Ryan ALM
Asset/Liability Management

RYAN ALM QUARTERLY

4Q 2023

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Pension Performance Monitor (Total Returns %)

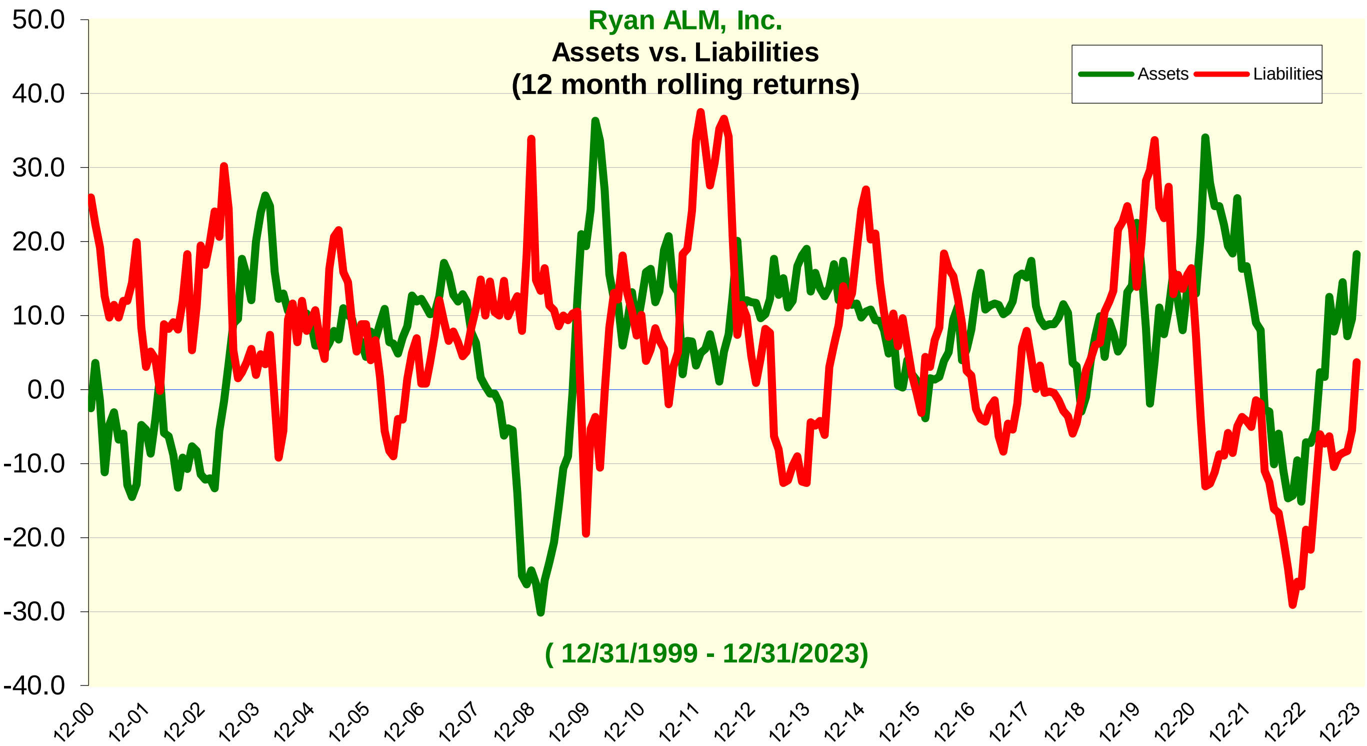
Pension Liabilities	2023 (%)
Market (Treasury STRIPS)	3.7
ASC 715 (FAS 158)	11.8
PPA (MAP 21 = 3 Segments)	8.5
PPA (Spot Rates)	2.2
GASB /ASOP (7.25% ROA)	7.5

Pension Assets	
Cash (Ryan Cash Index)	4.2
Bloomberg Barclay Aggregate	5.5
S&P 500	26.3
MSCI EAFE International	19.0
Asset Allocation Model[1]	18.3

Pension Assets Minus Liabilities	
Market (Treasury STRIPS)	14.6
ASC 715 (FAS 158)	6.5
PPA (MAP 21 = 3 Segments)	9.8
PPA (Spot Rates)	16.1
GASB/ASOP (7.50% ROA)	10.8

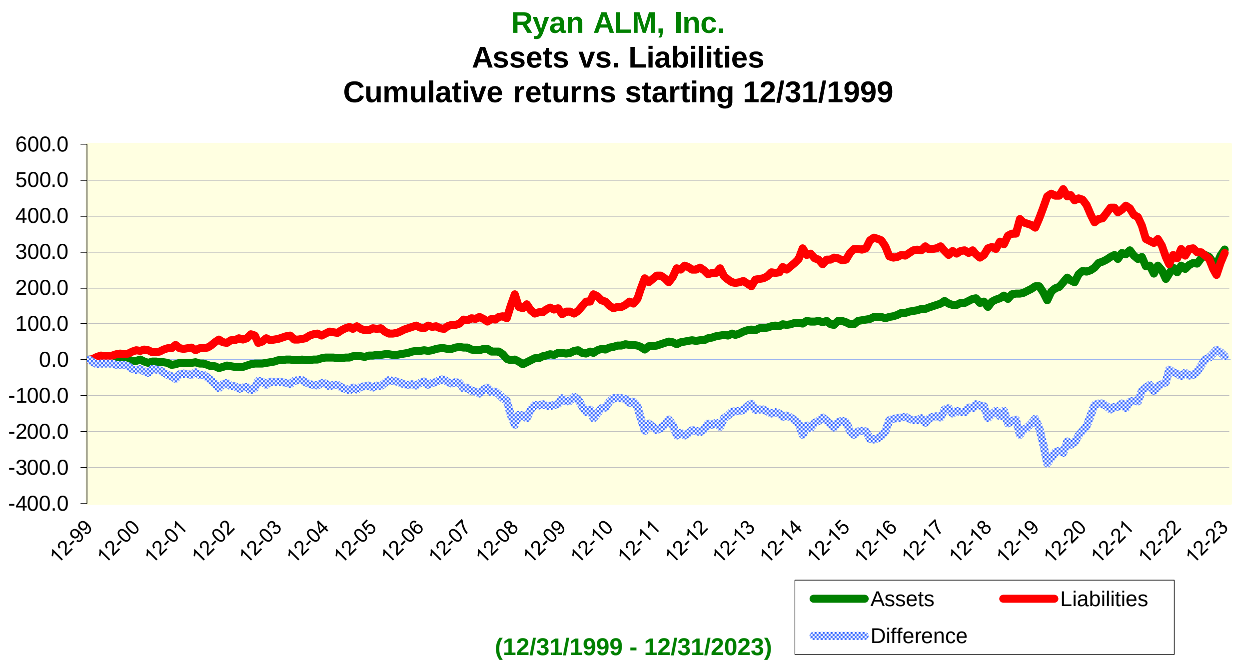
Based on the weights of the Ryan ALM Asset Allocation Model*, the difference in pension asset growth versus liability growth for 2023 reveals a significantly positive comparison of pension assets minus pension liabilities no matter how pension liabilities are calculated. Corporate plans showed more modest funding gains (6.5%) versus their liability benchmarks (ASC 715), while Public and Multiemployer plans using the ROA as the discount rate had more robust outperformance versus their liability growth rates (7.5%). Strong asset growth in equities, both domestic and international, continued into the fourth quarter, while a significant drop in interest rates propelled bonds in the 4th quarter.

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



2023 certainly surprised a lot of investors, especially those in the US equity market. Following a challenging 2022 and with the Fed still aggressively elevating rates. US equities as measured by the S&P 500 were up 11.7% in the fourth quarter closing the year with a 26.3% return. However, most of that gain was attributable to the Magnificent 7 Tech stocks. Large growth advanced 42.7% for calendar 2023 (R1000G) while the R1000V index representing value-oriented stocks advance only 11.5%. Seventy-two percent of the S&P 500 index constituents failed to match or exceed the index's return during the year. That is up more than 30% from 2022.

Longer-dated US interest rates rode their own rollercoaster during the year rising rapidly into October only to quickly reverse during the last 2+ months of the year, as market participants concluded that the Fed had achieved its goal. The end result of this volatility, as you will see on page 5, is that yields are basically as they were at the beginning of 2023 except for the short end, which saw significant increases mirroring the Fed's FFR changes. A strong US labor market and continuing economic growth create challenges for the US Fed, as they monitor the progress made to date on inflation. The market certainly believes that the FFR will be on a slide down all year, with some investors anticipating as many as 6-7 rate cuts. We don't see that occurring based on the underlying fundamentals.



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. We are pleased to report that the deficit has recently been eliminated as a result of the Fed's tightening campaign. The current level of performance is actually +9.9% 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 102.5%**,** which is based on the Ryan ALM liability calculations and hypothetical asset allocation**.** It is also very close to the estimated funded ratio provide by Milliman in Milliman 100 Pension Funding Index (PFI) which stood at 103.2% at the end of November. Strong market returns during 2023 and US interest rates that remained elevated relative to the end of 2021 have combined to support the funded ratio for the various types of DB plans, which have improved from the end of 2022.

US interest rates are not high relative to history, but they do provide the plan sponsor community the opportunity to reduce the risk within their plans by defeasing a portion of the liabilities such as the Retired Lives Liability. This is an opportunity that hasn't been available in decades as US rates plummeted to historic lows. We encourage you to act today before this opportunity fades.

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	-15.2	-26.6	11.4	-39.0	89.8
2023	18.3	3.7	14.6	9.9	102.5

Source: Ryan ALM, Inc.

Economic Snapshot as of December 31, 2023

	2022	2023
U.S. GDP	2.2%	2.6%*
US Debt	$30.9 T	$34.0 T
CPI - U	6.5%	3.1%^
Unemployment Rate	3.5%	3.7%
30-Year Treasury Yield	3.97%	4.08%
10-Year Treasury Yield	3.88%	3.94%
2-Year Treasury Yield	4.42%	4.33%
3 Mo. T-Bills Yield	4.42%	5.37%
S&P 500	3,831.87	4,742.83
Nasdaq 100	10,939.76	14,765.94
R2000	1,761.25	2,012.80
Gold	1,866.13	2,075.20
Oil	$80.26	$71.31
Existing Single Family sales	4.1 M	3.41M**

*GDPNow forecast as of January 2, 2024, **as of November 2023, ^annual # through November 30, 2023

Year-to-date change in the Treasury Yield Curve

Sharing Perspective

Corporate Pension LDI Issues

In a recent survey by Coalition Greenwich (CG) they pointed out how the much higher funded ratios (FR) for corporate DB plans have caused plan sponsors to change their goal from maximizing returns versus liabilities to maintaining high funded ratios and lower FR volatility.

Did the Investing Community Get Too Far Ahead of Itself - Continued

I believe that the investing community has gotten too far ahead of the Fed with regard to potential interest rate policy changes in 2024. The move down in Treasury yields of more than 100 bps across the curve has been incredible.

When It Stops Nobody Knows

As most everyone in our industry appreciates, we have two primary equity cycles involving Growth and Value and Large cap and Small cap. The style cycles are driven by economic conditions, but often exacerbated by fund flows.

Conditions Have Eased Substantially

Inflation has moderated. That is the good news. But the current level of inflation is not yet near the Fed's target of 2%. Despite the Fed's effort to force inflation down with a very aggressive tightening that has seen the Fed Fund's Rate (FFR) elevate from 0% to 5.25%-5.5%, inflation remains sticky, especially with regard to the services sector and housing.

What Is Duration?

There seems to be a fascination in our industry about using the duration of bonds to help mitigate pension funding risk, but does it? Let's start with the basics. What is duration?

What Is Your Purpose?

I recently saw an interesting LinkedIn.com post that touched on marketing one's firm in the investment management industry. It claimed that most asset management organizations spend tons of money on marketing with little to show for the effort. I agree!

LATEST THINKING

We are thrilled that the American Rescue Plan Act (ARPA) was passed as part of the $1.9 trillion stimulus package. This legislation has many of the elements of the Butch Lewis Act which Ryan ALM's Ron Ryan was instrumental in providing the defeasance language. Importantly, any Special Financial Assistance (SFA) received must be kept separate and managed conservatively to ensure that the funds received and earmarked to pay the promised benefits (through 2051) are actually available. The PBGC has approved the SFA applications for 69 multiemployer plans through December 31, 2023, totaling just about $53.5 billion (including supplemental filings and interest) in government grants. The PBGC provided the "Final, Final Rules" related to the implementation of this legislation in Jul 2022. Several items within the original Interim Final Rules have been altered, including permissible investments for the SFA assets. We disagreed with some of these elements, particularly the allowance for 33% of the SFA to be invested in return-seeking assets (RSA), which would include investment grade bonds that aren't used to defease a plan's liabilities (benefits and expenses).

We are very committed to educating plan sponsors and their advisors about the impact of rising interest rates and the impact those have on the ability to de-risk DB pensions through Cash Flow Matching (CFM). The US Federal Reserve is determined to conquer inflation and the multiple rounds of Fed Funds Rate increases has the rate at 5.25%-5.50%. The data (as of 9/30/23) below is a representative client. The projected cost savings through defeasing the plan's liabilities is incredible.

LBP Summary

	ASC 715	LBP Model	Cost Savings ($ and %) *	
Future Value	$652,599,365	$652,599,365		
Present Value	$333,423,063	$324,209,425	$328,389,940	50.32%
YTM	5.59%	6.05%		
Discount Rate	5.83%	6.14%		
MDuration	9.15	8.74		
LBP Model Efficiency		100.00%		
Total Assets		$324,211,856		

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 June 15, 2004 as an Asset/Liability Management firm. The firm has built 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. In this higher interest rate environment, our portfolios are producing cost savings of >2%/year. Our LBP best represents the core portfolio (or liquidity bucket) of a pension plan.

FASB requires corporations and nonprofit organizations to price their liabilities at certain discount rates. Importantly, 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.

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