06%	621.48%	468.31%	367.81%	485.67%	540.54%	588.32%
75th percentile	300.41%	338.58%	276.91%	231.59%	286.82%	311.39%	331.19%
50th percentile	198.57%	217.01%	186.39%	165.21%	193.85%	206.58%	217.19%
25th percentile	122.00%	128.54%	117.02%	109.90%	123.00%	128.59%	132.21%
5th percentile	49.55%	47.52%	50.39%	54.00%	53.29%	52.36%	53.02%

Termination Liability Funded Ratio - 0% Growth							
	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
95th percentile	540.98%	633.12%	475.62%	371.99%	493.97%	549.68%	598.73%
75th percentile	304.06%	343.36%	279.48%	233.64%	289.62%	315.24%	335.56%
50th percentile	199.87%	217.63%	186.93%	165.34%	194.47%	207.89%	218.58%
25th percentile	121.20%	127.62%	116.33%	108.97%	122.22%	127.58%	131.87%
5th percentile	47.09%	45.02%	48.38%	52.34%	51.13%	50.69%	50.28%

Termination Liability Funded Ratio - 1% Growth							
	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
95th percentile	556.54%	657.74%	490.95%	381.77%	509.54%	549.68%	619.68%
75th percentile	309.42%	349.28%	284.02%	235.34%	294.79%	315.24%	342.57%
50th percentile	200.66%	218.63%	187.25%	164.56%	194.51%	207.89%	218.88%
25th percentile	118.47%	125.57%	113.17%	106.07%	119.44%	127.58%	129.51%
5th percentile	42.06%	39.38%	42.79%	47.65%	46.01%	50.69%	45.52%

Termination Liability Funded Ratio - 2% Growth							
	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
95th percentile	573.72%	679.49%	506.93%	392.72%	526.07%	585.60%	640.64%
75th percentile	314.83%	356.49%	287.63%	237.55%	299.20%	326.98%	349.20%
50th percentile	201.00%	220.18%	187.08%	163.59%	195.28%	209.19%	220.03%
25th percentile	115.67%	122.34%	109.53%	103.18%	116.06%	122.19%	127.21%
5th percentile	36.46%	33.50%	36.30%	41.52%	40.17%	40.75%	39.48%

Conclusion – Funded Ratio Plan Termination Basis: Alternative Population Growth Scenarios

Regardless of the population scenario, the plan stays well-funded over 75 percent of the time, which is a strong outcome. In the case of the worst 5% outcome, which represents protracted weak markets, all of the asset allocations result in a funded ratio around 33% to 42%.

In two of the three alternative population scenarios, Asset Allocation 6 has the best outcome at the worst 5th percent and is in the top three in the third. As such, Asset Allocation 6 is the best performer among the asset allocations tested with respect to this metric.

Likelihood of Funding Shortfall

6.9.   With respect to the likelihood of funding shortfall, the following table compares the results for the baseline to the other three population scenarios at the end of 30 years.

	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Baseline (+0.5% growth)	0.179	0.167	0.187	0.203	0.174	0.162	0.154
0% growth	0.182	0.170	0.188	0.208	0.176	0.165	0.158
-1% growth	0.191	0.179	0.198	0.224	0.184	0.175	0.168
-2% growth	0.200	0.187	0.209	0.237	0.193	0.181	0.175

Conclusion – Likelihood of Shortfall: Alternative Population Growth Scenarios
Asset Allocation 7 has the lowest probability of shortfall across all of the population scenarios.

Contribution Sufficiency: Alternative Population Growth Scenarios

6.10.   With respect to the likelihood that the 23.7% of Pensionable Remuneration is sufficient, the table compares the results for the baseline to the other three population scenarios at the end of 30 years.

	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Baseline	0.79	0.80	0.78	0.75	0.80	0.81	0.82
0% growth	0.78	0.80	0.77	0.74	0.79	0.80	0.81
-1% growth	0.78	0.79	0.76	0.73	0.78	0.80	0.80
-2% growth	0.76	0.78	0.75	0.72	0.77	0.78	0.79

6.11.   Across all of the mixes and population growth scenarios there is a high probability of contribution sufficiency at the end of 30 years.

Conclusion – Contribution Sufficiency: Alternative Population Growth Scenarios

Regardless of the population scenario, there is a high likelihood of contribution sufficiency with the lowest result being 0.72, or 72%.

Asset Allocations 6 and 7 are the strongest performers among the asset allocations tested in the baseline and all three alternative scenarios and they have an 80% or better chance of sufficiency in all but the -2% growth scenario.

Risk of Forced Asset Sale to Meet Benefit Payments

6.12.   The table below shows the annual benefit payments that will need to come from investment earnings. The metric is computed as annual benefits less annual contributions as a percentage of plan assets. Over the 30 year period the highest that net benefit payment grow to as a percentage of assets at the worst 5th percent is 10.50% for any of the alternative population growth scenarios, which we believe will be manageable without forcing asset sales.

Baseline							
	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
95th percentile	5.42%	5.58%	5.34%	4.96%	5.02%	4.96%	4.97%
75th percentile	2.15%	2.04%	2.24%	2.39%	2.13%	2.05%	1.99%
50th percentile	1.32%	1.20%	1.40%	1.59%	1.35%	1.27%	1.21%
25th percentile	0.85%	0.75%	0.94%	1.12%	0.90%	0.83%	0.77%
5th percentile	0.47%	0.40%	0.53%	0.69%	0.51%	0.46%	0.42%

0% Growth							
	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
95th percentile	5.99%	6.20%	5.88%	5.47%	5.56%	5.49%	5.50%
75th percentile	2.30%	2.17%	2.39%	2.56%	2.27%	2.18%	2.12%
50th percentile	1.39%	1.27%	1.49%	1.68%	1.42%	1.34%	1.27%
25th percentile	0.89%	0.79%	0.98%	1.18%	0.94%	0.83%	0.81%
5th percentile	0.49%	0.42%	0.55%	0.72%	0.53%	0.48%	0.44%

-1% Growth							
	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
95th percentile	7.51%	7.95%	7.35%	6.83%	6.83%	6.89%	6.91%
75th percentile	2.63%	2.50%	2.74%	2.96%	2.61%	2.50%	2.41%
50th percentile	1.56%	1.42%	1.67%	1.89%	1.59%	1.49%	1.42%
25th percentile	0.99%	0.87%	1.09%	1.31%	1.04%	0.96%	0.89%
5th percentile	0.53%	0.45%	0.61%	0.80%	0.58%	0.52%	0.48%

-2% Growth							
	Asset Allocation 1 Current SAA	Asset Allocation 2 Current 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
95th percentile	9.77%	10.50%	9.39%	8.58%	8.65%	8.73%	8.91%
75th percentile	3.00%	2.84%	3.14%	3.38%	2.98%	2.84%	2.74%
50th percentile	1.73%	1.57%	1.86%	2.12%	1.77%	1.65%	1.57%
25th percentile	1.08%	0.96%	1.20%	1.45%	1.15%	1.05%	0.98%
5th percentile	0.58%	0.48%	0.66%	0.87%	0.63%	0.56%	0.52%

Conclusion – Risk of Forced Asset Sales

The risk of forced asset sales is low regardless of the asset allocation. Asset Allocation 7 has the lowest risk of all of the allocations in all but the most unfavorable conditions (95th percentile). We believe that Asset Allocation 7 is the best performer with respect to this metric. This result also supports the conclusion that asset liquidity is not likely to be a concern during the forecast period.

SECTION VII – SEQUENCING ANALYSIS

7.01.   The Investments Committee asked Buck to perform two sets of sequencing analysis using a more pessimistic set of capital market assumptions (Alternative 2) for Asset Allocations 2 and 7 in order to analyze more pessimistic outcomes.

7.02.   The two sets of sequencing analysis are:

a.   Sequencing 1 is based on the assumption that the market has a real rate of return of 0% from 2015 to 2017. This scenario is created by identifying 257 out of the 5,000 stochastic trials where real returns are between -0.5% and 0.5% (aggregate) over the period 2015 to 2017.

b.   Sequencing 2 is based on the lowest fixed income real return from 2015 to 2017. Of the 5,000 stochastic trials, the lowest 5% (250 trials) fixed income real returns are identified over the period 2015 to 2017.

Results under Sequencing 1 (Real Return of 0% through 2017)

7.03.   Under Sequencing 1, the portfolio returns for Asset Allocations 2 and 7 are:

	Average Real Portfolio Return 2015-2017	Minimum Real Portfolio Return 2015-2017	Maximum Real Portfolio Return 2015-2017	Probability Average Real Portfolio10yr Return > 3.50%	Probability Average Real Portfolio 30yr Return > 3.50%
Asset Allocation 2	-0.02%	-0.49%	0.50%	0.451	0.603
Asset Allocation 7	-0.22%	-1.77%	1.05%	0.447	0.626

Terminated Liability Funded Ratio under Sequencing 1

7.04.   The following four graphs illustrate the 30-year forecasts of the termination liability funded ratios for Asset Allocations 2 and 7 under the baseline results (Alternative 2) and the 257 stochastic trials that produce -0.5% to 0.5% real asset returns through 2017 (Sequencing 1). The lines show the 95th, 75th, 50th, 25th and 5th percentile outcomes.

Asset Allocation 2 Results under Alternative 2 Assumptions (All 5,000 Trials):
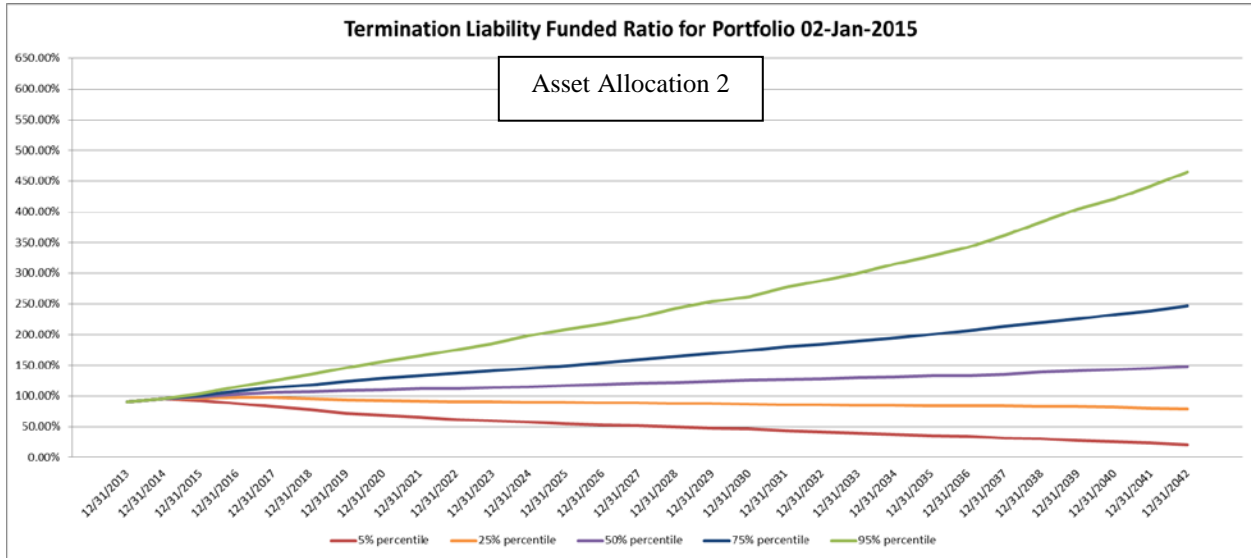
Asset Allocation 2 Results under Sequencing 1 (257 Trials with -0.5% to 0.5% real return 2015-2017):

Asset Allocation 7 Results under Alternative 2 Assumptions (All 5,000 Trials):
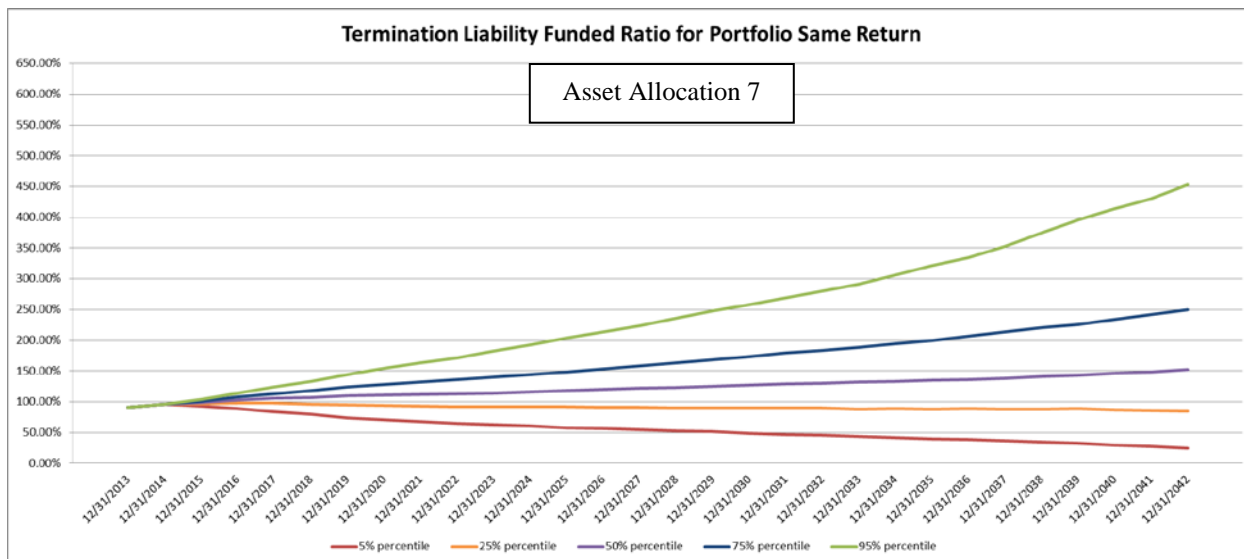
Termination Liability Funded Ratio for Portfolio Same Return — Asset Allocation 7

Asset Allocation 7 Results under Sequencing 1 (257 Trials with -0.5% to 0.5% real return 2015-2017):

Termination Liability Funded Ratio for Portfolio Same Return — Asset Allocation 7
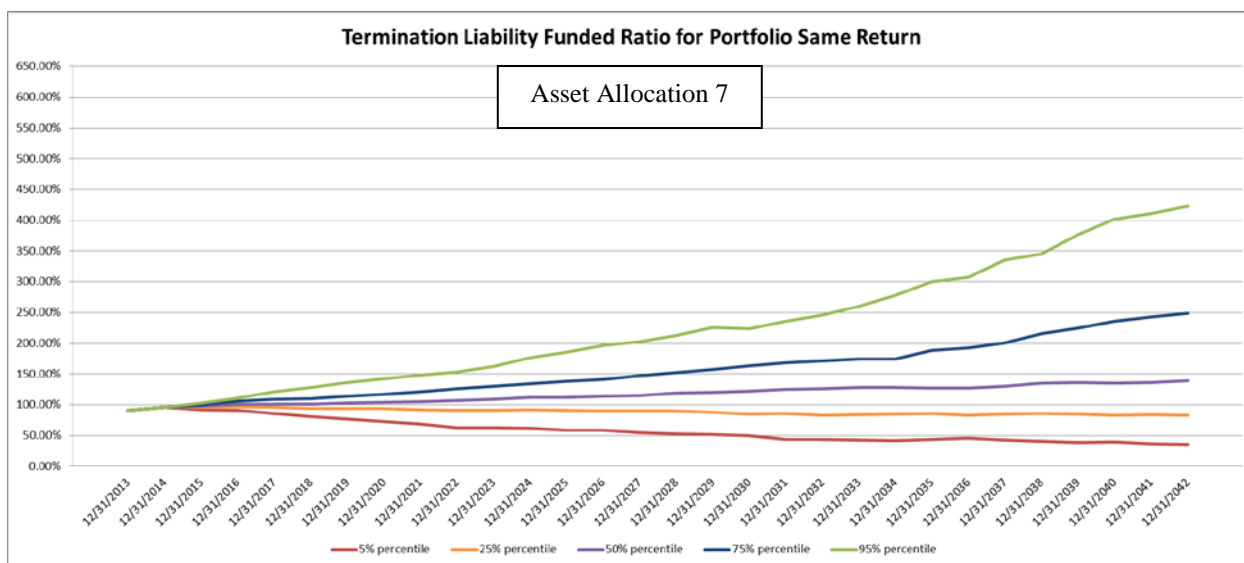
7.05.   We have observed that the termination liability funded ratios are affected by poor performances over the first three years but not significantly so in the long run. Within eight years, the probability of assets exceeding accrued liabilities is not materially different than the baseline results. In addition, the percentile results are incrementally more volatile year-over-year due to the usage of only 257 trials.

Probability of Contribution Sufficiency (under Sequencing 1)

7.06.   The graph shows the progression of the contribution sufficiency over the entire 30 years for Asset Allocations 2 and 7 based on -0.5% to 0.5% real asset returns through 2017 (Sequencing 1) and the baseline results (Alternative 2).
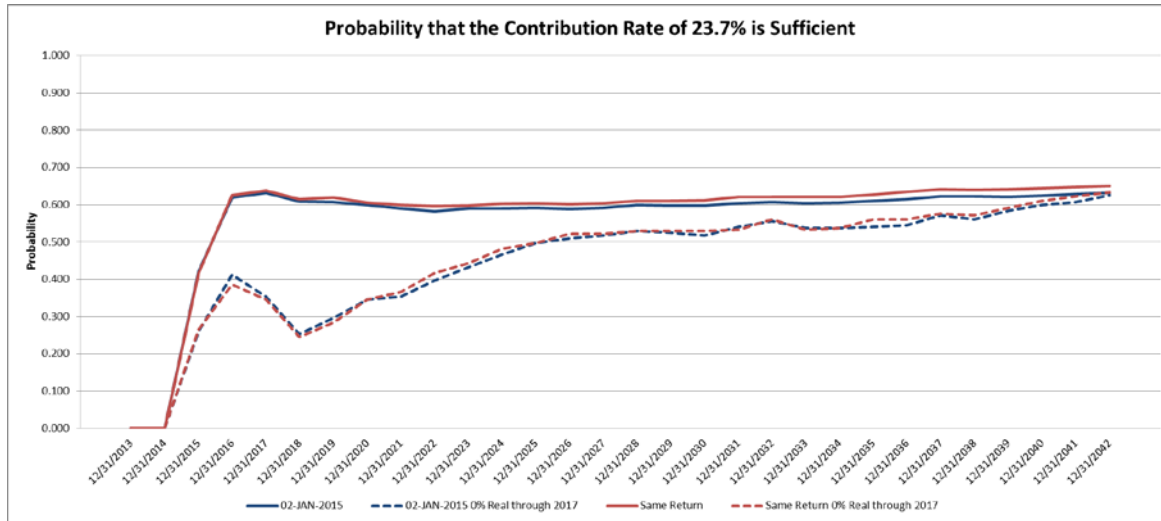
7.07.   At the end of 30 years, the likelihood of contribution sufficiency are:

	Asset Allocation 2 Baseline	Asset Allocation 2 257 Trials	Asset Allocation 7 Baseline	Asset Allocation 7 257 Trials
Likelihood of sufficiency (1.00 = 100%)	0.63	0.63	0.65	0.63

7.08.   Regardless of asset allocations, the likelihood of contribution sufficiency under Sequencing 1 is relatively low in the early years due to poor asset performances. However, after 30 years, the likelihood of contribution sufficiency has caught up and is equal to the baseline results for Asset Allocation 2 and is approximately 2% lower than the baseline results for Asset Allocation 7.

Likelihood of Shortfall (under Sequencing 1)

7.09.   The graph shows the progression of shortfall over the entire 30 years for Asset Allocations 2 and 7 based on -0.5% to 0.5% real asset returns through 2017 (Sequencing 1) and the baseline results (Alternative 2).
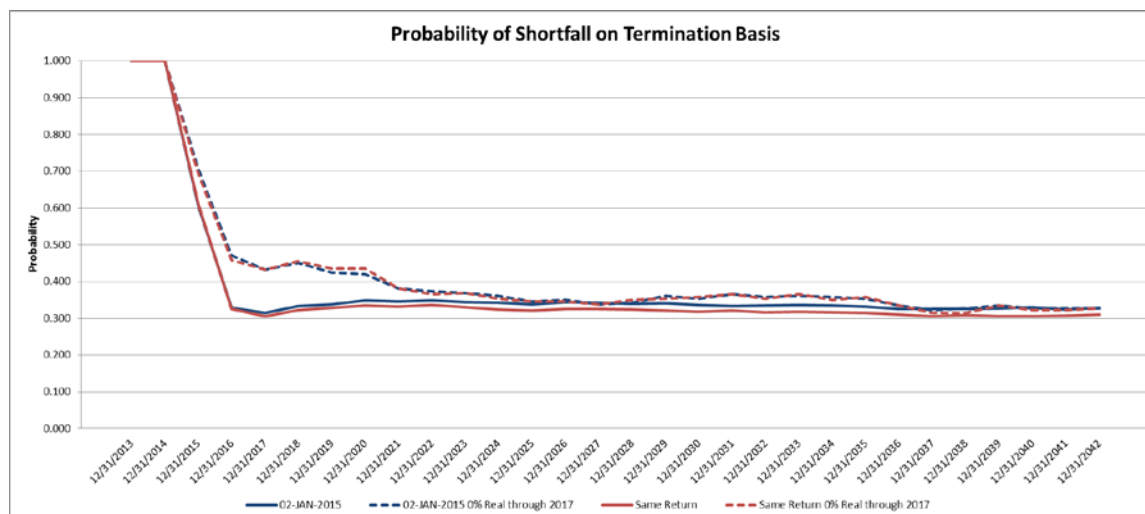
Probability of Shortfall on Termination Basis

7.10. At the end of 30 years, the likelihood of shortfall are:

	Current Asset Allocation 2 Current 02-JAN-2015 Baseline	Asset Allocation 2 Current 02-JAN-2015 257 Trials	Asset Allocation 7 Baseline	Asset Allocation 7 257 Trials
Likelihood of shortfall (1.00 = 100%)	0.328	0.327	0.311	0.327

7.11. Regardless of asset allocations, the likelihood of contribution shortfall under Sequencing 1 is relatively high in the early years due to poor asset performances; however, over 30 years, the likelihood of contribution shortfall is about the same as the baseline results for Asset Allocation 2 and is approximately 2% higher than the baseline results for Asset Allocation 7.

Results under Sequencing 2 (Lowest Fixed Income Return through 2017)

7.12. Under Sequencing 2, the portfolio returns for Asset Allocations 2 and 7 are:

	Average Real Portfolio Return 2015-2017	Average Real Portfolio Return 2015-2024	Average Real Portfolio Return 2015-2043
Asset Allocation 2 Low FI Trials	-1.21%	1.77%	3.59%
Asset Allocation 2 All Trials	3.66%	3.87%	4.24%
Asset Allocation 7 Low FI Trials	-1.00%	2.07%	3.80%
Asset Allocation 7 All Trials	3.71%	3.96%	4.35%

Terminated Liability Funded Ratio under Sequencing 2

7.13.   The following four graphs show the 30-year forecasts of the termination liability funded ratios for Asset Allocations 2 and 7 under the baseline results (Alternative 2) and the worst 250 fixed income returns through 2017 (Sequencing 2). The lines show the 95th, 75th, 50th, 25th and 5th percentile outcomes.

Asset Allocation 2 Results under Alternative 2 Assumptions (All 5,000 Trials):
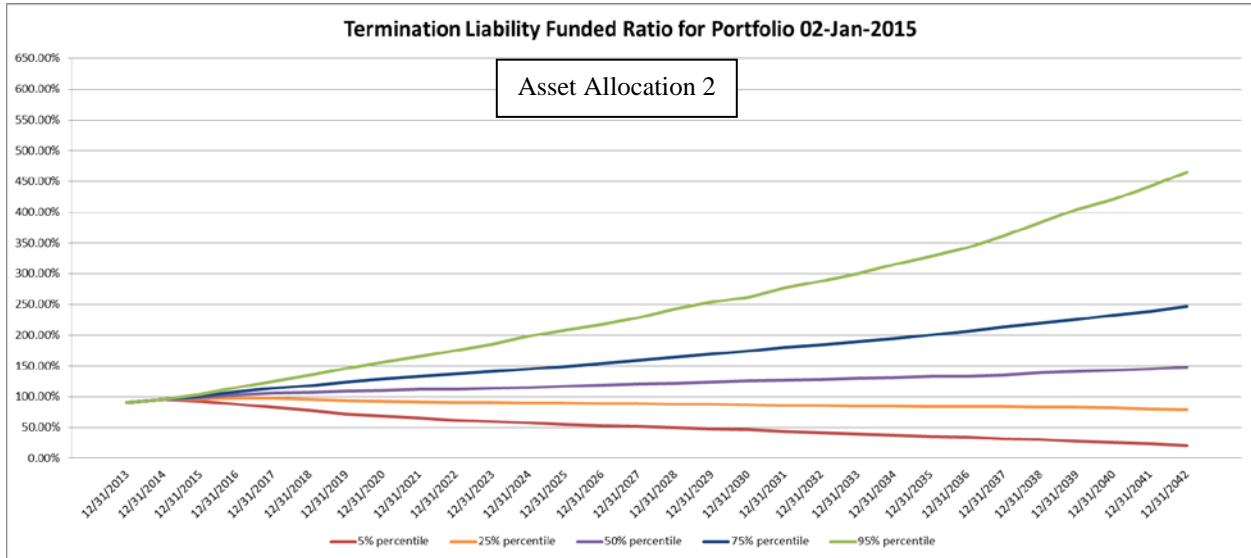
Asset Allocation 2 Results under Sequencing 2 (Worst 250 Fixed Income Returns 2015-2017):
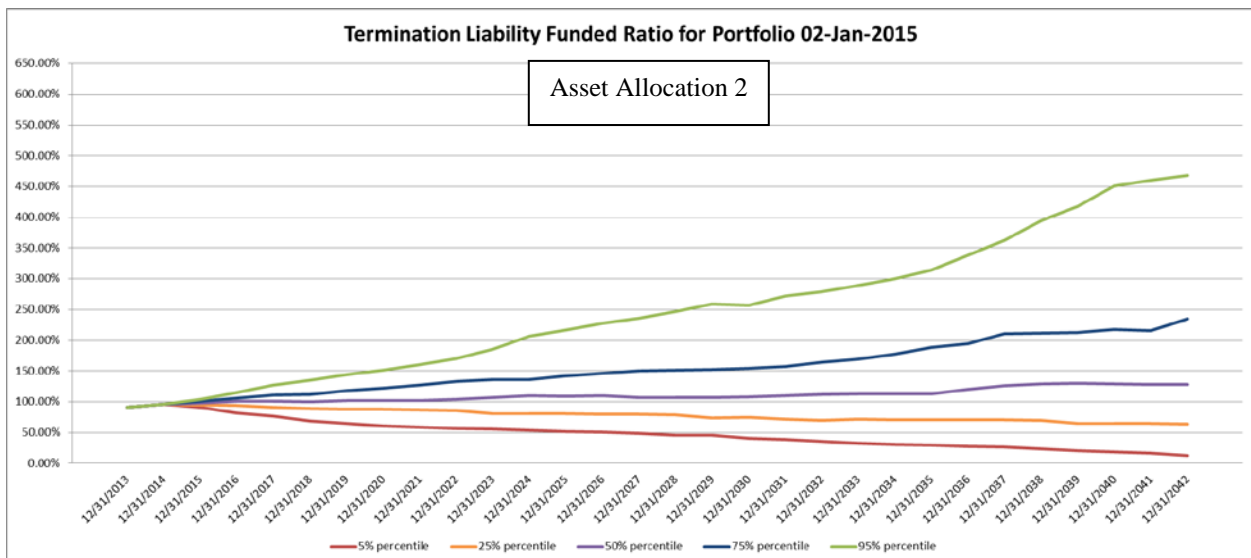
Asset Allocation 7 Results under Alternative 2 Assumptions (All 5,000 Trials):
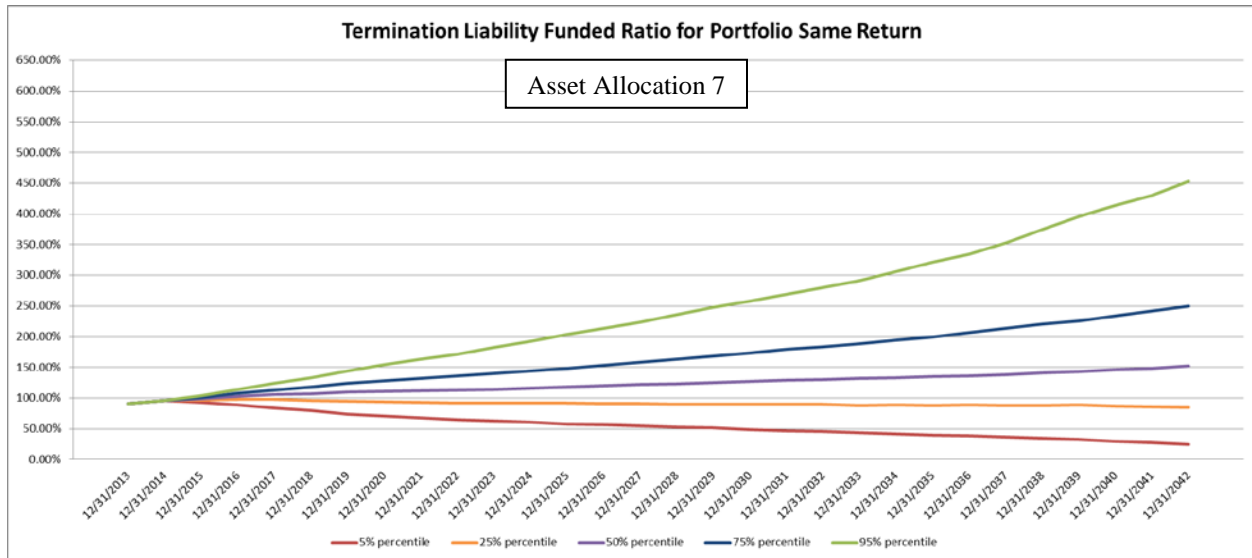
Asset Allocation 7 Results under Sequencing 2 (Worst 250 Fixed Income Returns 2015-2017):
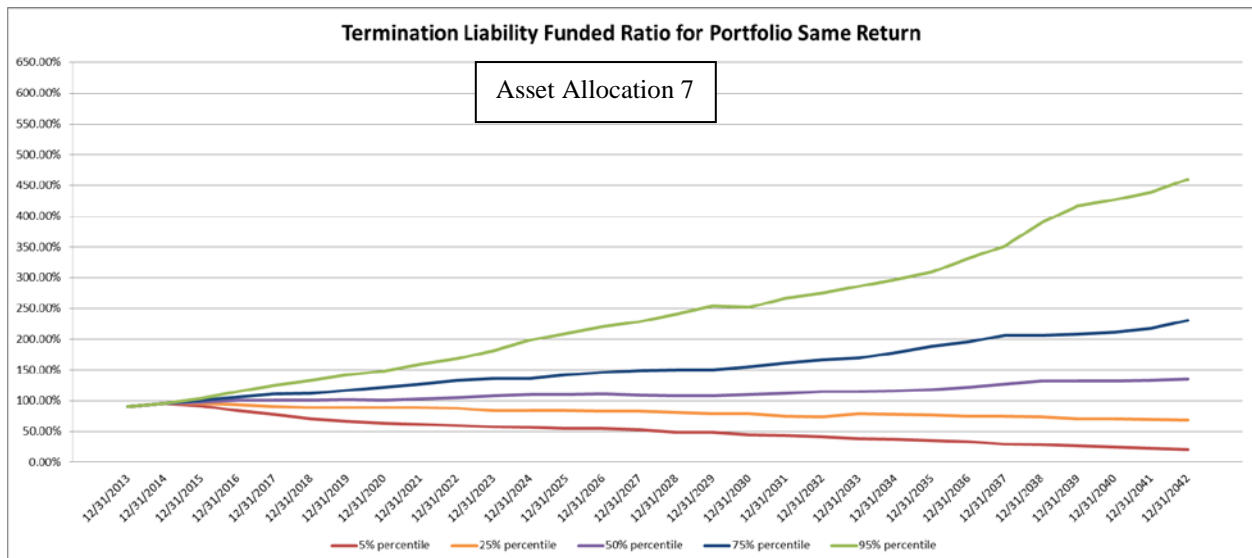
Probability of Contribution Sufficiency (Sequencing 2)

7.14.   The graph shows the progression of the contribution sufficiency over the entire 30 years for Asset Allocations 2 and 7 based on the worst 250 fixed income returns through 2017 (Sequencing 2) and the baseline results (Alternative 2).

7.15.   At the end of 30 years, the likelihood of contribution sufficiency are:

	Asset Allocation 2 Current 02-JAN-2015 Baseline	Asset Allocation 2 Current 02-JAN-2015 Worst 250 FI Returns	Asset Allocation 7 Baseline	Asset Allocation 7 Worst 250 FI Returns
Likelihood of sufficiency (1.00 = 100%)	0.63	0.55	0.65	0.56

7.16.   Regardless of asset allocations, the likelihood of contribution sufficiency under Sequencing 2 is relatively low in the early years due to weak fixed income returns. After 30 years, the likelihood of contribution sufficiency under Sequencing 2 is still lower than the baseline results by a margin of 8% and 9% for Asset Allocations 2 and 7, respectively.

Likelihood of Shortfall (under Sequencing 2)

7.17.   The graph shows the progression of shortfall over the entire 30 years for Asset Allocations 2 and 7 based on the worst 250 fixed income returns through 2017 (Sequencing 2) and the baseline results (Alternative 2).
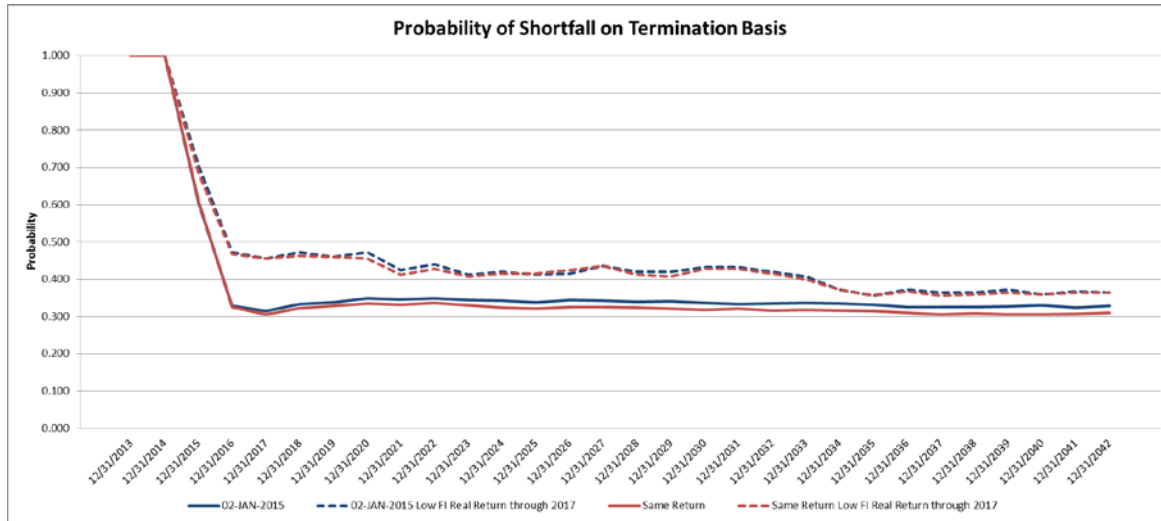
7.18.   At the end of 30 years, the likelihood of shortfall are:

	Asset Allocation 2 Current 02-JAN-2015 Baseline	Asset Allocation 2 Current 02-JAN-2015 Worst 250 FI Returns	Asset Allocation 7 Baseline	Asset Allocation 7 Worst 250 FI Returns
Likelihood of shortfall (1.00 = 100%)	0.328	0.364	0.311	0.364

7.19.   Regardless of asset allocations, the likelihood of contribution shortfall under Sequencing 2 is relatively high in the early years due to weak fixed income returns; however, over 30 years, the likelihood of contribution shortfall is still higher than the baseline results with a gap of 4% and 5% for Asset Allocation 2 and 7, respectively.

SECTION VIII – CONDITIONAL CORRELATION OF TAIL RESULTS

8.01.   Buck was asked by the Investment Committee to determine whether model correlations increase in unfavorable conditions.

8.02.   We computed the correlations based on the GEMS model using the following bases, and then compared the results over a 2-year time horozon:

    a. All 5,000 stochastic trials

    b. Worst 5% tail results (250 selected results)

    c. Worst 1% tail results (50 selected results)

8.03.   Note that the GEMS model, which is discussed in detail in Section 3 of the Report, has dynamic correlations between asset classes that change as economic conditions change, and vary by stochastic path.

8.04.   We have observed that for broad asset classes used in the ALM study, certain pairwise correlations increase, as shown in the table below (marked in red), as the subset of trials moves from all 5,000 trials toward the 1% tail.

All Trials

	Global Equities	Real Assets	Private Equity	Absolute Return	Global Fixed Income
Global Equities	1.000				
Real Assets	0.108	1.000			
Private Equity	0.918	0.109	1.000		
Absolute Return	0.498	0.048	0.497	1.000	
Global Fixed Income	-0.015	0.004	0.060	0.029	1.000

5% Tail

	Global Equities	Real Assets	Private Equity	Absolute Return	Global Fixed Income
Global Equities	1.000				
Real Assets	0.186	1.000			
Private Equity	0.927	0.195	1.000		
Absolute Return	0.505	0.056	0.484	1.000	
Global Fixed Income	-0.104	-0.028	-0.044	-0.079	1.000

1% Tail

	Global Equities	Real Assets	Private Equity	Absolute Return	Global Fixed Income
Global Equities	1.000				
Real Assets	0.282	1.000			
Private Equity	0.930	0.284	1.000		
Absolute Return	0.459	0.103	0.454	1.000	
Global Fixed Income	-0.080	-0.085	-0.017	-0.183	1.000

Change in Correlation from All Trials to 1% Tail

	Global Equities	Real Assets	Private Equity	Absolute Return	Global Fixed Income
Global Equities	0.000				
Real Assets	0.173	0.000			
Private Equity	0.012	0.175	0.000		
Absolute Return	-0.039	0.055	-0.043	0.000	
Global Fixed Income	-0.065	-0.089	-0.077	-0.213	0.000

8.05.   We have also observed that the increases in tail correlations appear to occur among sub-assets classes but not across broad asset classes. For example, equity sub-classes show increase correlations moving into the tails, as seen in red in the table below, but equity and fixed income correlations do not particularly exhibit that behavior.

All Trials	US Large Cap	US Mid Cap	US Small Cap	MSCI EAFE	MSCI EM
US Large Cap	1.000				
US Mid Cap	0.890	1.000			
US Small Cap	0.871	0.917	1.000		
MSCI EAFE	0.859	0.765	0.747	1.000	
MSCI EM	0.574	0.551	0.526	0.488	1.000

5% Tail	US Large Cap	US Mid Cap	US Small Cap	MSCI EAFE	MSCI EM
US Large Cap	1.000				
US Mid Cap	0.894	1.000			
US Small Cap	0.864	0.923	1.000		
MSCI EAFE	0.908	0.819	0.796	1.000	
MSCI EM	0.682	0.658	0.620	0.608	1.000

1% Tail	US Large Cap	US Mid Cap	US Small Cap	MSCI EAFE	MSCI EM
US Large Cap	1.000				
US Mid Cap	0.910	1.000			
US Small Cap	0.889	0.931	1.000		
MSCI EAFE	0.923	0.839	0.820	1.000	
MSCI EM	0.796	0.760	0.744	0.758	1.000

Change from All Trials to 1% Tail	US Large Cap	US Mid Cap	US Small Cap	MSCI EAFE	MSCI EM
US Large Cap	0.000				
US Mid Cap	0.020	0.000			
US Small Cap	0.018	0.014	0.000		
MSCI EAFE	0.064	0.074	0.072	0.000	
MSCI EM	0.222	0.209	0.218	0.270	0.000

SECTION IX – APPENDICES

Appendix A – Capital Market Assumptions (Buck)

Appendix B – Glossary of Terms

Appendix C – ACWI Country Weights

Appendix D – Alternative Capital Market Assumptions

APPENDIX A – CAPITAL MARKET ASSUMPTIONS (BUCK)

Expected Geometric Returns and Standard Deviations

Asset Class	10 year				20 Year		30 Year	
	Expected Return	Standard Deviation	Skew	Kurtosis	Expected Return	Standard Deviation	Expected Return	Standard Deviation
Global Equity	8.82%	16.25%	0.083	0.911	9.37%	16.73%	9.72%	16.92%
Global Fixed Income	2.46%	4.37%	0.666	1.289	3.92%	5.25%	4.71%	5.60%
Real Assets	8.84%	6.81%	0.261	0.274	9.28%	7.06%	9.63%	7.18%
Private Equity	9.13%	27.71%	0.053	1.808	10.52%	28.64%	11.41%	29.00%
Absolute Return	6.39%	8.70%	0.016	0.158	6.74%	8.82%	6.94%	8.86%
Cash	1.95%	5.80%	0.375	0.273	3.05%	6.05%	3.66%	6.17%
Inflation	2.43%	2.38%	1.510	4.055	2.81%	2.52%	3.04%	2.61%

Correlation Matrix over 10 Years

Correlation Matrix – 10 Years							
Asset Class	**Global Equity**	**Global Fixed Income**	**Real Assets**	**Private Equity**	**Absolute Return**	**Cash**	**Inflation**
Global Equity	1.000						
Global Fixed Income	-0.003	1.000					
Real Assets	0.134	0.071	1.000				
Private Equity	0.928	0.082	0.132	1.000			
Absolute Return	0.574	0.042	0.086	0.566	1.000		
Cash	0.037	0.137	0.041	0.044	0.024	1.000	
Inflation	0.037	0.100	0.318	0.039	0.028	0.088	1.000

Correlation Matrix over 20 Years

Correlation Matrix – 20 Years							
Asset Class	**Global Equity**	**Global Fixed Income**	**Real Assets**	**Private Equity**	**Absolute Return**	**Cash**	**Inflation**
Global Equity	1.000						
Global Fixed Income	0.003	1.000					
Real Assets	0.146	0.125	1.000				
Private Equity	0.928	0.097	0.149	1.000			
Absolute Return	0.586	0.056	0.094	0.577	1.000		
Cash	0.045	0.200	0.079	0.058	0.031	1.000	
Inflation	0.058	0.191	0.356	0.065	0.041	0.158	1.000

Correlation Matrix over 30 Years

Correlation Matrix – 30 Years							
Asset Class	**Global Equity**	**Global Fixed Income**	**Real Assets**	**Private Equity**	**Absolute Return**	**Cash**	**Inflation**
Global Equity	1.000						
Global Fixed Income	0.005	1.000					
Real Assets	0.150	0.153	1.000				
Private Equity	0.928	0.103	0.156	1.000			
Absolute Return	0.591	0.061	0.098	0.583	1.000		
Cash	0.054	0.223	0.100	0.069	0.035	1.000	
Inflation	0.070	0.229	0.376	0.080	0.049	0.192	1.000

APPENDIX B – GLOSSARY OF TERMS

Actuarial Value of Assets – an asset value determined by reflecting certain changes in market value over a period of time in a systematic manner. This is the value of assets reflected in the actuarial valuation of a pension plan and used to determine the required annual contribution and (in some cases including UNJSPF Article 26) funded ratios.

Alternative Asset Classes - asset classes other than fixed income and equities. This definition commonly includes hedge funds, commodities, managed futures, credit derivatives, private equity (funds invested with an absolute return strategy) and real estate.

Annualized return – the (geometric) average return that, if earned over the period covered, would produce the same total compound rate of return that the actual set of fluctuating returns produced.

Asset allocation – The apportioning of an investment portfolio among different asset categories, such as equities, fixed income, cash, etc. The asset allocation that is optimal for the Fund will depend largely on the time horizon and the Fund's ability to tolerate risk.

Asset Class - a major segment of the investment markets (e.g., domestic equities, fixed income, international equity, private equity, etc.). Each asset class typically has unique investment return, risk characteristics and correlations with other asset classes, performing differently under various market conditions.

Asset Class Assumptions - expected average annual returns, risks (volatilities) for each asset class, and correlations among/across all asset classes. These assumptions may be derived from both a statistical analysis of asset class history and quantitative forward-looking analyses. The assumptions are meant to reflect the long-term expectations for each asset class.

Asset-Liability Management (ALM) Study - an analysis of a pension plan that includes forward-looking projections for both the plan's assets and its liabilities, reflecting the uncertainty of such forecasts. Asset-liability studies are utilized to test and analyze how investment portfolios containing different allocations of assets might impact the future financial condition of the pension plan, as well as evaluate the factors affecting asset and liabilities in common and the resultant financial outcomes.

Capital Asset Pricing Model (CAPM) - a pricing model that assumes that the return of an asset is equal to the risk-free return, plus a beta (a quantitative measure of the volatility of a given stock relative to the overall market), multiplied by a market-wide premium. It is used to determine an asset's theoretically appropriate required rate of return.

Conditional Value at Risk or CVaR (Asset and Surplus) - is the average result expected from the most unfavorable results. For example, CVaR (5%) is the average of all outcomes from the worst 5% of outcomes. This is in contrast to Value at Risk (VaR), which measures the best (not the average) outcome from the worst 5% of outcomes.

Correlation - the degree to which the movement of two variables are related. When the prices of shares of companies or of bonds issued by borrowers move in tandem, correlation is said to be high.

Correlations range from +1.0 to -1.0. If the two series move together perfectly, then the correlation is +1.00. If they move completely independently, then the correlation is 0.00.

Cost-of-Living Adjustment (COLA) – adjustments to the pension benefit under the Fund regulations (check this word) after benefits commence. It represents an adjustment to account for the loss of purchasing power associated with general inflation.

Dynamic Asset Allocation – systematic reallocation of the Fund's assets based on changing conditions, from an allocation that meets current Fund objectives and risk tolerances, to one that would be better suited to meet Fund objectives and risk tolerances if certain changes in conditions come to pass If a Dynamic Asset Allocation is chosen, criteria for reallocating assets in the portfolio could include attainment of one of a series of funded ratio targets, or a calendar (time)-based event, etc. (For plan sponsors subject to certain accounting rules, benchmark interest rates can be another such trigger.)

Efficient Frontier - a set of optimal portfolios reflecting the maximum theoretical return for each level of risk. Equivalently, the efficient frontier minimizes the theoretical level of risk for each level of return. In more generalized terms, an efficient frontier is that set of portfolios that maximizes the ability to meet a certain objective while minimizing the risk of achieving that objective. The efficient frontier is predicated on several assumptions, including:

> Asset returns are normally distributed; no skew or kurtosis
> Correlations and volatility are fixed and do not change
> Investors are rational and risk-averse
> The assumed returns, volatilities and correlations are "correct" and known in advance
> There are no transaction costs

Expected nominal rate of return (gross of inflation) - the annual percentage return realized on the Fund's assets before inflation is factored in.

Expected real rate of return (net of inflation) - the annual percentage return realized on the Fund's assets after inflation is factored in; that is, the increase in purchasing power generated by the Fund's assets on a percentage basis

Funded Ratio - ratio of assets (actuarial or market value, depending on context) divided by liabilities (which may be defined in any number of ways). For the Fund, the Article 26 Termination Liability funded ratios use the Actuarial Value of Assets, divided by the liability computed on a termination basis (that is, assuming all active participants terminate on the measurement date, and then take the form of payment with highest actuarial value). These funded ratios are computed both with and without future COLA reflected, to arrive at two distinct funded ratios.

Glide Path – a Dynamic Asset Allocation construction roadmap that systematically alters the risk/return profile of a portfolio in response to predetermined conditions (e.g. changes in funded ratio).

Hedge Funds or Absolute Return Funds - funds that generate returns by adopting a wide range of strategies such as: equity long/short, equity market neutral, equity short bias, fixed income arbitrage, global macro Index, merger arbitrage, special situations and multi strategy.

Kurtosis - a measure of the 'peakness' of a probability distribution. High kurtosis means a higher likelihood of both outcomes near the mean and extreme observations or events, with less likelihood of events between the region of the mean and the tail region.

Liabilities – value as of a given date of benefit commitments measured on one of a number of bases.

Market Value of Assets – the value of the assets held by the plan (*i.e.* what they could be sold for at a point in time in an arm's-length transaction).

Monte Carlo Simulation - a mechanism for assessing the probability distribution of possible outcomes by aggregating a large number of simulations. Though technically different from the more generic "stochastic simulation", these two terms are sometimes used interchangeably.

Private Equity - represents an ownership interest in a company that is not listed or traded in a public market or exchange. Private equity investors typically hold large stakes (controlling stakes in some cases) and tend to be more directly and actively involved with management of the business than the shareholders in public companies. Private equity has somewhat higher risk due to illiquidity, but offers diversification from a traditional portfolio of marketable securities and potential for higher returns.

Real Return Asset Class - a collection of asset classes that endeavor to maintain purchasing power versus inflation. Such asset classes include, but are not limited to: inflation protected securities, timber, commodities, low-volatility hedge funds or hedge fund-of-funds, unlevered infrastructure, among others.

Skew – one measure of the symmetry of distributions of outcomes of a stochastic analysis. . If skew of a distribution is greater than zero, the distribution is positively skewed. If it's less than zero, it's negatively skewed and equal to zero means it's symmetric. Negatively skewed distributions have a long left tail, which mean a greater chance of extremely negative outcomes. Positive skew would mean frequent small negative outcomes, and extremely bad scenarios are not as likely.

Standard Deviation - a statistical measure of volatility indicating the dispersion of returns, representing the square root of the variance of data points from the mean. In the context of ALM analyses, Standard Deviation is used as a common measure of volatility of results.

Stochastic Analysis - refers to analysis pertaining to a series of random processes, reflecting that the future is inherently uncertain, and thus analysis of a range of possible future states of the world is necessary. This contrasts with Deterministic Analysis, in which a single scenario (often a best estimate scenario) is analyzed. (See also Monte Carlo simulation)

Strategic Asset Allocation – A target allocation intended to reflect a fund's best long-term asset mix under neutral conditions. The strategic asset allocation targets may change over time as the Fund goals and needs change. This contrasts with a tactical asset allocation, which may deviate from the strategic allocation due to perceived short-term changes in baseline conditions. The Strategic Asset Allocation is codified in an Investment Policy Statement, which will detail the ranges which the actual asset allocation can deviate from the stated policy targets, by establishing minimum and maximum values for each asset class.

Surplus Efficient Frontier – A variant of the Efficient Frontier that reflects the existence of plan liabilities. A surplus efficient frontier seeks to maximize the surplus return (that is, asset return minus growth of liabilities) for a given level of surplus volatility (standard deviation of the surplus).

Tactical Asset Allocation – a target asset allocation that may deviate from the Strategic asset allocation due to short-term deviations from normal investing conditions. As with Strategic asset allocations, Tactical asset allocations state a desired asset allocation, but allow for ranges of holdings for each asset class. These are minimum and maximum acceptable percentages that permit the Fund to take advantage of market conditions within these parameters. Thus, the Fund can move to the higher end of the range when stocks are expected to do better and to the lower end when the economic outlook is bleak.

Value at Risk or VaR (Asset and Surplus) – a measure of the expected loss (or change in surplus) at a given percentile if unfavorable conditions emerge. For example, VaR (95%) reflects the best outcome from the 5% worst outcomes generated by the stochastic model.

Variance - a measure of a random variable's statistical dispersion, indicating how its possible values are spread around an expected value.

Volatility - refers to the intensity of fluctuations in the prices of the Fund's assets. The larger and more frequent the swings in prices, the greater the volatility. Volatility is commonly measured by standard deviation.

APPENDIX C – ACWI COUNTRY WEIGHTS

Country	Weight	Relative Weight	Region	Subregion	Developed/ Emerging
Australia	2.68%	2.71%	Greater Asia	Australasia	Developed
Austria	0.09%	0.09%	Greater Europe	Europe Developed	Developed
Belgium	0.44%	0.45%	Greater Europe	Europe Developed	Developed
Brazil	1.14%	1.15%	Americas	Latin America	Emerging
Canada	3.72%	3.76%	Americas	North America	Developed
Chile	0.16%	0.16%	Americas	Latin America	Emerging
China	2.06%	2.08%	Greater Asia	Asia Emerging	Emerging
Colombia	0.11%	0.11%	Americas	Latin America	Emerging
Czech Republic	0.03%	0.03%	Greater Europe	Europe Emerging	Emerging
Denmark	0.51%	0.51%	Greater Europe	Europe Developed	Developed
Egypt	0.02%	0.02%	Greater Europe	Africa/Middle East	Emerging
Finland	0.32%	0.32%	Greater Europe	Europe Developed	Developed
France	3.62%	3.65%	Greater Europe	Europe Developed	Developed
Germany	3.32%	3.36%	Greater Europe	Europe Developed	Developed
Greece	0.07%	0.07%	Greater Europe	Europe Developed	Developed
Hong Kong	1.59%	1.60%	Greater Asia	Asia Developed	Developed
Hungary	0.02%	0.02%	Greater Europe	Europe Emerging	Emerging
India	0.72%	0.73%	Greater Asia	Asia Emerging	Emerging
Indonesia	0.27%	0.28%	Greater Asia	Asia Emerging	Emerging
Ireland	0.11%	0.11%	Greater Europe	Europe Developed	Developed
Israel	0.19%	0.19%	Greater Europe	Africa/Middle East	Developed
Italy	0.90%	0.90%	Greater Europe	Europe Developed	Developed
Japan	7.35%	7.42%	Greater Asia	Japan	Developed
Malaysia	0.41%	0.41%	Greater Asia	Asia Emerging	Emerging
Mexico	0.56%	0.56%	Americas	Latin America	Emerging
Netherlands	0.77%	0.78%	Greater Europe	Europe Developed	Developed
New Zealand	0.05%	0.05%	Greater Asia	Australasia	Developed
Norway	0.30%	0.30%	Greater Europe	Europe Developed	Developed
Peru	0.05%	0.05%	Americas	Latin America	Emerging
Philippines	0.11%	0.11%	Greater Asia	Asia Emerging	Emerging
Poland	0.18%	0.18%	Greater Europe	Europe Emerging	Emerging
Portugal	0.06%	0.06%	Greater Europe	Europe Developed	Developed
Qatar	0.03%	0.03%	Greater Europe	Africa/Middle East	Emerging
Russian Federation	0.54%	0.55%	Greater Europe	Europe Emerging	Emerging
Singapore	0.53%	0.54%	Greater Asia	Asia Developed	Developed

Country	Weight	Relative Weight	Region	Subregion	Developed/ Emerging
South Africa	0.81%	0.81%	Greater Europe	Africa/Middle East	Emerging
South Korea	1.66%	1.67%	Greater Asia	Asia Developed	Emerging
Spain	1.29%	1.30%	Greater Europe	Europe Developed	Developed
Sweden	1.11%	1.12%	Greater Europe	Europe Developed	Developed
Switzerland	3.31%	3.34%	Greater Europe	Europe Developed	Developed
Taiwan	1.28%	1.29%	Greater Asia	Asia Developed	Emerging
Thailand	0.24%	0.24%	Greater Asia	Asia Emerging	Emerging
Turkey	0.17%	0.18%	Greater Europe	Europe Emerging	Emerging
United Arab Emirates	0.03%	0.03%	Greater Europe	Africa/Middle East	Emerging
United Kingdom	7.20%	7.27%	Greater Europe	United Kingdom	Developed
United States	48.91%	49.40%	Americas	North America	Developed
Subtotal	99.00%	100.0%			
Unclassified	1.00%				
Total	100.00%				

Total by Region:

Americas	55.19%
Latin America	0.00%
Greater Europe	25.68%
Africa/Middle East	0.00%
Greater Asia	19.14%
	100.00%

Total by Subregion:

North America	53.16%
Latin America	2.03%
United Kingdom	7.27%
Europe Developed	16.37%
Europe Emerging	0.95%
Africa/Middle East	1.09%
Japan	7.42%
Australasia	2.75%
Asia Developed	5.10%
Asia Emerging	3.86%
	100.00%

Total by Developed vs Emerging:

Developed	89.30%
Emerging	10.70%
	100.00%

APPENDIX D – ALTERNATIVE CAPITAL MARKET ASSUMPTIONS

At the request of IMD, this Asset-Liability study was also prepared on alternative capital market assumptions, reflecting different viewpoints on the direction of the global economy and of markets in general. The set of capital market assumptions labelled "Alternative 1" represent a relatively optimistic view of markets over the next 10 years. "Alternative 2" represent relatively pessimistic views of the markets over the next 10 years.

Capital Market Assumptions – Alternative 1

Expected Geometric Returns and Standard Deviations

Asset Class	10 year				20 Year		30 Year	
	Expected Return	Standard Deviation	Skew	Kurtosis	Expected Return	Standard Deviation	Expected Return	Standard Deviation
Global Equity	9.46%	15.81%	0.071	1.029	9.69%	16.11%	9.85%	16.30%
Global Fixed Income	3.42%	5.25%	0.201	0.079	4.56%	5.47%	5.13%	5.50%
Real Assets	7.30%	14.00%	0.280	0.261	7.71%	14.45%	8.03%	14.56%
Private Equity	12.01%	23.71%	0.054	1.984	12.75%	24.41%	13.22%	24.69%
Absolute Return	6.98%	8.69%	0.047	0.181	7.15%	8.74%	7.28%	8.79%
Cash	1.83%	5.85%	0.359	0.234	3.00%	6.06%	3.59%	6.14%
Inflation	2.69%	2.58%	1.116	2.546	2.89%	2.71%	2.98%	2.72%

Capital Market Assumptions – Alternative 2

Expected Geometric Returns and Standard Deviations

Asset Class	10 year				20 Year		30 Year	
	Expected Return	Standard Deviation	Skew	Kurtosis	Expected Return	Standard Deviation	Expected Return	Standard Deviation
Global Equity	7.35%	17.80%	0.071	1.029	7.60%	18.14%	7.77%	18.36%
Global Fixed Income	2.42%	5.25%	0.201	0.079	3.55%	5.43%	4.16%	5.49%
Real Assets	7.30%	14.00%	0.280	0.261	7.71%	14.45%	8.03%	14.56%
Private Equity	9.90%	28.50%	0.054	1.984	10.70%	29.19%	11.13%	29.65%
Absolute Return	6.98%	8.69%	0.047	0.181	7.15%	8.74%	7.28%	8.79%
Cash	1.19%	5.47%	0.359	0.234	2.29%	5.66%	2.84%	5.73%
Inflation	2.69%	2.58%	1.116	2.546	2.89%	2.71%	2.98%	2.72%

Expected Return and Volatility

Constrained Asset Only Efficient Frontier – Alternative 1

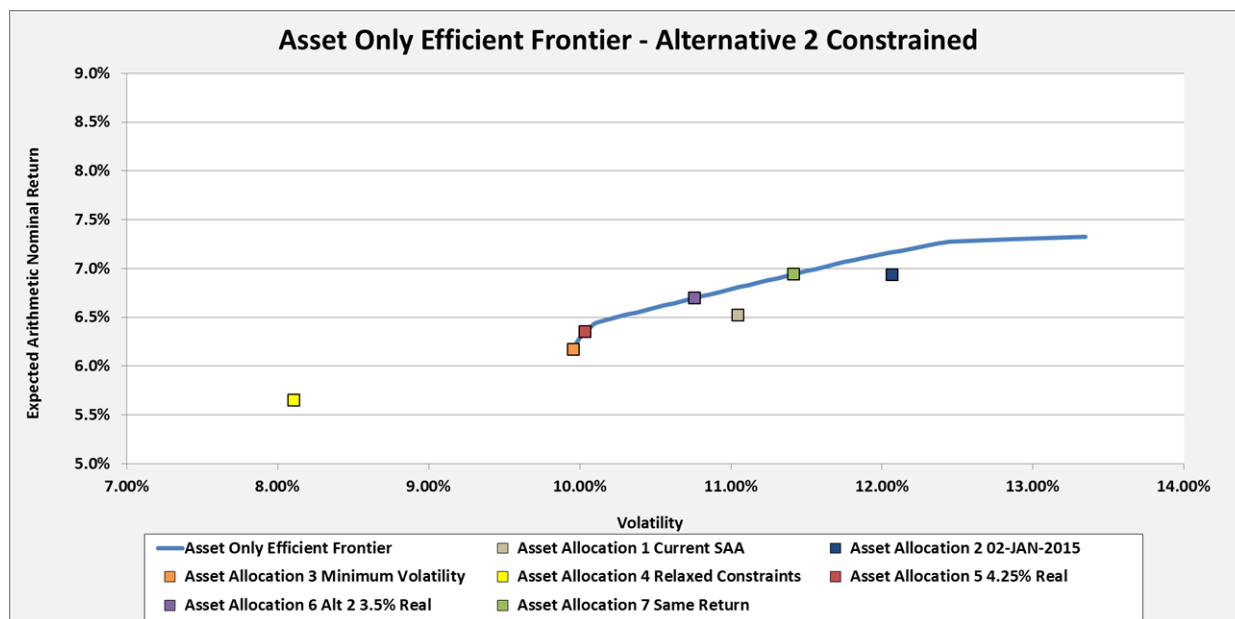| Asset Class	Asset Allocation 1 Current SAA	Asset Allocation 2 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Global Equities	60.0%	63.4%	50.0%	37.0%	50.0%	54.0%	58.0%
Global Fixed Income	31.0%	24.6%	38.0%	47.5%	36.5%	30.5%	26.5%
Real Assets	6.0%	5.3%	6.0%	9.0%	9.0%	9.0%	9.0%
Alternative Investments	0.0%	3.0%	3.0%	5.0%	3.0%	5.0%	5.0%
Cash & Short Term	3.0%	3.7%	3.0%	1.5%	1.5%	1.5%	1.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Expected Nominal Return – 10 years	7.53%	7.88%	7.16%	6.59%	7.31%	7.62%	7.85%
Expected Real Return – 10 years	4.83%	5.19%	4.46%	3.90%	4.62%	4.93%	5.16%
Volatility (Nominal Returns) – 10 years	9.87%	10.74%	8.90%	7.34%	8.98%	9.61%	10.19%
Expected Nominal Return – 20 years	8.10%	8.41%	7.81%	7.33%	7.95%	8.20%	8.39%
Expected Real Return – 20 years	5.21%	5.52%	4.92%	4.44%	5.06%	5.31%	5.50%
Expected Nominal Return – 30 years	8.45%	8.73%	8.19%	7.75%	8.33%	8.55%	8.73%
Expected Real Return – 30 years	5.41%	5.69%	5.15%	4.72%	5.29%	5.51%	5.69%

Note: Asset Allocations 3, 5, 6 and 7, which lay on the Efficient Frontier according to the Capital Market Assumptions used in the main body of the report, also lie on the Efficient Frontier defined by the Alternative 1 Capital Market Assumptions (after suitable rounding). However, the expected real geometric return varies with the capital market used.

Constrained Asset Only Efficient Frontier – Alternative 2

Asset Only Efficient Frontier - Alternative 2 Constrained

Asset Class	Asset Allocation 1 Current SAA	Asset Allocation 2 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Global Equities	60.0%	63.4%	50.0%	37.0%	50.0%	54.0%	58.0%
Global Fixed Income	31.0%	24.6%	38.0%	47.5%	36.5%	30.5%	26.5%
Real Assets	6.0%	5.3%	6.0%	9.0%	9.0%	9.0%	9.0%
Alternative Investments	0.0%	3.0%	3.0%	5.0%	3.0%	5.0%	5.0%
Cash & Short Term	3.0%	3.7%	3.0%	1.5%	1.5%	1.5%	1.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Expected Nominal Return – 10 years	6.01%	6.32%	5.76%	5.37%	5.93%	6.21%	6.40%
Expected Real Return – 10 years	3.31%	3.62%	3.06%	2.68%	3.24%	3.51%	3.70%
Volatility (Nominal Returns) – 10 years	11.05%	12.07%	9.96%	8.10%	10.03%	10.76%	11.41%
Expected Nominal Return – 20 years	6.60%	6.86%	6.42%	6.13%	6.58%	6.81%	6.95%
Expected Real Return – 20 years	3.70%	3.96%	3.53%	3.24%	3.69%	3.91%	4.06%
Expected Nominal Return – 30 years	6.95%	7.20%	6.82%	6.56%	6.98%	7.17%	7.30%
Expected Real Return – 30 years	3.91%	4.15%	3.78%	3.53%	3.94%	4.13%	4.26%

Note: Asset Allocations 3, 5, 6 and 7, which lay on the Efficient Frontier according to the Capital Market Assumptions used in the main body of the report, also lie on the Efficient Frontier defined by the Alternative 2 Capital Market Assumptions (after suitable rounding). However, the expected real geometric return varies with the capital market used.
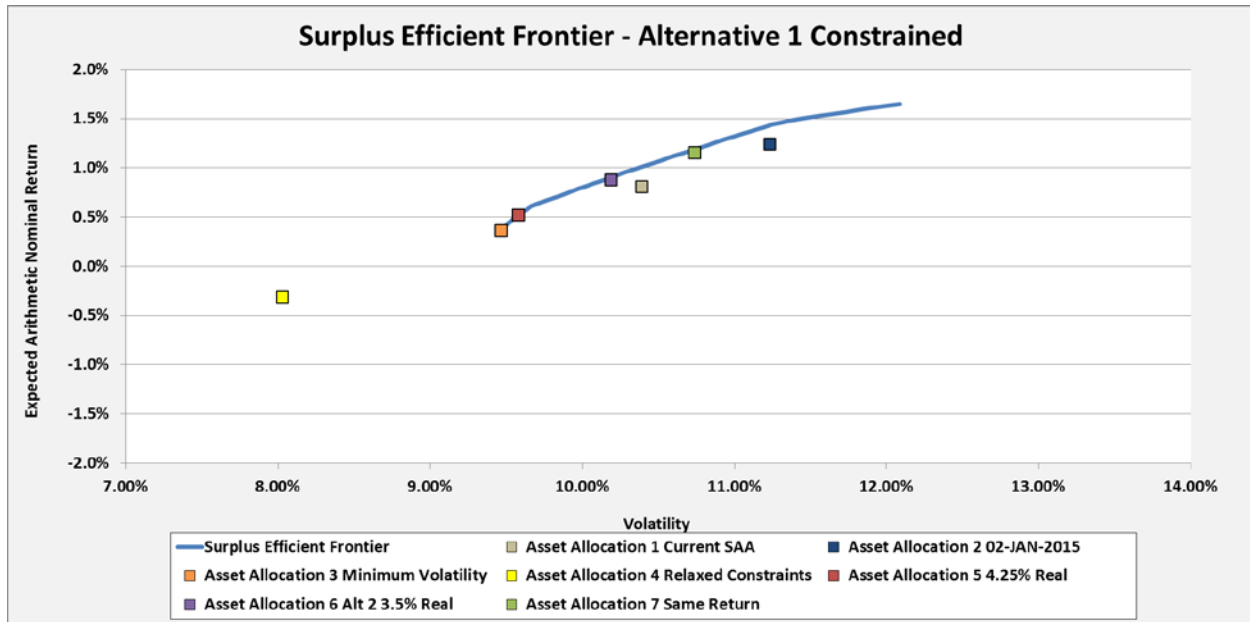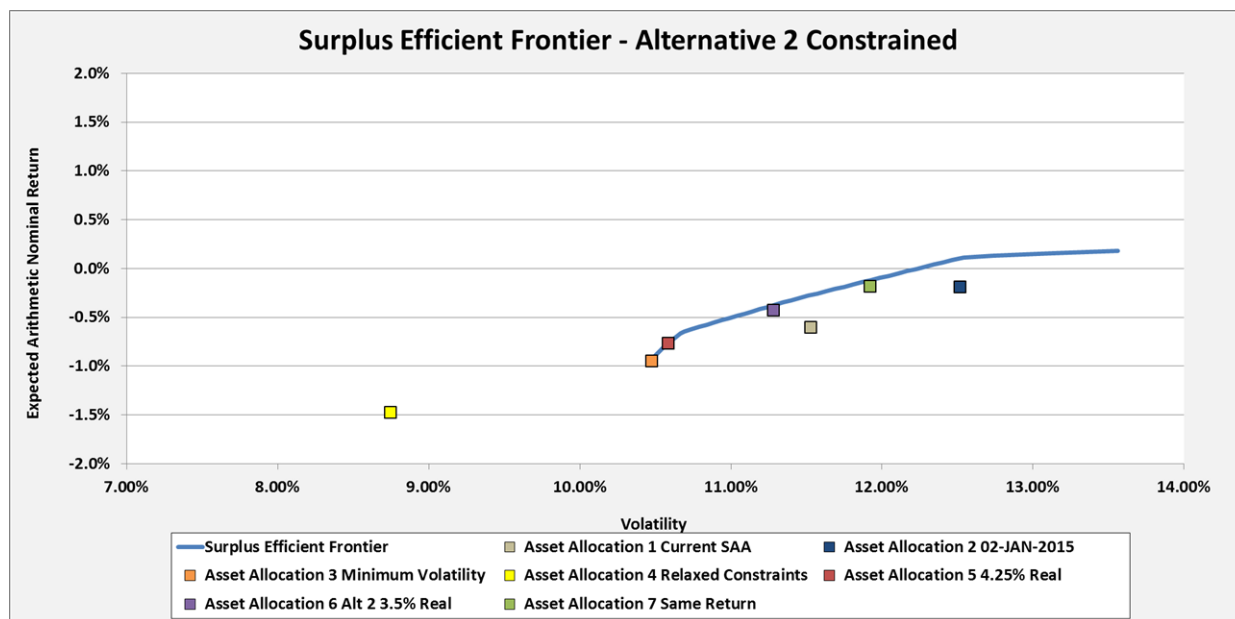
Constrained Surplus Efficient Frontier – Alternative 1

Asset Class	Asset Allocation 1 Current SAA	Asset Allocation 2 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Global Equities	60.0%	63.4%	50.0%	37.0%	50.0%	54.0%	62.5%
Global Fixed Income	31.0%	24.6%	38.0%	47.5%	36.5%	30.5%	24.0%
Real Assets	6.0%	5.3%	6.0%	9.0%	9.0%	9.0%	9.0%
Alternative Investments	0.0%	3.0%	3.0%	5.0%	3.0%	5.0%	3.0%
Cash & Short Term	3.0%	3.7%	3.0%	1.5%	1.5%	1.5%	1.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Expected Geometric Return on Surplus – 10 years	0.80%	1.23%	0.36%	-0.31%	0.52%	0.87%	1.39%
Surplus Volatility – 10 years	10.39%	11.23%	9.47%	8.03%	9.58%	10.19%	11.29%
Expected Geometric Return on Surplus – 20 years	1.42%	1.81%	1.05%	0.45%	1.19%	1.49%	1.96%
Expected Geometric Return on Surplus – 30 years	1.78%	2.15%	1.44%	0.88%	1.58%	1.86%	2.30%
* Positive return over longer time horizons							

Constrained Surplus Efficient Frontier – Alternative 2

Asset Class	Asset Allocation 1 Current SAA	Asset Allocation 2 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Global Equities	60.0%	63.4%	50.0%	37.0%	50.0%	54.0%	58.0%
Global Fixed Income	31.0%	24.6%	38.0%	47.5%	36.5%	30.5%	26.5%
Real Assets	6.0%	5.3%	6.0%	9.0%	9.0%	9.0%	9.0%
Alternative Investments	0.0%	3.0%	3.0%	5.0%	3.0%	5.0%	5.0%
Cash & Short Term	3.0%	3.7%	3.0%	1.5%	1.5%	1.5%	1.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Expected Geometric Return on Surplus – 10 years	-0.61%	-0.20%	-0.96%	-1.48%	-0.77%	-0.44%	-0.19%
Surplus Volatility – 10 years	11.53%	12.52%	10.47%	8.75%	10.58%	11.28%	11.92%
Expected Geometric Return on Surplus – 20 years	0.03%	0.40%	-0.24%	-0.70%	-0.08%	0.21%	0.42%
Expected Geometric Return on Surplus – 30 years	0.41%	0.76%	0.17%	-0.25%	0.33%	0.60%	0.79%
* Positive return over longer time horizons							

Note: Asset Allocation 6 lies near, but very slightly off the Surplus Efficient Frontier defined by the Alternative 2 Capital Market Assumptions.

Value at Risk Metrics

Value at Risk metrics under Buck Capital Market Assumptions (Baseline)

Metric	Asset Allocation 1 Current SAA	Asset Allocation 2 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Value at Risk or VaR *(Asset Only)*	-6.66%	-7.52%	-6.03%	-4.35%	-5.80%	-6.19%	-6.59%
Value at Risk or VaR *(Surplus basis)*	-10.31%	-11.13%	-9.85%	-8.15%	-9.56%	-9.92%	-10.35%
Conditional VaR or cVaR / Expected Shortfall *(Surplus basis)*	-14.66%	-15.93%	-13.66%	-11.26%	-13.40%	-14.12%	-14.82%
Conditional VaR or cVaR / Expected Shortfall *(Asset Only)*	-10.93%	-12.24%	-9.87%	-7.36%	-9.61%	-10.37%	-11.10%

Value at Risk metrics under Alternative 2 Capital Market Assumptions

Metric	Asset Allocation 1 Current SAA	Asset Allocation 2 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Value at Risk or VaR *(Asset Only)*	-9.48%	-10.04%	-8.75%	-7.48%	-8.55%	-8.85%	-9.27%
Value at Risk or VaR *(Surplus basis)*	-15.95%	-17.17%	-14.81%	-12.58%	-14.82%	-15.42%	-16.09%
Conditional VaR or cVaR / Expected Shortfall *(Surplus basis)*	-20.85%	-22.53%	-19.10%	-15.90%	-19.10%	-20.19%	-21.25%
Conditional VaR or cVaR / Expected Shortfall *(Asset Only)*	-14.92%	-16.06%	-13.56%	-11.29%	-13.47%	-14.19%	-14.93%

Funded Ratio Plan Termination Basis: Alternative 2 Capital Market Assumptions

The table below shows the funded ratios at the end of 30 years reflecting the Buck and Alternative 2 capital market assumptions:

Termination Liability Funded Ratio – Buck Assumptions – Baseline							
	Asset Allocation 1	Asset Allocation 2	Asset Allocation 3	Asset Allocation 4	Asset Allocation 5	Asset Allocation 6	Asset Allocation 7
95th percentile	531.06%	621.48%	468.31%	367.81%	485.67%	540.54%	588.32%
75th percentile	300.41%	338.58%	276.91%	231.59%	286.82%	311.39%	331.19%
50th percentile	198.57%	217.01%	186.39%	165.21%	193.85%	206.58%	217.19%
25th percentile	122.00%	128.54%	117.02%	109.90%	123.00%	128.59%	132.21%
5th percentile	49.55%	47.52%	50.39%	54.00%	53.29%	52.36%	53.02%

Termination Liability Funded Ratio – Alternative 2 Assumptions							
	Asset Allocation 1	Asset Allocation 2	Asset Allocation 3	Asset Allocation 4	Asset Allocation 5	Asset Allocation 6	Asset Allocation 7
95th percentile	402.40%	465.12%	365.40%	303.52%	386.33%	422.13%	453.12%
75th percentile	221.26%	246.57%	209.36%	186.89%	219.41%	236.09%	250.30%
50th percentile	137.04%	148.20%	134.04%	125.92%	139.45%	146.53%	152.16%
25th percentile	76.33%	78.77%	77.48%	78.45%	81.08%	83.86%	84.93%
5th percentile	22.89%	20.88%	26.53%	32.00%	28.09%	26.51%	25.10%

Likelihood of Funding Shortfall: Alternative 2 Capital Market Assumptions

With respect to the likelihood of funding shortfall, the following table compares the results at the end of 30 years reflecting the Buck and Alternative 2 Capital Market Assumptions:

	Asset Allocation 1 Current SAA	Asset Allocation 2 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Buck Assumptions Baseline	0.179	0.167	0.187	0.203	0.174	0.162	0.154
Alternative 2 Assumptions	0.345	0.328	0.351	0.364	0.333	0.318	0.311

Contribution Sufficiency: Alternative 2 Capital Market Assumptions

With respect to the likelihood that the 23.7% of Pensionable Remuneration is sufficient, the following table compares the results at the end of 30 years reflecting the Buck and Alternative 2 Capital Market Assumptions:

	Asset Allocation 1 Current SAA	Asset Allocation 2 02-JAN-2015	Asset Allocation 3 Minimum Volatility	Asset Allocation 4 Relaxed Constraints	Asset Allocation 5 4.25% Real	Asset Allocation 6 Alt 2 3.5% Real	Asset Allocation 7 Same Return
Buck Assumptions Baseline	0.792	0.804	0.780	0.753	0.798	0.810	0.817
Alternative 2 Assumptions	0.604	0.632	0.602	0.575	0.624	0.642	0.651

Risk of Forced Asset Sale to Meet Benefit Payments: Alternative 2 Capital Market Assumptions

The table below shows the annual benefit payments that will need to come from investment earnings calculated under the Buck and Alternative 2 Capital Market Assumptions. The metric is computed as annual benefits less annual contributions as a percentage of plan assets:

Buck Assumptions – Baseline							
	Asset Allocation 1	Asset Allocation 2	Asset Allocation 3	Asset Allocation 4	Asset Allocation 5	Asset Allocation 6	Asset Allocation 7
95th percentile	5.42%	5.58%	5.34%	4.96%	5.02%	4.96%	4.97%
75th percentile	2.15%	2.04%	2.24%	2.39%	2.13%	2.05%	1.99%
50th percentile	1.32%	1.20%	1.40%	1.59%	1.35%	1.27%	1.21%
25th percentile	0.85%	0.75%	0.94%	1.12%	0.90%	0.83%	0.77%
5th percentile	0.47%	0.40%	0.53%	0.69%	0.51%	0.46%	0.42%

Alternative 2 Assumptions							
	Asset Allocation 1	Asset Allocation 2	Asset Allocation 3	Asset Allocation 4	Asset Allocation 5	Asset Allocation 6	Asset Allocation 7
95th percentile	13.29%	14.76%	11.72%	9.07%	10.83%	11.37%	11.80%
75th percentile	3.72%	3.59%	3.64%	3.62%	3.49%	3.41%	3.36%
50th percentile	2.05%	1.88%	2.10%	2.25%	2.01%	1.90%	1.83%
25th percentile	1.23%	1.09%	1.30%	1.48%	1.24%	1.15%	1.09%
5th percentile	0.65%	0.55%	0.72%	0.89%	0.69%	0.62%	0.57%

Comparison of Asset Allocation 6 and 7 Results

under Buck and Alternative 2 Capital Market Assumptions

Criteria	Buck Capital Market Assumptions		Alternative 2 Capital Market Assumptions	
	Asset Allocation 6	Asset Allocation 7	Asset Allocation 6	Asset Allocation 7
1. Is Asset Allocation X on the efficient frontier?	Yes	Yes	Yes	Yes
2. Will the Fund's investments meet the return objective of 3.5% real?	Yes	Yes	Yes	Yes
3. Is the Fund's Termination Liability Funded Ratio greater than 100% at the 50th percentile after 30 years?	Yes	Yes	Yes	Yes
4. Is the contribution rate of 23.7% of Pensionable Remuneration sufficient at the end of 30 years?	Yes	Yes	Yes	Yes
5. Is the VaR (asset and surplus) for Asset Allocation X less than those under the current strategic asset allocation and current asset allocation?	Yes	Yes	Yes	Yes
6. Is the cVaR (asset and surplus) for Asset Allocation X less than those under the current strategic asset allocation and current asset allocation?	Yes	Yes	Yes	Yes
7. Is the volatility (standard deviation) for Asset Allocation X less than those under the current strategic asset allocation and current asset allocation?	Yes	Yes	Yes	Yes