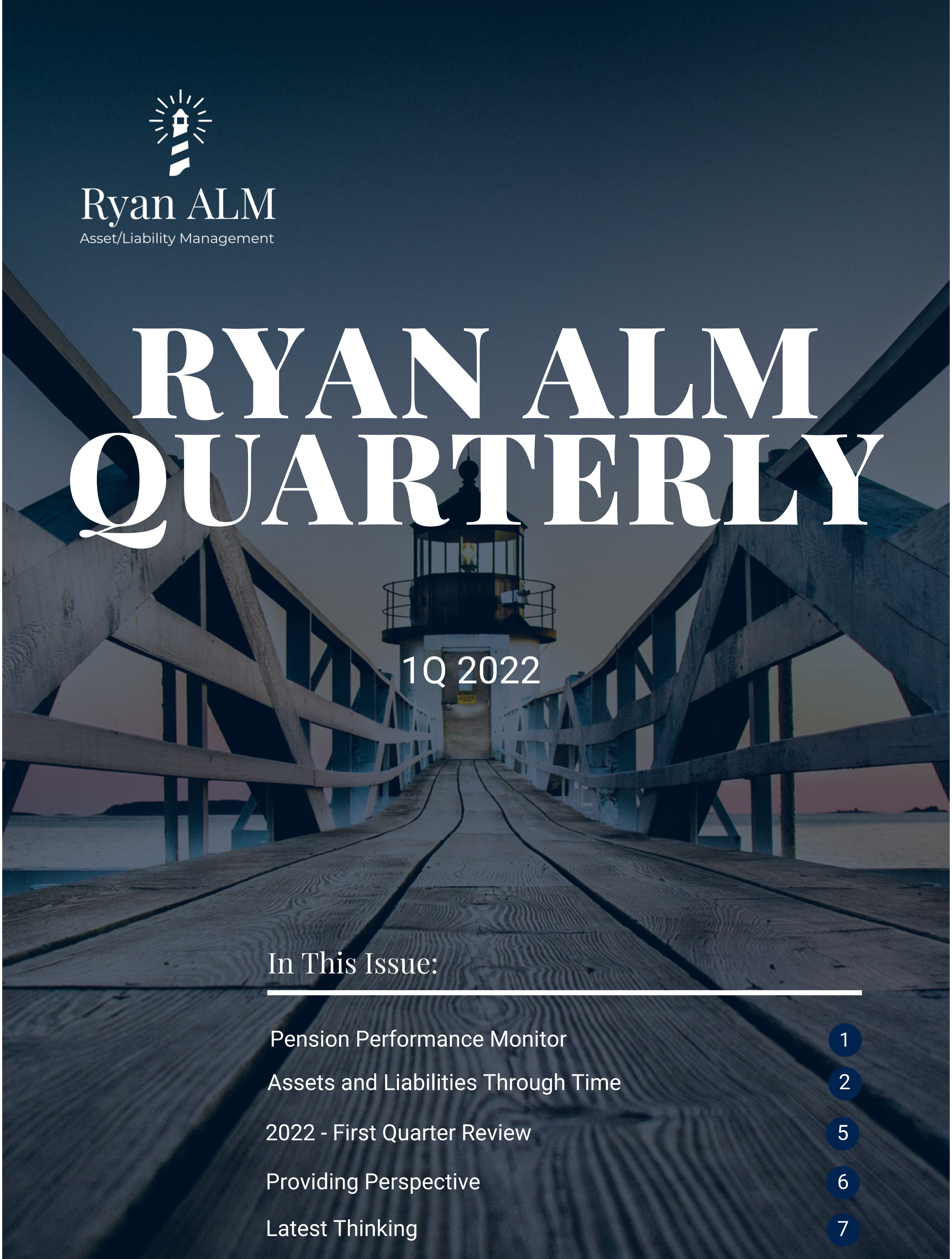


Ryan ALM
Asset/Liability Management

RYAN ALM QUARTERLY

1Q 2022

In This Issue:

Pension Performance Monitor

Pension Liabilities	1Q'22 (%)
Market (Treasury STRIPS)	-9.2
ASC 715 (FAS 158)	-12.0
PPA (MAP 21 = 3 Segments)	1.5
PPA (Spot Rates)	-8.1
GASB /ASOP (7.50% ROA)	1.8

Pension Assets	
Cash (Ryan Cash Index)	-0.1
Bloomberg Barclay Aggregate	-5.9
S&P 500	-4.6
MSCI EAFE International	-5.8
Asset Allocation Model[1]	-4.8

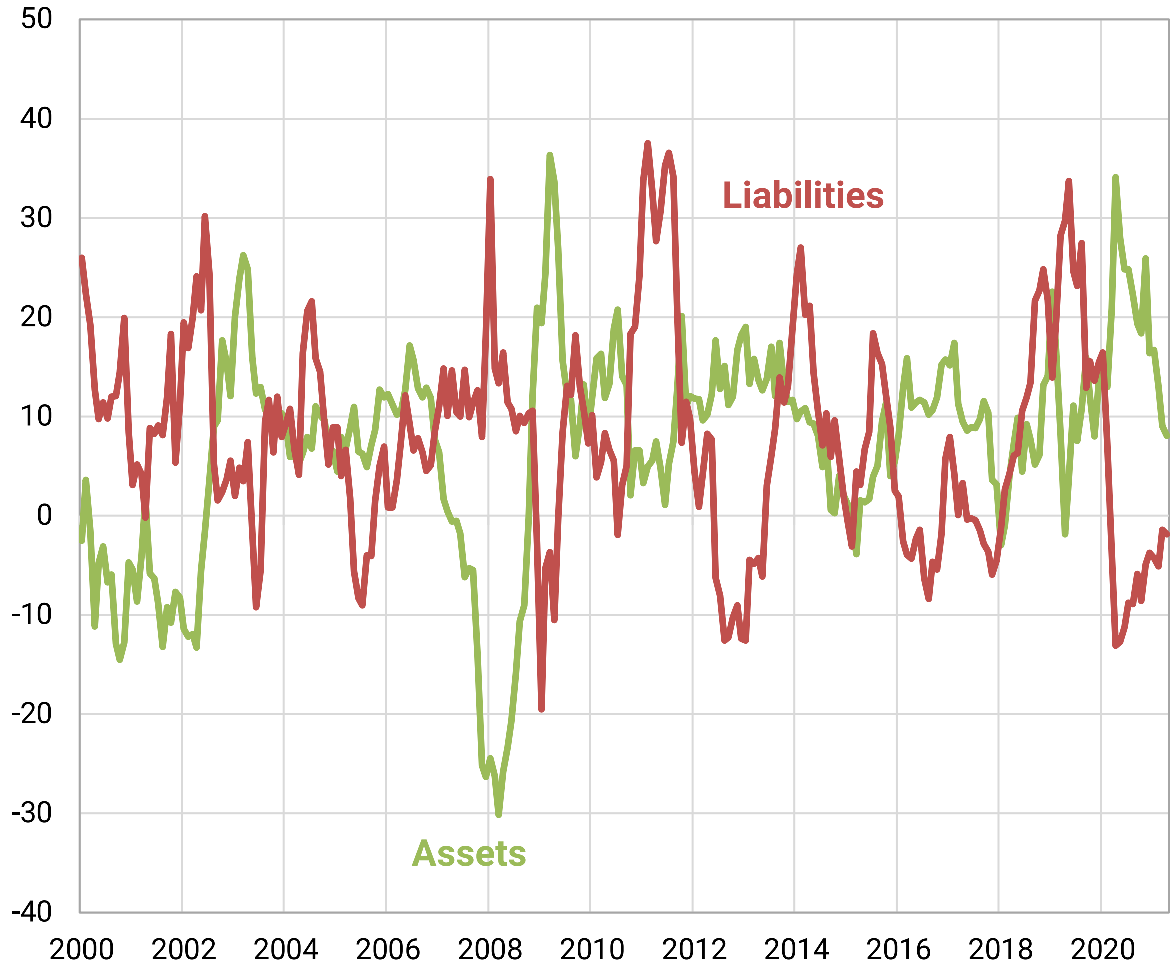
Pension Assets Minus Liabilities	
Market (Treasury STRIPS)	4.4
ASC 715 (FAS 158)	7.2
PPA (MAP 21 = 3 Segments)	-6.3
PPA (Spot Rates)	3.3
GASB/ASOP (7.50% ROA)	-6.6

Based on the weights of the Ryan ALM Asset Allocation Model[1], the difference in pension asset growth versus liability growth for Q1'22 reveals mixed results very much dependent on how pension liabilities are calculated. Corporate plans showed significant outperformance versus their liability benchmarks, while Public and multiemployer plans using the ROA as the discount rate underperformed their liability growth rates. Rising interest rates had a positive impact on corporate liabilities and offset some of the poor asset performance across most asset classes.

1. Model weights are: 5% Ryan Cash, 30% Bloomberg Barclay Aggregate, 60% S&P 500, and 5% MSCI EAFE International

Assets and Liabilities Through Time

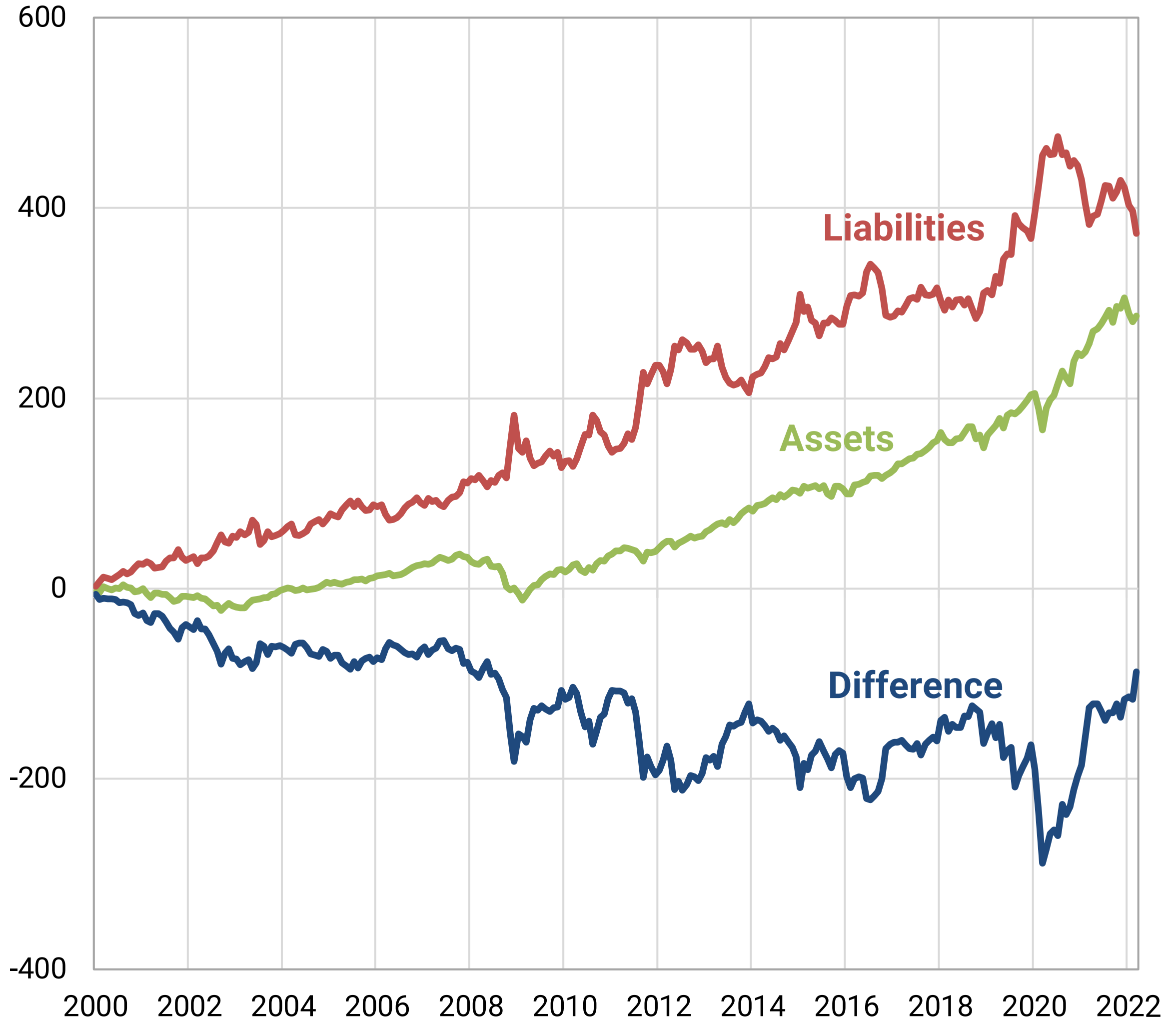
Rolling 12-month asset versus liability growth



Source: Ryan ALM, Inc.

The bull market rally for equities that lasted more than 13 years has helped to close the gap between assets and liabilities came under pressure during the first three months. US fixed income was hammered as the US Federal Reserve began to elevate rates in an attempt to combat significant inflationary pressures. Are we witnessing the longest bull-market run in history for bonds, which began in 1982, coming to its conclusion? Failure to manage plan assets relative to plan liabilities lead to significant volatility in both contribution costs and the funded ratio through the last several decades. Given the improved funding that we've witnessed, it would ***be imprudent not to de-risk*** pension systems at this time.

Cumulative returns of assets versus liabilities



Source: Ryan ALM, Inc.

Most pension funds enjoyed a funded ratio surplus in 1999, but pension asset growth has underperformed liability growth (based on the Ryan ALM Treasury STRIPS discount rate) fairly consistently for much of the past two decades. The current level of underperformance is -122.6% on a compound index basis starting at 100 on 12/31/99. Starting at a funded ratio of 100 on 12/31/99, the estimated funded ratio today would be **81.6%. Despite weak market returns, the funded ratio improved from last quarter's 78.6%.**

Cumulative returns of assets versus liabilities (%)

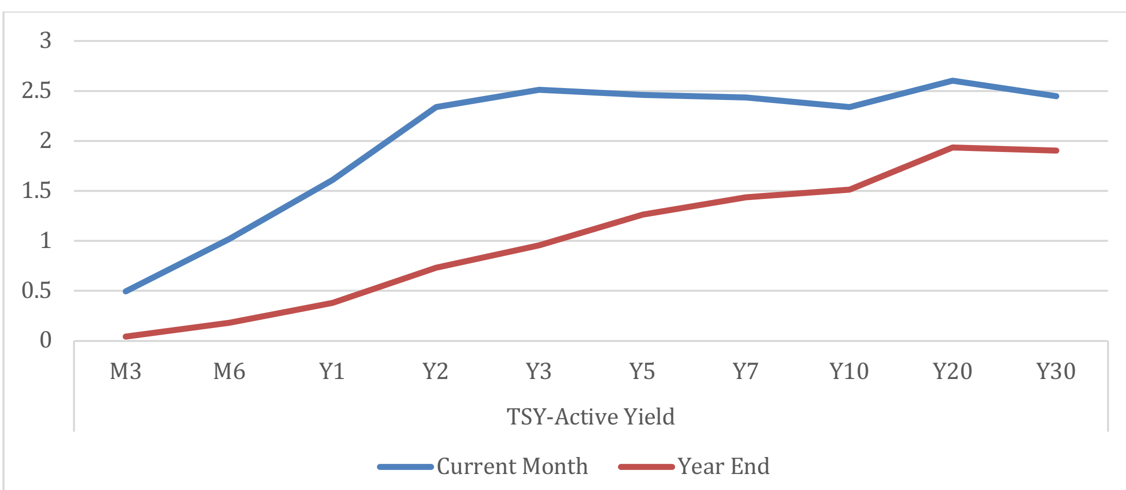
	Assets	Liabilities	Difference	Cumulative Difference	Funded Ratio
2000	-2.5	26.0	-28.5	-28.5	77.4
2001	-5.4	3.1	-8.5	-37.6	71.0
2002	-11.4	19.5	-30.9	-73.4	52.7
2003	20.0	2.0	18.1	-60.1	62.0
2004	8.9	9.4	-0.4	-66.1	61.8
2005	4.4	8.9	-4.4	-76.8	59.2
2006	12.3	0.8	11.4	-64.6	66.0
2007	6.4	11.0	-4.6	-77.5	63.2
2008	-24.5	33.9	-58.4	-181.6	35.7
2009	15.7	-19.5	35.3	-106.9	52.9
2010	11.9	10.1	1.8	-115.7	53.8
2011	3.3	33.8	-30.5	-195.7	41.5
2012	11.8	4.5	7.3	-194.3	44.4
2013	19.0	-12.6	31.6	-120.7	60.5
2014	9.7	24.4	-14.6	-177.1	53.4
2015	1.2	-0.5	1.7	-172.8	54.3
2016	8.1	1.9	6.2	-163.4	57.6
2017	15.2	7.9	7.2	-160.3	60.9
2018	-3.0	-1.3	-1.7	-162.7	60.4
2019	22.8	13.9	8.9	-163.9	65.0
2020	14.4	16.5	-2.1	-197.1	63.8
2021	17.4	-4.2	21.6	-116.1	77.8
2022	-4.8	-9.2	4.4	-122.6	81.6

Source: Ryan ALM, Inc.

2022 – First Quarter Review

	2021	Q1'22
U.S. GDP	$22.9 T	Est. +0.9%
US Debt	$29.6 T	$30.3 T
CPI - U	6.81	7.90
Unemployment Rate	3.90	3.60
30-Year Treasury Yield	1.90	2.44
10-Year Treasury Yield	1.52	2.32
2-Year Treasury Yield	0.73	2.34
3 Mo. T-Bills Yield	0.06	0.51
S&P 500	4,796.56	4,530.41
Nasdaq 100	15,832.80	14,838.49
R2000	2,245.31	2,070.13
Gold	1,794.25	1,936.90
Oil	$75.21	$100.28
Existing Single Family sales	6.12 M	6.02 M

Treasury Yield Curve for March 31, 2022 versus December 31, 2021



Providing Perspective

Are We Looking at the 1970s?

The 1970s were one of the most challenging times for our capital markets. The decade began somewhat harmlessly although equity valuations were inflated following incredibly strong equity markets during the 1960s. These stretched valuations would eventually produce the infamous "Nifty Fifty" stocks,

The Risk/Reward of Bonds

Unlike any other asset class, fixed income (bonds) has two risk/reward values:

The total return value in bonds is the converse of interest rate movements. When rates go down, as they have from 1981 to 2021, they produce price appreciation and higher total returns. And the opposite happens when rates go up as they did from 1953 to 1981.

This is the Impact of Riding the Asset Allocation Rollercoaster

I am happy to report that today's post is the 1,000 produced on this blog. We've tried to cover many different aspects of pension management. Our blogs are intended to help, encourage, urge, foster, persuade, promote, advance, and even implore change…

The Importance of Dividends on the Total Return

Everyone in the Pension arena understands the actuarial formula: B+E = C+I, where outflows (benefits and expenses) equal inflows (contributions and investment earnings). This equation strives for harmony,

A few Pension Facts

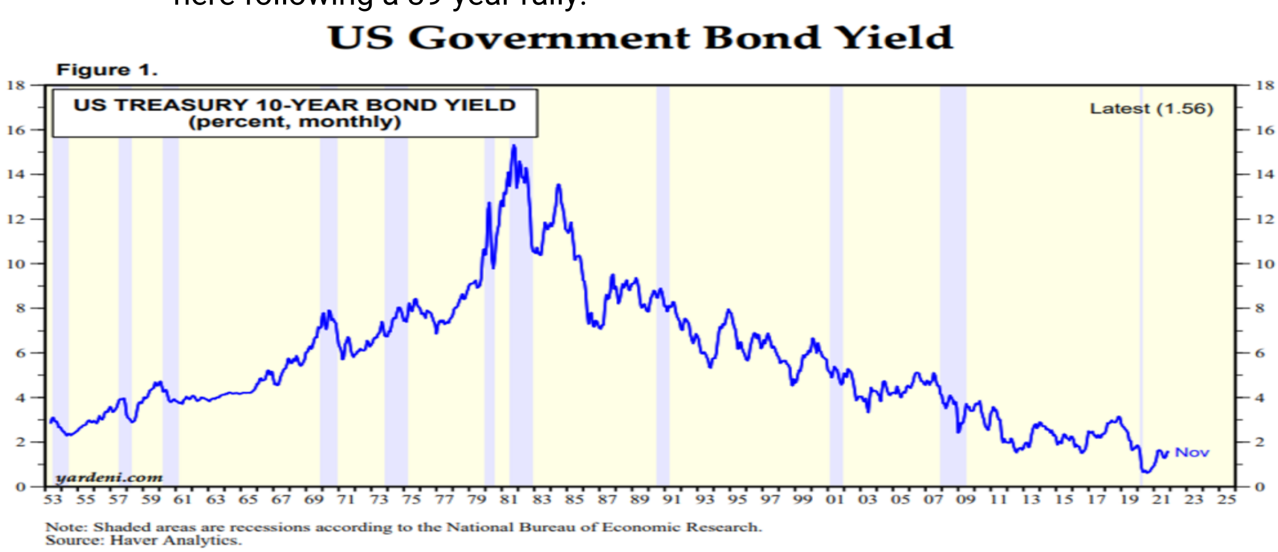
Fact 1: Managing a pension plan is ***NOT*** an easy endeavor. In fact, it is incredibly difficult. Forecasting the size of one's future workforce, their longevity, salary and benefit increases, inflation, market returns, contributions, etc. can be as difficult an actuarial exercise as exists.

Latest Thinking

Despite a recent spike in US interest rates, Ryan ALM is still engaged in a number of exciting conversations with major public pension systems regarding the appropriateness of using a Pension Obligation Bond (POB) to help close the funding gap, improve liquidity to meet near-term benefit payments and expenses, while also reducing the stress on state and municipal budgets that have been impacted by the disruptive Covid-19 virus. The use of POBs can dramatically improve the plan's economics longer-term, while significantly reducing the volatility of the funded status and contribution expenses. The success of this strategy is predicated on how the bond's proceeds are invested. We believe that a successful outcome begins by using the proceeds to defease the current Retired Lives Liability as far out into the future as the allocation will fund.

We are thrilled that the American Rescue Plan Act (ARPA) was passed as part of the $1.9 trillion stimulus package. This legislation has some of the elements of the Butch Lewis Act. Importantly, any Special Financial Assistance (SFA) received must be kept separate and managed conservatively to ensure that the funds necessary to pay the promised benefits (through 2051) are actually available. The PBGC has approved ten plans that filed for the SFA, totaling just over $2 billion in government grants. Despite the recent flurry of activity, we are still waiting on the PBGC to provide us with the "Final, Final Rules" related to the implementation of this legislation.

We are very committed to educating plan sponsors and their advisors about the impact of rising interest rates on traditional fixed income products, which continue to dominate pension portfolios. The end of an unprecedented bull market may be here following a 39-year rally.



Ryan ALM's mission is to solve liability driven problems through low cost, low risk solutions.

About Ryan ALM, Inc.

Ryan ALM was founded by Ronald J. Ryan, CFA on July 12, 2004 as an Asset/Liability Management firm. The firm builds a turnkey system of proprietary synergistic products designed to measure liabilities as a Custom Liability Index (CLI) and manage assets to the CLI as Liability Beta Portfolios.

Ryan ALM is unique in having its own proprietary Index company named ALM Research Solutions, LLC. This company builds both custom and generic bond indexes. Such indexes range from Custom Liability Indexes to ETF Indexes.

Our Liability Beta Portfolio™ is our proprietary cost optimization model that "cash flow matches" clients projected liability benefit payment schedules at the least cost using investment grade bonds. It is back-tested since 2009 showing a consistent cost savings of 8% to 15%. Our LBP best represents the core portfolio of a pension plan.

FASB requires corporations and nonprofit organizations to price their liabilities at certain discount rates. Ryan ALM provides these discount rates in conformity to ASC 842: Lease Accounting and ASC 715: Pensions. For more info: Read here

Our team has been recognized for our expertise and results including Ron Ryan having won the William F. Sharpe Index Lifetime Achievement Award.

Ryan ALM
Asset/Liability Management

Contact Us

Russell D. Kamp
Managing Director
rkamp@ryanalm.com
+1 (201) 675-8797

500 Ocean Trail Way
Unit 410
Jupiter, FL 33477