Ryan ALM
Asset/Liability Management

RYAN ALM QUARTERLY

1Q 2023

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Pension Performance Monitor (Total Returns %)

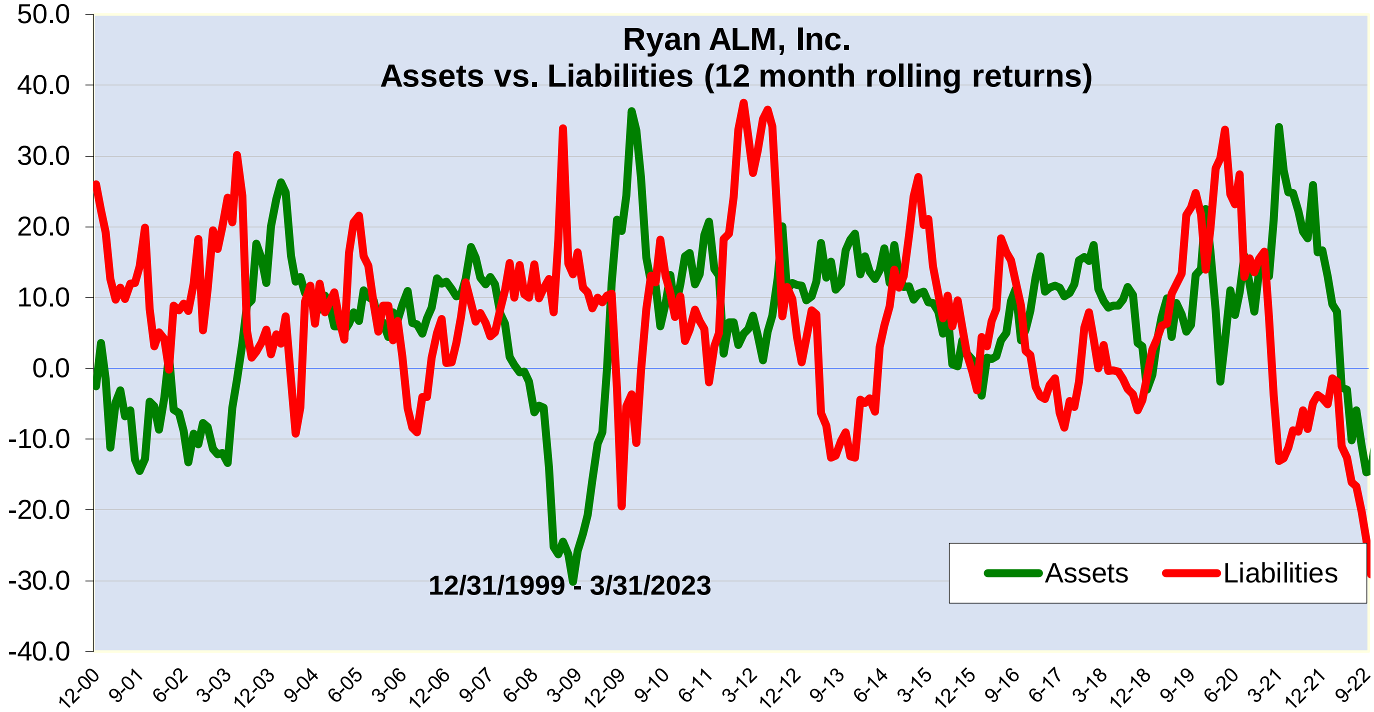
Pension Liabilities	1Q’23 (%)
Market (Treasury STRIPS)	6.6
ASC 715 (FAS 158)	7.2
PPA (MAP 21 = 3 Segments)	4.2
PPA (Spot Rates)	8.6
GASB /ASOP (7.50% ROA)	1.8

Pension Assets	
Cash (Ryan Cash Index)	1.2
Bloomberg Barclay Aggregate	3.0
S&P 500	7.5
MSCI EAFE International	8.7
Asset Allocation Model[1]	5.9

Pension Assets Minus Liabilities	
Market (Treasury STRIPS)	-0.7
ASC 715 (FAS 158)	-1.3
PPA (MAP 21 = 3 Segments)	1.7
PPA (Spot Rates)	-2.7
GASB/ASOP (7.50% ROA)	3.9

Based on the weights of the Ryan ALM Asset Allocation Model*, the difference in pension asset growth versus liability growth for 1Q’23 reveals mixed results very much dependent on how pension liabilities are calculated. Corporate plans showed underperformance versus their liability benchmarks, while Public and multiemployer plans using the ROA as the discount rate outperformed their liability growth rates. Falling interest rates during 1Q’23 had a negative impact on the present value of corporate pension liabilities (strong growth) and offset the improved asset performance experienced across asset classes.

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



Are we at an inflection point or is the current risk on trade a bull market head-fake in a bear market environment? The bull markets for both equities and bonds that helped to close the gap between assets and liabilities ended in 2022, but 2023 has begun well as many market participants anticipate that the Fed will soon culminate the increases in the FFR – now at 4.75%-5.0%. If they are right, 2023 may prove to be a very good year for most assets. However, the Fed doesn't seem ready to declare victory over inflation, as the "core" inflation number now tops the CPI-U and labor markets remain historically strong.

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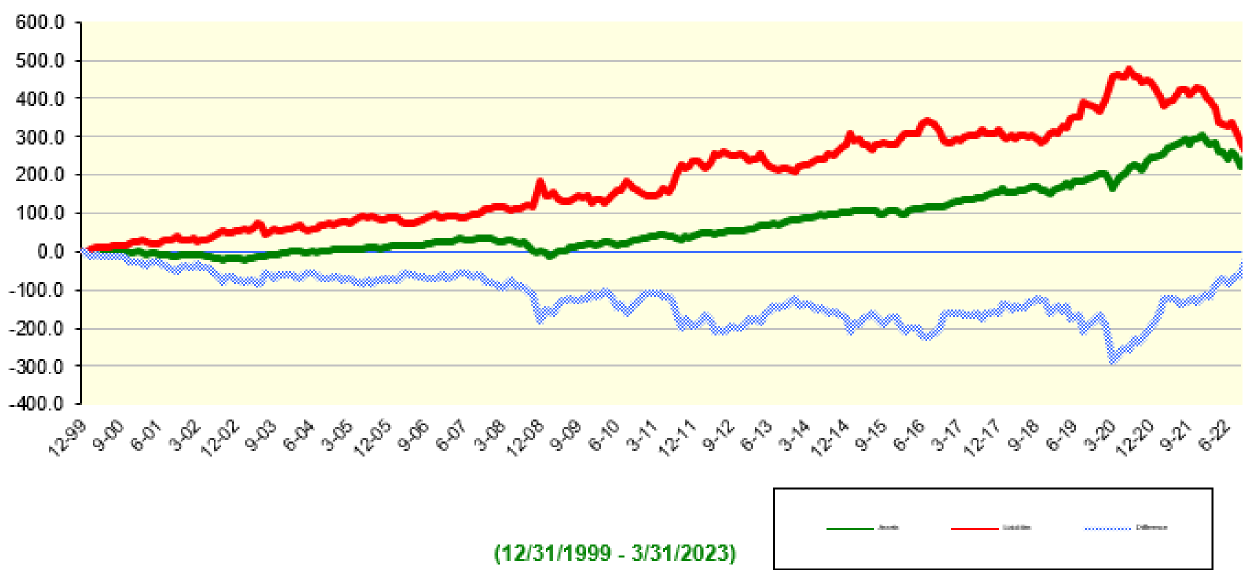
Assets vs. Liabilities
Cumulative returns starting 12/31/1999



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. Although the deficit has narrowed quite considerably. The current level of underperformance is -44.1% 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 89.2%**,** which is based on the Ryan ALM liability calculations and hypothetical asset allocation**.** Despite relatively strong market returns during the first quarter, the funded ratio for corporate plans slightly deteriorated from the end of 2022 as pension liabilities outpaced pension assets as FASB accounting rules require that ASC 715 discount rates are used to value plan liabilities and falling US interest rates produced liability growth.

It was the opposite story for public pension plans as their accounting rules (GASB) allow for the ROA to be used. In that case, liability growth was 1.8% versus the 5.9% achieved by the hypothetical asset allocation. US interest rates have recently begun rising after a dramatic fall brought about by fear of a broadening banking crisis. Fortunately, it seems as if that crisis has not led to greater contagion. US rates should once again reflect the current economic environment which would suggest a higher level before year-end.

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
1Q'23	5.9	6.6	-0.7	-44.1	89.2

Source: Ryan ALM, Inc.

ECONOMIC SNAPSHOT AS OF MARCH 31, 2023

	2022	1Q'23
U.S. GDP	2.2%	Est. 2.5%*
US Debt	$30.9 T	$31.4 T
CPI - U	6.5%	5.0%
Unemployment Rate	3.5%	3.6%
30-Year Treasury Yield	3.97%	3.67%
10-Year Treasury Yield	3.88%	3.48%
2-Year Treasury Yield	4.42%	4.06%
3 Mo. T-Bills Yield	4.42%	4.85%
S&P 500	3,831.87	4,109.31
Nasdaq 100	10,939.76	13,201.75
R2000	1,761.25	1,813.50
Gold	1,866.13	1,978.36
Oil	$80.26	$75.67
Existing Single Family sales	4.1 M	4.6M**

*GDPNow forecast and **as of February 2023

Year-to-date change in the Treasury Yield Curve

	Curve Id	1M	2M	3M	6M	1Y	2Y	3Y	5Y	7Y	10Y	20Y	30Y
11)	I25 03/31/23	4.403	4.588	4.693	4.857	4.591	4.025	3.788	3.573	3.531	3.468	3.795	3.650
12)	I25 12/31/22	3.976	4.325	4.343	4.753	4.687	4.426	4.224	4.004	3.965	3.875	4.144	3.963
13)	I25 (03/31/23-...	42.7	26.3	35.0	10.4	-9.6	-40.1	-43.6	-43.1	-43.4	-40.7	-34.9	-31.3

Providing Perspective

ASOP 4 – Requires Fixed Income Market Discount Rates

ASOP #4 was approved and adopted by the ASB in December 2021. It becomes effective for actuarial reports on or after February 15, 2023. It requires a new way to select a discount rate

The Ryan ALM 1Q'23 Pension Monitor

Pension plan liabilities need to be measured and monitored regularly. Without knowledge of plan liabilities, the allocation of plan assets cannot be done efficiently or appropriately.

Investing to Lose

The recent banking "crisis" has once again highlighted the willingness on the part of fixed-income "investors" to buy and hold bonds that are losing value to inflation every day. It makes little sense.

What a Ride

The volatility witnessed in the capital markets during the last week or so has been incredible. As it relates to US fixed income, the interest rate moves have been nearly unprecedented. As you may recall, Fed Chairman Powell's Congressional testimony sent US Treasury yields skyward on Monday and Tuesday, as it became more apparent that the Fed's inflation fight would continue for longer.

It is Not an Absolute Objective

I have to push back on the idea that public pensions have an absolute objective in managing pension assets despite the fact that the accounting rules under GASB allow for pension liabilities to be discounted at the return on asset assumption.

The SWAN Strategy

I believe that Pension America would be well served by adopting the SWAN strategy. These majestic birds embody a serenity that anyone would appreciate that has to deal with the uncertainty of the capital markets…

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 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 received and earmarked to pay the promised benefits (through 2051) are actually available. The PBGC has approved the SFA applications for 41 multiemployer plans through March 31, 2023, totaling just about $44.8 billion 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 on traditional fixed income products, which continue to dominate pension portfolios. The end of an unprecedented bull market is here following a 39-year bond market rally. The US Federal Reserve is determined to conquer the significant inflation through multiple rounds of Fed Funds Rate increases. To date the Fed has increased rates by 4.75% with an expectation that we could see at least another 0.25% to 0.5% before they pause by year-end 2023. Even if inflation moderates from current levels, "sticky" inflation suggests that a 4% level is not out of the question. Historic "Real" rates of return would suggest long bonds with yields of 5-7% or higher. Despite the recent willingness on the part of the investment community to take on risk – see Nasdaq and Crypto currencies as examples. The investing environment will remain a challenging environment as inflation, rising rates, war in the Ukraine, China/Taiwan, China/Russia, etc. weigh on markets and investors.

One critical way to limit the impact on your fund from these episodic events is to "Buy-Time" for your growth assets by bifurcating the asset allocation into 2 buckets – liquidity and Growth. We'd be happy to share with you our insights on this subject.

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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