Ronald Ryan, CEO, CFA

William F. Sharpe
Lifetime Achievement Award

Money Management Letter
Lifetime Achievement Award

Capital Link
Most Innovative ETF Award

IMN
ETF of the Year Award

Bernstein Fabozzi/Jacobs Levy
Research Paper of the Year Award

The Ryan ALM Pension Letter™

December 31, 2015

Index	Returns YTD 2015	Weights
Pension Liabilities:		
Market (Tsy STRIPS)	-0.49%	100 %
ASC 715 (FAS 158)	2.14	
PPA (MAP 21 = 3 Segments)	6.78	
PPA (Spot Rates)	1.30	
GASB / ASOP (8% ROA)	8.00	
Pension Assets:		
Ryan Cash	0.23 %	5 %
Barclay (Lehman) Aggregate	0.55	30
S&P 500	1.38	60
MSCI EAFE Int'l	-0.19	5
Asset Allocation Model	1.22 %	100 %
Pension Assets – Liabilities:		
Market	1.71%	
ASC 715 (FAS 158)	-0.92	
PPA (MAP 21 = 3 Segments)	-5.56	
PPA (Spot Rates)	-0.08	
GASB/ASOP (8% ROA)	-6.78	

Using the Asset Allocation above, the difference in pension asset growth vs. liabilities in 2015 was: **1.71%** (market valuation STRIPS), **-0.92%** (ASC 715), **-5.56%** (PPA 3 segment rates), **-0.08%** (PPA-Spot Rates) and **-6.78%** (GASB/ ASOP). Such valuations show the significant difference in not using *market* valuations. Most pension funds enjoyed a funded ratio surplus in 1999 but **pension asset growth has *underperformed* liability growth since by an estimated -172.78%** on a compounded index basis starting at 100 on 12/31/99!

	Total Returns (Market Values)										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Assets	-2.50	-5.40	-11.41	20.04	8.92	4.43	12.25	6.82	-24.47	19.43	
Liabilities	25.96	3.08	19.47	1.96	9.35	8.87	0.81	11.76	33.93	-19.52	
Difference:											
Annual	-28.46	-8.48	-30.89	18.08	-0.43	-4.44	11.44	-4.94	-58.40	38.95	
Cumulative		-37.60	-73.40	-60.08	-66.13	-76.75	-64.60	-77.50	-181.5	-106.94	
	2010	2011	2012	2013	2014	2015					
Assets	11.89	3.27	11.79	19.04	9.74	1.22					
Liabilities	10.13	33.77	4.46	-12.59	24.35	-0.49					
Difference:											
Annual	1.76	-30.50	7.33	31.63	-14.61	1.71					
Cumulative	-115.67	-195.73	-194.30	-120.74	-177.14	-172.78					

2015 Pension Year in Review… Victory or Loss?

According to our Asset Allocation model, assets barely outperformed liabilities on a market value basis (1.22% - (0.49%) = 1.71% victory). However, using ASC 715, PPA and GASB discount rates… assets underperformed liabilities. Moreover, pension assets missed their ROA target significantly. When pension asset growth underperforms the forecasted ROA (return on asset assumption) it sets off a ripple effect. For public pension plans, they will feel a higher contribution rate going forward. Corporations will also see an ***actuarial loss*** which is a direct hit to EPS. Actual total pension asset growth vs. the ROA (minus a 10% corridor) is amortized over the life of the pension (@ 10 years). Due to the size of pension assets this small % actuarial loss may be meaningful in $ and results in a direct hit to EPS over the period amortized.

Best Way to De-Risk a Pension

De-risking has become a major pension trend. The recent insurance buyout annuity product alone has won over $100 billion of business in recent years. The big attraction here is the transfer of the pension to the insurance company and the removal of this liability from the balance sheet and the pension expense from the income statement. Such buyout annuities come at great cost with most using a 3% discount rate as the cost of assets to be transferred. LDI strategies have been around awhile and they try to hedge liabilities using a duration-matching strategy. Duration matching strategies are not cost efficient either. Since coupon bonds durations peak out at around 16 years, any liabilities longer than 16 years are duration matched with high cost Treasury STRIPS. Moreover, buying a 5-year duration bond to match a 5-year duration liability, a 10-year duration bond to match a 10-year duration liability, etc., etc. is much more costly than ***cash flow matching***. Cash flow matching uses longer bonds to fund the shorter liabilities. Bond math is clear that the longer the maturity the lower the cost (purchase price) given the same yield. Moreover, the yield curve is usually positive sloping such that the longer bonds have higher yields which results in more cost savings. Please read my research paper ***"How To De-Risk A Pension"*** located in the research section of our web site www.RyanALM.com. Our proprietary **Liability Beta Portfolio (LBP)** is a cost optimization model which matches + funds liabilities chronologically at the lowest cost to the plan. Our LBP model is back tested since 2009 with a consistent monthly cost savings of 8% to 12%. To see a demonstration please contact us at Contact@RyanALM.com or call us at 561-656-2014.

Moody's Issues Report Suggesting Corporate Pensions Could Be Fully Funded by 2018

On December 14, Moody's released a report suggesting that if interest rates go up, as they predict, then corporate pension discount rates will go up thereby enhancing the funded ratio. With current discount rates around 4.0%, an increase to 6.0% by 2018 with a ROA of 7.75% should produce fully funded plans as the norm. Moody's calculates the average funded ratio at 78% for 2015 (based on 670 non-financial companies). Assuming a 200 bps increase in the discount rate over the next three years would translate into a decrease in pension liabilities of about 24% (assuming a 12-year average duration). This reverses the long trend since 1982 of lower interest rates and increasing pension liabilities present values. This liability growth neutralized the strong asset pension growth of over 10% per year since 2008. Pension assets are up 50.8% since 2008 totaling about $1.6 trillion for corporate plans according to Moody's.

26% of Multiemployer Pension Plans in Red Zone

According to Segal Consulting, 64% of multiemployer plans are in the Green Zone (funding status of at least 80%), and 26% of multiemployer plans are in the Red Zone (funding status less

than 65%). About 34% of the Red Zone plans are deemed to be in the "critical and declining" status, a new designation by the Multiemployer Pension Reform Act (MPRA) of 2014. These plans are expected to be insolvent in 15 years. The MPRA gives trustees new powers to reduce promised benefits to avoid insolvency up to 110 of the benefits guaranteed by the PBGC, if approved by the Department of the Treasury. PBGC's highest guaranty is only $13,000 annually. Retirees 80 years and older would be exempt from this benefit reduction.

P&I Editorial: Debunks ROA as Discount Rate

Public pensions use the ROA as their discount rate for liabilities. P&I editorial comments on Dec. 28 are quite succinct: "… those rates don't reflect real economics. Instead, they should use a lower risk-free rate matched to the duration or maturity of the projected benefit payments." P&I references Robert Novy-Marx, professor at University of Rochester, NY who explains why risk-free benefits should be discounted at risk-free rates: "Payment streams should be valued using discount rates that reflect the cash flow risks." Donald Kohn, vice-chairman of the Fed said in a speech: "Public pension benefits are essentially bullet-proof promises to pay." P&I points out the use of ROA discount rates bolsters pension funding levels, making the funds appear more robust than they actually are, while reducing the required contribution, damaging the funding of the plans. The average ROA assumption is 7.68% according to NASRA as of May 2015. According to Wilshire, 87% of state retirement plans are underfunded with an average funded ratio of 73%... using the ROA as the discount rate.

NOTE: P&I cite the trend to lowering the ROA among public pensions. This will create higher contributions and lower funded ratios. If you lower the ROA from 8% to 7.50% this would increase liabilities by about 13%. Just like a bond with a 10-year duration, you have 8% income return + price return of 5% (50 bps x 10). If interest rates trend upward, the *economic* present value of liabilities would go down… showing, perhaps, negative growth of liabilities. Therein lays the conundrum where accounting/actuarial values show increased liability growth and economic values show negative growth.

Are BBB bonds Safer than AAA?

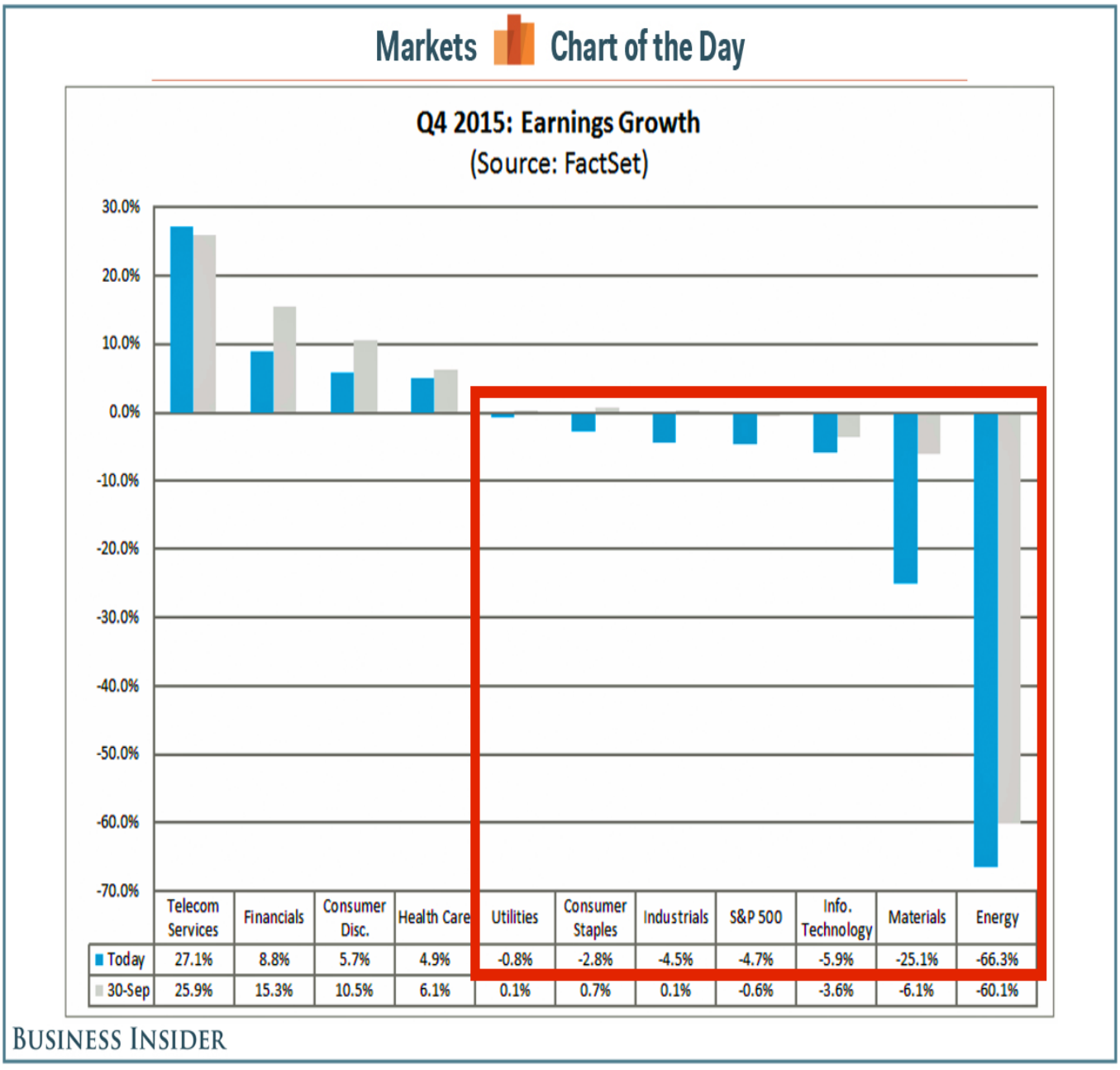
According to a Moody's report from 1970-2013, the 10-year default for Baa municipal bonds was 0.32% while Aaa corporates was 0.49% in the years after they received their credit rating. S&P just released its default report showed BBB municipal bonds with a 0.42% default rate while Aaa corporates were at 0.87% default rate in the 10 years after such ratings.

"The U.S. Pension Crisis" Book Wins IPPY Gold Award for Finance

My new book on The U.S. Pension Crisis was just honored with the top IPPY award for an independent publisher on finance. The IPPY awards were launched in 1996 as the first awards program exclusively for independents. This year's competition had 5,240 entries. If you are interested in purchasing, please email us at **Contact@RyanALM.com or visit our web site for purchase info www.RyanALM.com.**

"Recession Alert"… Negative Stock Market EPS 4Q Growth

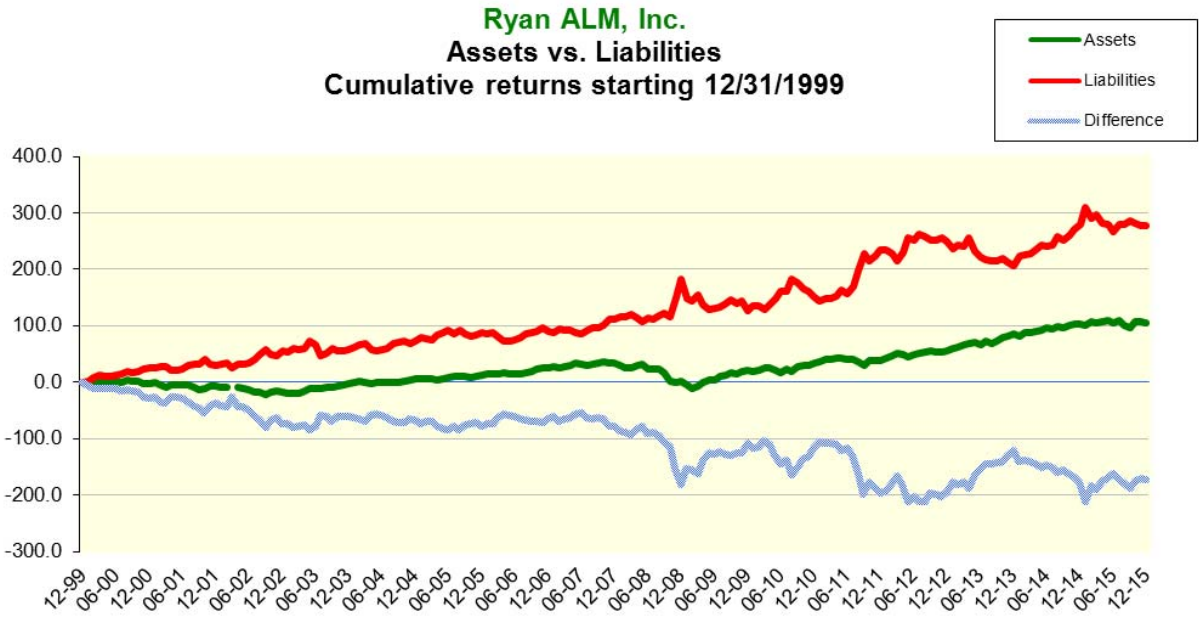
According to FactSet, earnings for the S&P 500 will show **-4.7%** growth for the 4Q 2015. This will mark the first time the S&P 500 index has seen three consecutive quarters of year-over-year declines in EPS. The energy sector has been the main cause of this S&P earnings trend.



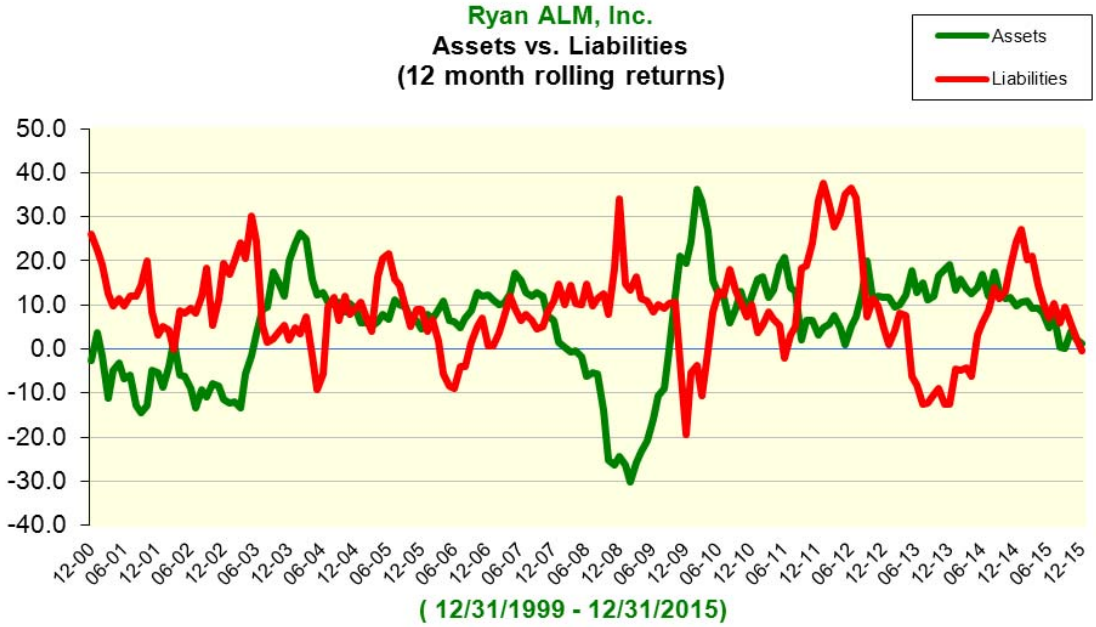
	Telecom Services	Financials	Consumer Disc.	Health Care	Utilities	Consumer Staples	Industrials	S&P 500	Info. Technology	Materials	Energy
Today	27.1%	8.8%	5.7%	4.9%	-0.8%	-2.8%	-4.5%	-4.7%	-5.9%	-25.1%	-66.3%
30-Sep	25.9%	15.3%	10.5%	6.1%	0.1%	0.7%	0.1%	-0.6%	-3.6%	-6.1%	-60.1%

Ryan ALM Pension Scoreboard

The graphs below show asset vs. liability rolling 12 month and cumulative growth since 1999. Ryan ALM Benchmark Liability Index = **278.03%** growth while pension assets = **105.25%** growth for a difference of **–172.78% suggesting any pension Funded Ratio below 184.18% in 1999 has a deficit today on a *market weighted* basis. The Ryan ALM Pension Funded Ratio = 54.29%.**



(12/31/1999 - 12/31/2015)



(12/31/1999 - 12/31/2015)

The World of Ryan Indexes

Custom Liability Indexes … (Patent Pending)

The best way to price (discount rate) and understand the interest rate sensitivity of liabilities is the **Ryan Treasury STRIPS yield curve indexes** as a **LIABILITY INDEX BENCHMARK.** In March 1985, when STRIPS were born, the Ryan Financial Strategy Group (RFSG) created the **1st STRIPS Index.** Based upon these Ryan STRIPS indexes we created the **1st Liability Index** as the proper Liability Benchmark for liability driven objectives. The Ryan team has developed hundreds of Custom Liability Indexes (CLI). Similar to snowflakes, no two pension funds are alike with unique benefit payment schedules due to different labor forces, mortality and plan amendments. Until a CLI is installed as the benchmark, the asset side is in jeopardy of managing vs. the wrong objective (market indexes). **If you outperform generic market indexes, but lose to the CLI … the plan loses!**

Ryan Treasury Yield Curve Indexes (*Constant Maturity / Duration* series)

In March 1983, the Ryan Financial Strategy Group (RFSG) created the **1st Daily bond Indexes (the Ryan Index)** as a *Treasury Yield Curve constant maturity* index series for each ***auction*** maturity series (from Bills to Bonds). In March 1985, the day after Treasury STRIPS were born RFSG created the **1st Treasury STRIPS indexes** as a *Treasury Yield Curve constant duration* series of 1-30 year maturities (30 distinct constant duration indexes + composite)**.** The best way to measure interest rate risk is to use the Ryan Treasury Yield Curve Index series**.**

RAFI Fundamental Weighted High Yield Index Series + RAFI Investment Grade Index Series

(PowerShares ETFs = PHB + PFIG)

In January 2010, Research Affiliates announced the creation of a series of bond indexes based on the RAFI fundamental weights. These include a short, intermediate long and composite Investment grade series and a short and intermediate High Yield series. Ryan ALM was honored and chosen as the index designer and calculation agent. In August 2010 the RAFI 1-10 year High Yield Index was launched as a **PowerShares ETF (PHB)**. There is also a Canadian hedged version **(PFH_CN)**. In September 2011 the RAFI 1-10 year Investment Grade index was launched as a PowerShares ETF **(PFIG)**. For more info on these ETFs and index, please go to:

www.Powershares.com (click on fixed income portfolios)

Ryan/Nasdaq 1-30 year Treasury Maturity Ladder (PowerShares ETF = PLW)

On October 11, 2007 PowerShares launched a fixed income ETF **(PLW)** based upon the Ryan/Nasdaq 1-30 year Treasury Maturity Ladder index. This index is an equal-weighted diversified portfolio of 30 distinct maturities. For more info on this ETF and index, please go to:

www.Powershares.com (click on fixed income portfolios)

Ryan ASC 715 (formerly FAS 158) Discount Rates

In 2006, Ryan ALM designed the FAS 158 yield curve index that prices any private pension liabilities in conformity to FAS 158 standards. We provide four distinct yield curves of AA corporate zero-coupon bonds in conformity to ASC 715.

Given the Wrong Index … you will get the Wrong Risk/Reward!

To view all Ryan Indexes data go to: www.RyanIndex.com

Pension Solutions:
Custom Liability Index and Liability Beta Portfolio™
(Patent Pending)

Ryan ALM offers a turnkey system of CLI + Liability Beta portfolio as a pension solution:

Custom Liability Index (Patent pending) - The first step in prudent pension management is to measure and monitor the liability objective frequently and accurately. Until liabilities are packaged as a **Custom Liability Index (CLI)** the asset side is in jeopardy of managing to the wrong objectives (i.e. market indexes). Only a CLI best represents the unique liability schedule of pensions. Just like snowflakes, no two pension liability schedules are alike due to different labor forces, salaries, mortality and plan amendments. How could a *generic market index* ever properly represent such a diverse array of pension liabilities? Once the CLI is installed the pension will now know the true **economic Funded Ratio** which should dictate the appropriate Asset Allocation, Asset Management and Performance Measurement. Ryan ALM is a leader in CLI as Ron Ryan was the inventor of the *first Liability Index* in 1991. In 2006, Ron won the *William F. Sharpe Index Lifetime Achievement Award*!

Liability Beta Portfolio (Patent Pending) – The value added in bonds is small as every performance ranking study proves (1st quartile vs. median difference). **The best value in bonds is to match and fund liabilities** as Dedication, Immunization and Defeasance have proven for decades. Since liabilities are dynamic calculations they need a CLI to monitor their risk/reward behavior. The *core* or Beta portfolio for a pension should be in high quality bonds that match and fund liabilities. A Beta portfolio is defined as the portfolio that matches the objective. If the true objective is liability driven then, by definition, the proper beta portfolio for any liability objective must be … a **Liability Index Fund or Liability Beta Portfolio**. This requires a Custom Liability Index in order to be executed.

The Ryan ALM Beta portfolio system will invest only in high quality securities that match the CLI. This provides our clients with the ***lowest cost and lowest risk portfolio***. It is the lowest risk portfolio since it has:

No Interest Rate Risk (matches CLI)
No Liquidity Risk
No Credit Risk
No Event Risk
No Prepay Risk

The Ryan ALM Beta portfolio is the lowest cost portfolio since we will always out yield liabilities by more than our low fee thereby guarantying each client **No *Net* Fee** to maturity (liability benefit payment dates). Moreover, the Beta portfolio is a matching liability portfolio that fully funds liabilities thereby reducing the cost and volatility of contributions.