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Bernstein Fabozzi/Jacobs Levy
Research Paper of the Year Award



The Ryan ALM Pension Letter™

September 30, 2016

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Index	Returns YTD 2016	Weights
Pension Liabilities:		
Market (Tsy STRIPS)	14.28%	100 %
ASC 715 (FAS 158)	15.91	
PPA (MAP 21 = 3 Segments)	5.23	
PPA (Spot Rates)	17.95	
GASB /ASOP (8% ROA)	5.95	
Pension Assets:		
Ryan Cash	0.49 %	5 %
Bloomberg Barclay Aggregate	5.80	30
S&P 500	7.82	60
MSCI EAFE Int'l	2.17	5
Asset Allocation Model		6.66 %
		100 %
Pension Assets – Liabilities:		
Market	-7.62	
ASC 715 (FAS 158)	-9.25	
PPA (MAP 21 = 3 Segments)	1.43	
PPA (Spot Rates)	-11.29	
GASB/ASOP (8% ROA)	0.71	

Using the Asset Allocation above, the difference in pension asset growth vs. liabilities in 2016 was: **-7.62%** (market valuation STRIPS), **-9.25%** (ASC 715), **1.43%** (PPA 3 segment rates), **-11.29%** (PPA-Spot Rates) and **0.71%** (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 -213.08%** on a compounded index basis starting at 100 on 12/31/99!

						Total Returns	(Market Values)				
Assets	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Liabilities	-2.50	-5.40	-11.41	20.04	8.92	4.43	12.25	6.82	-24.47	19.43	
Difference:	25.96	3.08	19.47	1.96	9.35	8.87	0.81	11.76	33.93	-19.52	
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	-181.53	-106.9	
	2010	2011	2012	2013	2014	2015	2016				
Assets	11.89	3.27	11.79	19.04	9.74	1.22	6.66				
Liabilities	10.13	33.77	4.46	-12.59	24.35	-0.49	14.28				
Difference:											
Annual	1.76	-30.50	7.33	31.63	-14.61	1.71	-7.62				
Cumulative	-115.67	-195.73	-194.30	-120.74	-177.14	-172.78	-213.08				

\$6 Trillion Public Pension Hole

According to an August 20, 2016 article by Ed Bartholomew and Jeremy Gold, they estimate the deficit of city and state pensions at \$6 trillion. They blame flaws in actuarial practices for masking the true extent of the problem. Actuarial standards of practice (i.e. ASOP 27) calculate liabilities by discounting pension funds cash flows using expected returns on risky plan assets (the ROA). The average return on asset (ROA) assumption today is around 7.50%. Much debate today focuses on whether 7.50% is too optimistic and should be lowered to around 6%. **Finance 101 says that discounting liabilities should be based on the riskiness of the liabilities... not the assets.** Financial economists would argue that the proper discount rate should be default-free rates... Treasury STRIPS. Reported actuarial valuations suggest aggregate liabilities as of June 30, 2015 at \$5 trillion based on the ROA as the discount rate with reported assets at \$4 trillion leaving a \$1 trillion shortfall. However, **if liabilities were priced at U.S. Treasury rates, Ed and Jeremy estimate June 30, 2016 risk-adjusted liabilities at nearly \$10 trillion with assets unchanged at \$4 trillion leaving a deficit of \$6 trillion!** Compounding the problem is that the aggregate ARC (annual required contributions) of \$160 billion don't pay for newly earned benefits... adding more debt to be paid by future generations. State and local governments have experienced spiking contribution costs since 2000 requiring higher taxes and crowding out other government spending as witnessed in Chicago, Detroit, etc.

Ryan ALM recommends that the first step in solving the pension crisis is to install a Custom Liability Index (CLI) that measures and monitors liabilities accurately and frequently. We calculate the present value of liabilities based on all discount rates that our clients (and their actuaries and consultants) feel are relevant. We also include the market value of liabilities at both the AA corporate rates (ASC 715) and Treasury STRIPS yield curve. With a CLI installed, pensions will now know the true economics of their plan: MV present value, growth rate of liabilities, interest rate sensitivity and statistical summary (YTM, Duration, etc.). Pensions will now know their true economic funded ratio and funded status every quarter. Without a CLI, it would be difficult for the asset side to function effectively on asset allocation, asset management and performance measurement.

Rank of State's Trust Fund Solvency

A recent study by Eileen Norcross and Olivia Gonzalez at the Marcatus Center ranks each state fiscal condition by five criteria: cash solvency, budget solvency, service-level solvency and trust fund solvency. The study included both pension and OPEB liabilities. Most importantly, the study uses *market value* (based on risk-free Treasury interest rates) not actuarial valuations. Based on trust-fund solvency (considered the most relevant) here is the ranking:

Top Ten States

1. Nebraska
2. Oklahoma
3. Wisconsin
4. Tennessee
5. Indiana
6. Vermont
7. Wyoming
8. North Carolina
9. South Carolina
10. Delaware

Bottom Ten States

41. Louisiana
42. California
43. Hawaii
44. Nevada
45. Kentucky
46. Illinois
47. Mississippi
48. Ohio
49. New Mexico
50. Alaska

Another Chicago Tax To Help Pension Fund

A tax on water and sewer services will be assessed on Chicago's citizens to avert insolvency of the Municipal Employees Pension Fund... the city's largest pension. Chicago's home rule status allows the city council to raise taxes without state approval. Under the tax plan, the average water bill would go up about \$200 per year providing up to \$240 million higher annual pension contributions. Mayor Emmanuel said "this agreement represents an incredible milestone on the road to financial recovery. For the first time in a very long time, every single one of our pension funds is on a path to financial security."

Solution to Illinois Pension Deficit

Greg Baise, President of the Illinois Manufacturers' Association, declared on August 30 that the best solution to the mounting state pension deficits is to amend the constitution so as to cut pension benefits. He cited that inept state and local government is "closing Illinois one day at a time". He continued with "we are faced with 300,000 manufacturing jobs gone and our pension system further in debt. The irresponsible spending and lack of balanced budgets have caused businesses to rethink their plans for expansion or capital expenditures." Baise asked "in what world do we live in where a \$100 billion-plus pension obligation can be explained away by saying... it's in the constitution? A constitutional provision that was drafted in 1970 cannot and must not bankrupt this great state." He proposed tax reform that lowers rates but widens the base, making the state's research and development tax credit permanent, slashing the estate tax and boosting vocational and technical education.

Louisiana's \$12 billion Pension Shortfall Unreported

In 2012, GASB 68 required governments to disclose a "net pension liability" on their balance sheets. As reported by Truth in Accounting...Treasurer John Kennedy had previously been hiding the approximate \$20 billion state pension debt for several years. When Governor Edwards took office in 2016, he immediately addressed the seriousness of Kennedy's failure to report and fully fund the pension liabilities during his 15 years as Treasurer.

Watch List: Atlantic City

Atlantic City hired two financial advisors (PFM Group Consulting and NW Financial Group) to assist with its recovery plan due November 8 to the State of New Jersey. The city also hired McManimon Scotland & Baumann to help restructure its \$240 million bond debt. These firms will help Atlantic City develop a Recovery Plan. AC plans to sell its historic airport, Bader Field, as part of its recovery plan. Recently, another historic waterfront site, Garden Pier, was sold to a private investor.

Watch List: Alaska

Gov. Bill Walker's administration just approved a \$3.5 billion pension obligation bond (POB) to be sold in the last week of October. The POB is designed to save state money on pension payments because the state assumes it can earn 8% on these funds which will cost less than 4%. Walker's administration has the ability to issue the POBs without approval from the state legislature based on a 2008 bill.

Watch List: Mississippi

The State of Mississippi is in an \$8.4 billion financial hole according to Truth in Accounting... a public pension watchdog. They have calculated a much higher debt than reported on

Mississippi's 2015 CAFR (Comprehensive Annual Financial Report). Sheila Weinberg of TIA says pension liabilities should be a part of the report and count as debt. Mississippi has \$5.4 billion in unfunded pension benefits.

Duration Matching = Hedging Strategies... NOT De-risking Strategies

Duration matching is designed to match the growth rate of liabilities. Since the duration of most liabilities are not provided by the actuary, most duration matching strategies use *generic* bond indexes as a proxy for liabilities. This is not an accurate or effective way to match liabilities. Liabilities are like snowflakes... you will never find two alike. Only through a Custom Liability Index (CLI) could you ever know the duration profile of liabilities which is quite interest rate sensitive. Since coupon bonds durations peak out at around 16 years, any liabilities longer than 16 years must be 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. is much more costly than ***cash flow matching***. Cash flow matching uses longer bonds (interest income) 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. **Futures, derivatives and interest rate swaps are certainly not de-risking strategies** since there are no funds to match and pay the liability benefit payment schedule. The objective of a pension should not be return oriented (especially the ROA). The 1990s should be a constant reminder of what happens when your focus is on a target return instead of the funded ratio and funded status. Had pension's cash flow matched liabilities in the 1990s when they had surpluses, there would be no pension crisis today!

Insurance Buyout Annuities (IBA)... Most Costly Way to De-risk

IBA have won over \$500 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 + PBGC expense from the income statement. Such IBA come at great cost with most using a U.S. Treasury discount rate – 20 bps. (@ 2.50% as of 12/31/15) as the discount rate cost of assets to be transferred. This is in sharp contrast to the ASC 715 discount rates of 3.80% and our LBP average YTM of 5.50% (as of 12/31/15). This translates into our LBP product is 26% to 30% less costly than IBA!

Ryan ALM Pension Scoreboard

The graphs below show asset vs. liability rolling 12 month and cumulative growth since 1999. Ryan ALM Benchmark Liability Index = **332.00%** growth while pension assets = **118.92%** growth for a difference of **-213.08%** suggesting any pension **Funded Ratio** below **197.34%** in 1999 has a deficit today on a *market weighted* basis.

The Ryan ALM Pension Funded Ratio = 50.68% (starting at 100.00 on 12/31/99)



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

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In October 2005, Ron Ryan terminated his license agreement with Ryan Labs to distribute and calculate the Ryan Indexes and Ryan STRIPS Indexes. Ron Ryan and Ryan ALM have no affiliation with Ryan Labs. Any use of the formulas, methodologies and data of any of the Ryan Indexes without Ron Ryan's written permission is prohibited.

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.