



# **Rethinking Asset Allocation**

## **Dual Portfolio Structure**

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**Date: PAPERS Presentation on May 23, 2013**

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- I. Overview
- II. Accounting and Regulatory Changes
- III. Implementing the Dual Portfolio
- IV. Diagnostic of a Public Pension
- V. Glide Path Considerations

## **Why do we accumulate Assets in Pension Trusts?**

1. Ensure we meet our obligations when they come due
2. Equitable to the current and future taxpayer
3. Meet or outgrow liabilities

## Challenges facing Public Pensions:

1. Mean Variance Optimization (MVO) still driving asset allocation
2. Assumed Rates of Return vs. Mark to Market
3. Solvency Vs Long Time horizons (Agency versus Pass-Through)
4. Traditional methods do not provide data for risk management
5. Principal | Agent structure
6. Ratings agencies incorporate pensions into methodology (2012)
7. GASB 67 revised reporting requirements for pensions

## Problem: Traditional Mean Variance Optimization (MVO) Model

Assumes normal distribution of returns in a fat tailed world

Only useful within VaR boundary of 2 standard deviations

Fails during highly correlated periods (1987, 1998, 2001, 2008, ...)

Brittle vis-a-vis black swan events

Academic exercise

## Rethinking Asset Allocation: Dual Portfolio Defined

Incorporate a coherent framework on collateral and promises

1. Dual Portfolio Structure → Cornerstone of sound risk management
2. Hedged Portfolio → “How much do I want to sleep at night”
3. Performance Portfolio → “How much do I want to hunt”

Key Concern for Public Pension Funds is their balance sheet (CAFR)

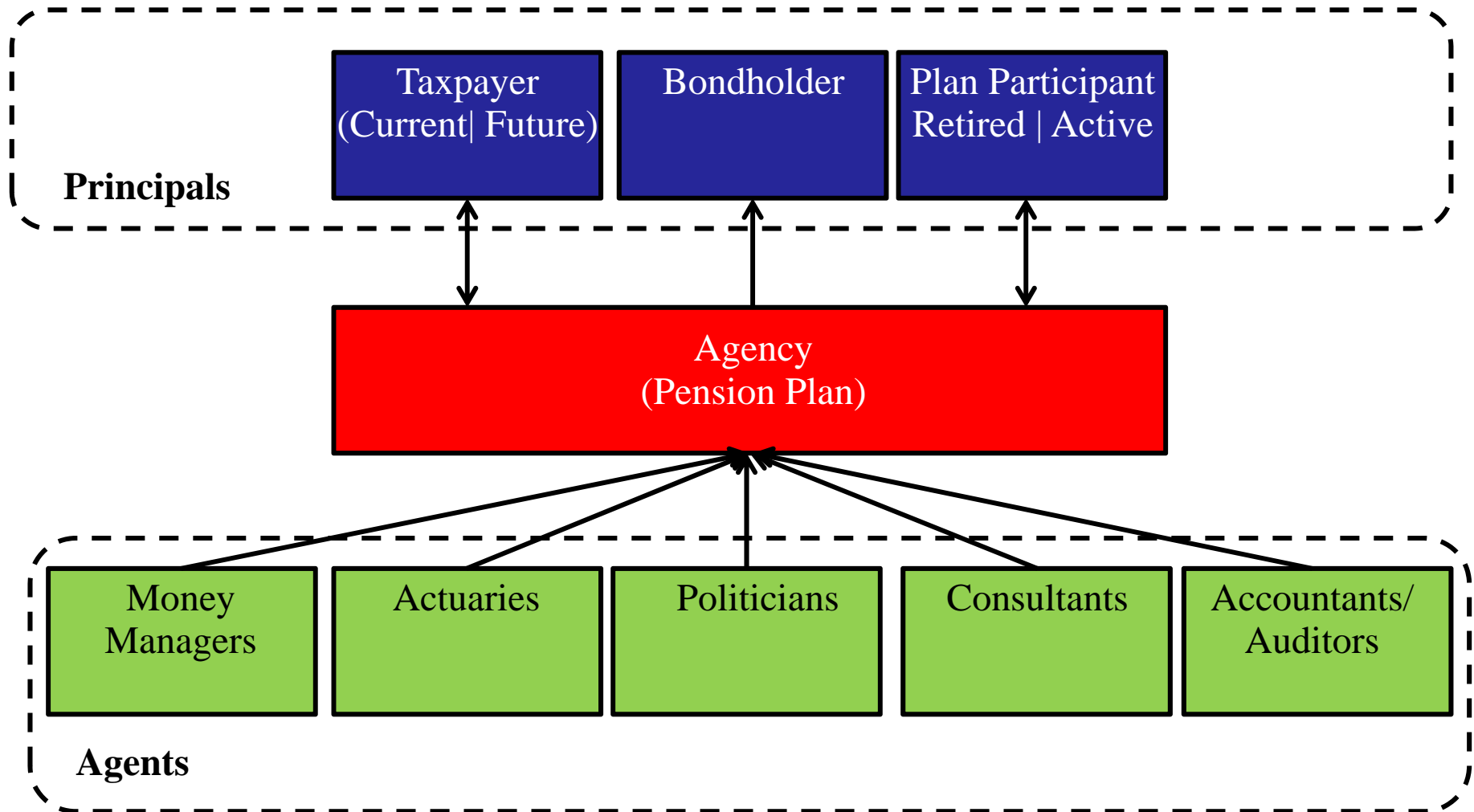
# Understanding The Three Pension Levers:

## **Three Levers in Pension Plans**

1. Asset Allocation
2. Contribution Strategy
3. Benefit Management



# Alignment of Interest: Principal vs. Agent Tension



**Risk Transfer:  
Higher Risk | Lower Risks**

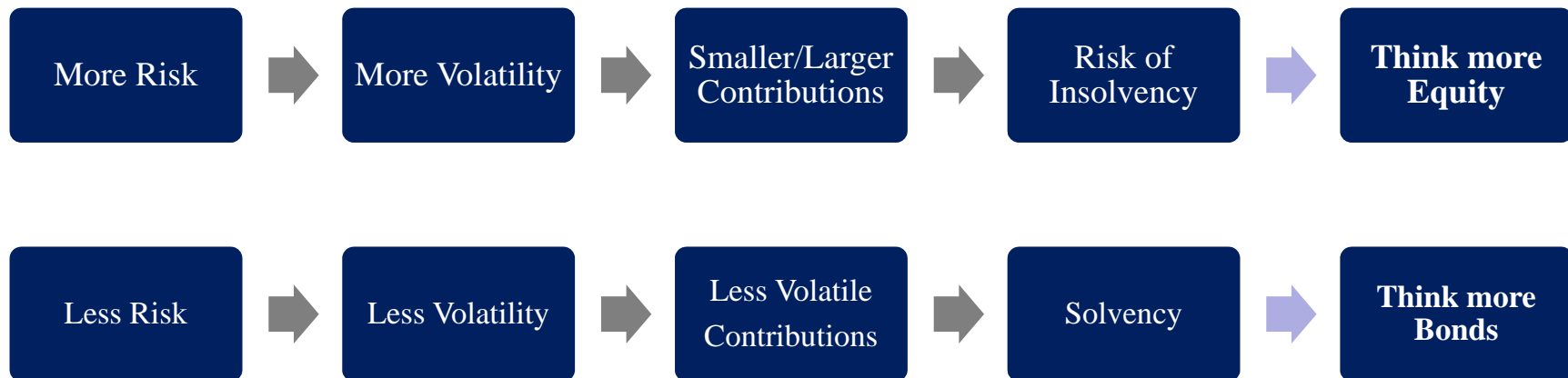
$$C + \boxed{I} = B + E$$

**Contributions + Income = Benefits + Expenses**

$$V = H + P$$

**Vacation**

**Hotel + Poker**



## **II. Accounting and Regulatory Changes**

# GASB 25 | GASB 67 (Revisions): Disclosure | Valuation

Cell	Future Value (\$)	Weight (%)	RL PPA Yield (%)	Price (\$)	Market Value (\$)	GASB 67 Rate(%)	Actuarial Value (\$)	GASB 25 Rate(%)	Actuarial Value (\$)
Short (0 - 0.5)	449,994,499	2.00	0.58	99.83	449,231,156	7.75	440,266,047	7.75	440,266,047
0.51 - 01.5	940,024,928	4.16	0.77	99.18	932,280,872	7.75	869,531,791	7.75	869,531,791
01.51 - 02.5	990,676,780	4.33	1.02	97.93	970,173,042	7.75	850,512,933	7.75	850,512,933
02.51 - 03.5	1,037,228,458	4.46	1.16	96.53	1,001,261,443	7.75	826,467,013	7.75	826,467,013
03.51 - 04.5	1,079,441,078	4.56	1.32	94.84	1,023,680,645	7.75	798,271,064	7.75	798,271,064
04.51 - 05.5	1,118,057,691	4.61	1.56	92.47	1,033,772,119	7.75	767,381,883	7.75	767,381,883
Limited (0.51 - 5.5)	5,165,428,935	22.12	1.17	96.11	4,961,168,122	7.75	4,112,164,683	7.75	4,112,164,683
05.51 - 06.5	1,152,996,788	4.59	1.90	89.25	1,028,964,166	7.75	734,465,390	7.75	734,465,390
06.51 - 07.5	1,184,083,581	4.50	2.28	85.28	1,009,560,351	7.75	700,036,511	7.75	700,036,511
07.51 - 08.5	1,211,380,949	4.36	2.68	80.82	978,727,135	7.75	664,680,663	7.75	664,680,663
08.51 - 09.5	1,234,799,651	4.19	3.05	76.19	940,452,360	7.75	628,814,419	7.75	628,814,419
09.51 - 10.5	1,254,417,899	4.00	3.38	71.62	898,168,416	7.75	592,872,079	7.75	592,872,079
Intermediate (5.51 - 10.5)	6,037,678,867	21.65	2.63	80.94	4,855,872,428	7.75	3,320,869,062	7.75	3,320,869,062
10.51 - 11.5	1,270,284,512	3.81	3.65	67.29	854,513,893	7.75	557,201,240	7.75	557,201,240
11.51 - 12.5	1,282,391,063	3.62	3.87	63.28	811,271,657	7.75	522,063,814	7.75	522,063,814
12.51 - 13.5	1,290,969,323	3.43	4.04	59.64	769,682,558	7.75	487,764,403	7.75	487,764,403
13.51 - 14.5	1,296,104,229	3.26	4.17	56.35	730,232,144	2.86	872,317,338	7.75	454,490,722
14.51 - 15.5	1,297,878,246	3.09	4.26	53.41	692,998,797	2.96	836,730,581	7.75	422,386,121
15.51 - 16.5	1,296,013,010	2.93	4.32	50.75	657,538,100	2.96	811,501,201	7.75	391,450,267
16.51 - 17.5	1,290,566,049	2.78	4.36	48.32	623,500,526	3.06	771,786,167	7.75	361,775,023
17.51 - 18.5	1,281,366,065	2.63	4.39	46.09	590,471,192	3.06	743,516,271	7.75	333,367,706
18.51 - 19.5	1,268,038,731	2.49	4.41	44.02	558,051,513	3.17	699,349,477	7.75	306,179,421
19.51 - 20.5	1,250,673,298	2.35	4.42	42.07	526,126,318	3.20	665,921,129	7.75	280,272,366
Long (10.51 - 20.5)	12,824,284,526	30.38	4.15	54.34	6,814,386,698	4.08	6,968,151,622	7.75	4,116,951,082
20.51 - 21.5	1,229,299,392	2.21	4.42	40.24	494,606,470	3.20	634,281,348	7.75	255,674,591
21.51 - 22.5	1,204,084,986	2.07	4.43	38.50	463,497,400	3.20	602,041,968	7.75	232,423,765
22.51 - 23.5	1,175,131,518	1.93	4.43	36.84	432,813,774	3.20	569,379,318	7.75	210,525,117
23.51 - 24.5	1,142,812,056	1.80	4.43	35.24	402,692,750	3.20	536,581,170	7.75	190,014,115
24.51 - 25.5	1,107,102,936	1.66	4.44	33.71	373,145,029	3.34	486,648,001	7.75	170,841,795
25.51 - 26.5	1,068,013,196	1.53	4.44	32.23	344,212,982	3.34	454,309,596	7.75	152,960,320
26.51 - 27.5	1,025,978,265	1.41	4.45	30.81	316,085,915	3.34	422,339,481	7.75	136,375,418
27.51 - 28.5	981,407,730	1.29	4.46	29.45	288,931,815	3.34	390,950,148	7.75	121,071,948
28.51 - 29.5	934,679,502	1.17	4.47	28.13	262,892,659	3.34	360,315,694	7.75	107,017,124
29.51 - 30.5	886,286,127	1.06	4.47	26.87	238,119,737	3.35	329,655,131	7.75	94,180,492
Very Long (20.51 - 30.5)	10,754,795,709	16.13	4.44	34.17	3,616,998,533	3.27	4,786,501,855	7.75	1,671,084,685
Ultra Long (30.51 + )	9,325,364,641	7.72	4.51	20.01	1,730,943,575	3.35	2,636,258,148	7.75	564,907,972
<b>Total</b>	<b>44,557,547,177</b>	<b>100.00</b>	<b>3.16</b>	<b>64.35</b>	<b>22,428,600,510</b>	<b>5.11</b>	<b>22,264,211,417</b>	<b>7.75</b>	<b>14,226,243,531</b>

## Discount rate based on a blended rate:

- Use the expected rate of return as long as they cover benefits
- Use the current rate on municipal bonds
- Effective date will be Trust reporting 6/15/2013 | Employer reporting 6/15/2014

**S&P reports a change in March 2012**

Reports Outstanding Debt plus Pension Deficit at 8%

**Fitch reports a change in April 2012**

Reports Outstanding Debt plus Pension Deficit at 8% | 6% | 4%

**Moody's reports a change in July 2012**

a.Reports Outstanding Debt plus Pension Deficit at Corp AA

# Boston College Study: Pension Funding on Run Off and On-going

## Boston College Study (March 2011)

Plan name	Termination		Ongoing	
	6%	8%	6%	8%
Pennsylvania School Employees	2020	2021	2034	2049
Pennsylvania State ERS	2022	2024	2031	2044

House of Representative Bill | April 22, 2013:  
Public Employees Pension Transparency Act (PEPTA)



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**OVERVIEW**

**Public Employee Pension Transparency Act**

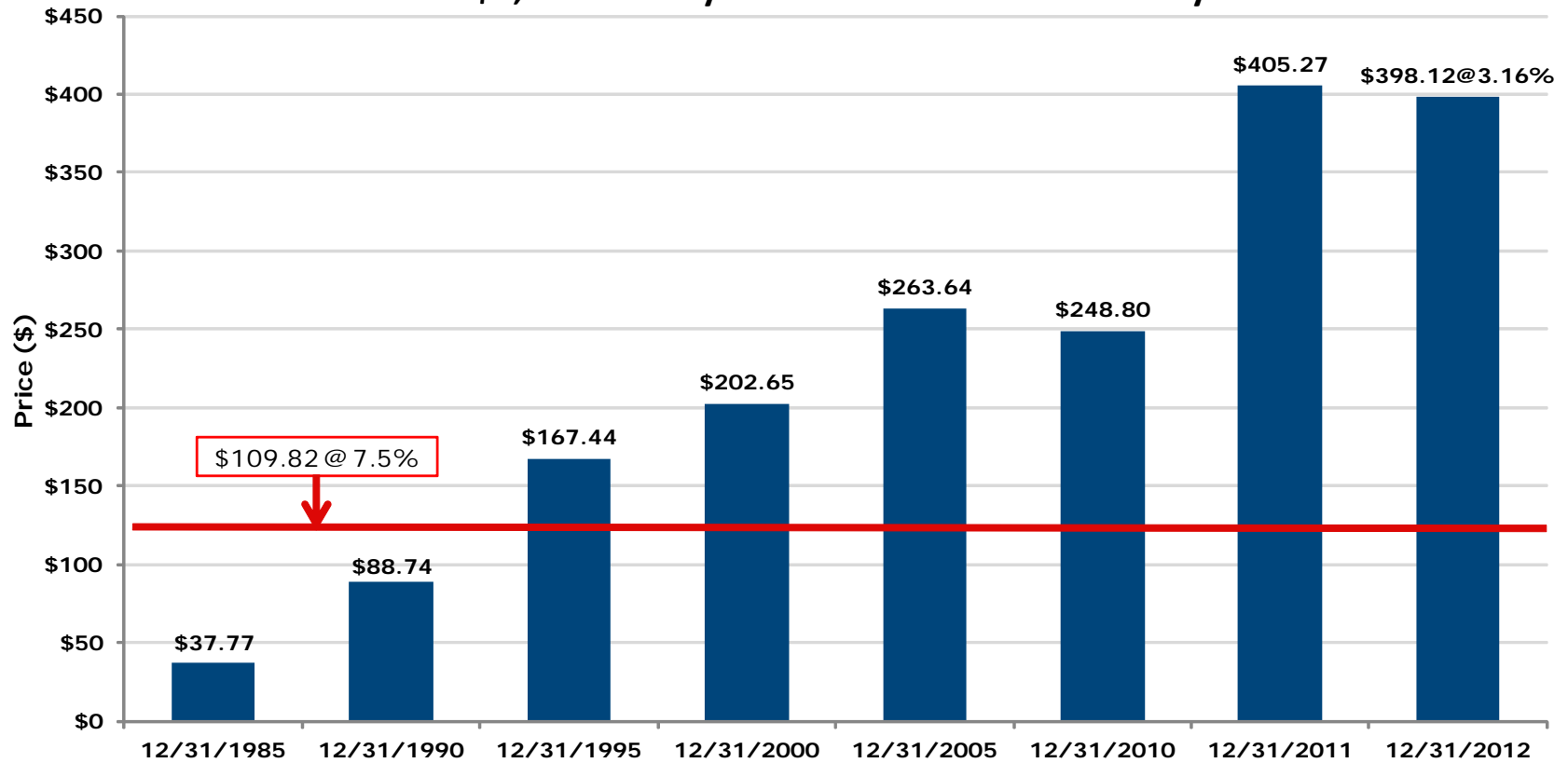
Municipalities required to disclose the true nature of their Liabilities

Valuation mechanism will be Treasury Yield Curve

The responsibility of the plan lies at the local and state level

# Falling Interest Rates | Higher Costs for Retirement Savings

Market Value of \$1,000 Liability valued at 30 Year US Treasury STRIPS





# **III. Implementing the Dual Portfolio**

## Investment Objectives: Balance the Risk with the Return

1. Connect the plan sponsor's risk capacity with the pension
2. Review three pension levers in conformity the CAFR

### **Q: What is the definition of a Hedging Portfolio?**

- A: An fixed income portfolio that looks like the promise

### **Q: Why are Hedge Portfolios important to avoid the mistakes of the past?**

- A: Allows the plan sponsor to derisk or go neutral

# Ryan Labs Asset/Liability Watch: Ending March 31, 2013

Index	Weights	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	3/'13
Ryan Labs Cash	5%	7	5	2	1	1	3	5	5	3	1	0	0	0	0
Barclays Aggregate	30%	12	8	10	4	4	2	4	7	5	6	7	8	4	0
S&P 500	60%	-9	-12	-25	29	11	5	16	5	-37	26	15	2	13	10
MSCI EAFE Int'l	5%	-14	-21	-16	39	21	14	27	12	-43	32	8	-12	18	5
Asset Allocation Model	100%	-2	-5	-13	20	9	5	12	6	-24	19	12	3	11	5
RL PPA Liability		8	15	24	7	11	6	2	2	10	6	14	21	9	-3
Return Difference		-10	-21	-38	13	-2	-1	10	4	-35	13	-2	-18	2	9
Funding Ratio (RL PPA)		145	119	83	93	91	90	98	102	70	78	77	66	67	73

## **IV. Pension Diagnostic**

# Municipal CAFR: (12/31/2012)

## FINANCIALS - General Fund

\$MM	FY 2011	FY 2010	FY 2009	FY 2008	FY 2007	FY 2006	FY 2005
<b>Balance Sheet</b>							
+ Cash & Near Cash	106	134	97	319	172	272	153
+ Marketable Securities	170	80	76	514	833	720	478
+ Accounts Receivable	357	123	313	370	388	334	338
+ Due From Other Funds	138	149	150	91	154	162	131
Total Assets	924	528	694	1,332	1,594	1,518	1,132
+ Accrued Liabilities	320	454	445	280	230	222	144
Total Liabilities	367	495	509	357	298	255	167
+ Reserved for Other	N/A	243	273	407	415	250	220
+ Unreserved General Fund	557	-211	-88	464	657	935	715
Total Fund Balances	557	33	185	974	1,296	1,264	966
Total Liabilities and Fund Balances	924	528	694	1,332	1,594	1,518	1,132
<b>Income Statement</b>							
+ Income Tax Revenues	1,473	1,409	1,374	1,637	1,619	1,664	1,485
+ Sales and Use Tax Revenues	2,686	2,469	2,550	2,740	2,763	2,496	2,261
+ Other Tax Revenue	337	252	227	230	250	245	236
Total Revenues	4,928	4,437	4,376	4,846	4,853	4,641	4,198
- Gen Gov't Expenses	353	344	421	407	352	367	384
- Education Expenses	2,202	2,251	2,856	2,586	2,442	2,168	1,949
- Health Expenses	1,223	1,217	1,215	1,318	1,261	1,108	1,014
- Public Safety Expenses	259	295	288	281	256	223	204
Total Operating Expenses	4,155	4,226	4,949	4,786	4,459	3,986	3,654
+ Excess (Deficiency) of Revenues	773	211	-573	60	394	655	544
Fund Balances Ending	557	33	185	974	1,296	1,264	966

## RATIOS

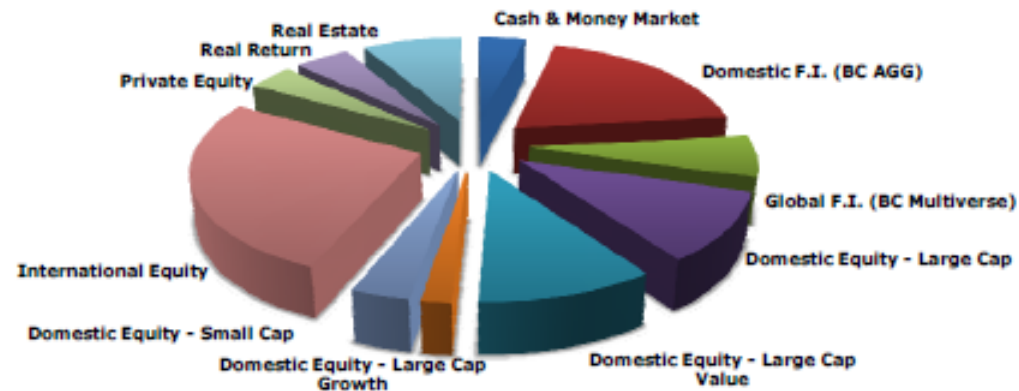
\$MM	FY 2011	FY 2010	FY 2009	FY 2008	FY 2007	FY 2006	FY 2005
Op Margin (%)	16%	5%	-13%	1%	8%	14%	13%
Income Tax Revenue Growth (%)	5%	3%	-16%	1%	-3%	12%	
Tax Revenues % of Total GF Revenues (%)	30%	32%	31%	34%	33%	36%	35%
General Fund Revenue Growth (%)	11%	1%	-10%	0%	5%	11%	
General Fund Balance Growth (%)	1591%	-82%	-81%	-25%	3%	31%	
Federal Grants Growth (%)	34%	11%	-1%	-8%	2%	4%	
Assets Growth (%)	75%	-24%	-48%	-16%	5%	34%	
Pension Funding Ratio (%)	59%	61%	65%	69%	67%		

## PENSION GENERAL

\$MM	FY 2011	FY 2010	FY 2009	FY 2008	FY 2007
FV of Plan Assets	11,943	11,346	11,400	11,381	10,590
PBO	20,097	18,484	17,636	16,549	15,697
Underfunding	-8,154	-7,138	-6,236	-5,168	-5,107
Funded Ratio	59%	61%	65%	69%	67%

*CAFR is not based on a Pennsylvania Municipality*

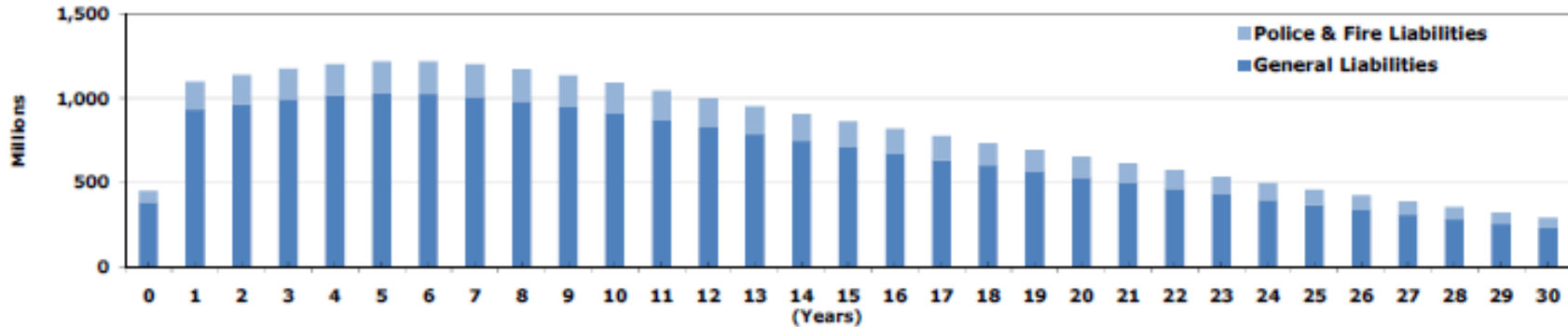
# Asset Allocation: Ending June 30, 2012



Total Assets	Market Value		MDuration (Years) <sup>(1)</sup>	\$ Mduration <sup>(2)</sup>
	(A)	%	(B)	(A) x (B) 100
Cash & Money Market	442,974,035	3.9%	00.42	1,859,081
Domestic F.I. (BC AGG)	2,167,957,991	19.2%	05.07	109,915,470
Global F.I. (BC Multiverse)	722,652,664	6.4%	05.95	42,997,833
Domestic Equity - Large Cap	1,194,777,976	10.6%		
Domestic Equity - Large Cap Value	1,212,160,170	10.7%		
Domestic Equity - Large Cap Growth	205,415,574	1.8%		
Domestic Equity - Small Cap	398,031,506	3.5%		
International Equity	3,031,839,152	26.9%		
Private Equity	437,964,499	3.9%		
Real Return	526,805,912	4.7%		
Real Estate	949,395,655	8.4%		
<b>Total Assets</b>	<b>11,289,975,133</b>	<b>100.0%</b>	<b>01.37</b>	<b>154,772,385</b>

Data Source: ABC

# Term Structure and Valuation of Liabilities: Actuarial | Economic | GASB 67



Market Value Statistics							
Liability Years	Short (0 - 0.5)	Limited (0.51 - 5.5)	Intermediate (5.51 - 10.5)	Long (10.51 - 20.5)	Very Long (20.51 - 30.5)	Ultra (30.51+)	Total
Police & Fire	66,565,414	890,901,653	950,237,774	1,502,200,308	883,761,585	479,386,654	4,773,053,388
General	382,894,005	4,935,686,837	4,866,246,230	6,930,544,574	3,560,047,730	1,615,476,793	22,290,896,169
<b>Total</b>	<b>1.77%</b>	<b>22.90%</b>	<b>22.86%</b>	<b>33.14%</b>	<b>17.47%</b>	<b>8.23%</b>	<b>106.37%</b>
Yield (%)	0.69	1.56	2.99	4.36	4.71	4.82	3.49
Mduration <sup>(1)</sup>	0.25	2.99	7.78	14.71	35.72	35.72	13.22
<b>Total (\$)</b>	<b>449,459,419</b>	<b>5,826,588,490</b>	<b>5,816,484,004</b>	<b>8,432,744,882</b>	<b>4,443,809,315</b>	<b>2,094,863,447</b>	<b>25,443,432,590</b>
<b>% of Assets</b>	<b>3.98%</b>	<b>51.61%</b>	<b>51.52%</b>	<b>74.69%</b>	<b>39.36%</b>	<b>18.56%</b>	<b>225.36%</b>
					<b>RL PPA Funding:</b>		<b>44.37%</b>
					<b>GASB 67 Funding:</b>		<b>41.46%</b>
					<b>Actuarial Funding:</b>		<b>63.88%</b>

Notes:  
Data source: XYZ

## To Maintain Current Dollar Deficit: Asset Allocation will need additional contributions

<b>To Maintain Current Dollar Deficit</b>			
	<b>Assets</b>	<b>Liabilities</b>	<b>Difference</b>
Starting (in millions)	\$11,290	\$27,064	<b>(\$15,774)</b>
Ending (in millions)	\$12,321	\$28,030	<b>(\$15,709)</b>
Return	9.1%	3.6%	5.6%

<b>Close Gap in One Year</b>			
	<b>Assets</b>	<b>Liabilities</b>	<b>Difference</b>
Starting (in millions)	\$11,290	\$27,064	<b>(\$15,774)</b>
Ending (in millions)	\$28,030	\$28,030	\$0
Return	148.3%	3.6%	144.7%

<b>Required Return to Reach Full Funding in Five Years</b>			
	<b>Assets</b>	<b>Liabilities</b>	<b>Difference</b>
Starting (in millions)	\$11,290	\$27,064	<b>(\$15,774)</b>
Ending (in millions)	\$32,254	\$32,254	\$0
Return	23.4%	3.6%	19.8%

Liability valuation at RL PPA curve (AAA to A corporate bond), GASB 67 and Actuarial EROA of 7.75%  
New contributions = New Liabilities



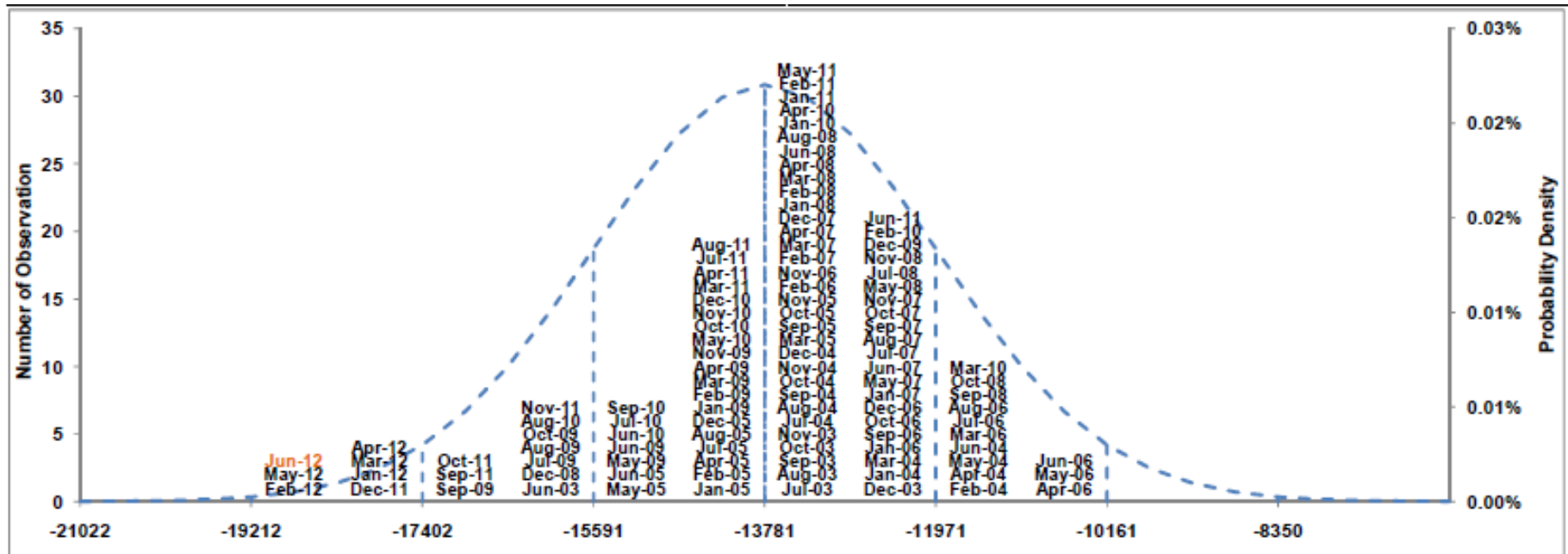
## Yield Curve Break Even: Parallel Yield Curve Shift Up

<b>Close Gap in One Year</b>			
	<b>Assets</b>	<b>Liabilities</b>	<b>Yield Curve Shift</b>
Starting (in millions)	\$11,290	\$27,064	
Ending (in millions)	\$11,967	\$11,968	
Return	6.0%	-55.8%	+432 bps one year

<b>Required Return to Reach Full Funding in Three Years</b>			
	<b>Assets</b>	<b>Liabilities</b>	<b>Yield Curve Shift</b>
Starting (in millions)	\$11,290	\$27,064	
Ending (in millions)	\$13,447	\$13,447	
Return	6.0%	-20.8%	+192 bps each year

<b>Required Return to Reach Full Funding in Five Years</b>			
	<b>Assets</b>	<b>Liabilities</b>	<b>Yield Curve Shift</b>
Starting (in millions)	\$11,290	\$27,064	
Ending (in millions)	\$15,109	\$15,110	
Return	6.0%	-11.0%	+125 bps each year

# Risk Budget: One STD Dollar Vol over any 12 month horizon



**Notes & Assumptions:**

Dollar surplus/deficit is computed on a 12-month period, with funding ratio reset at the beginning of each testing period. Ten-year time horizon generates 109 surplus/deficit data points, which serve as the measurement for tracking error calculation.

**Risk Budget:**  
**One STD Dollar Vol over any 12 month horizon**

		<b>BC Agg + BC Multiverse</b>						
		<b>Dollar Funding Volatility (Standard Deviation \$mm)</b>						
		<b>Bond Allocation</b>						
		0%	20%	26%	40%	60%	80%	100%
<b>Funding</b>	42%	2,048	1,857	1,810	1,708	1,618	1,600	1,661
	60%	2,576	2,213	2,119	1,897	1,662	1,553	1,608
	80%	3,298	2,753	2,607	2,248	1,827	1,573	1,591
	100%	4,092	3,377	3,181	2,693	2,086	1,665	1,617
	120%	4,925	4,046	3,804	3,193	2,408	1,817	1,685
	140%	5,779	4,742	4,454	3,725	2,772	2,016	1,790



## **IV. Glide Path Considerations**

## IV. Tactical Considerations & Concerns

### Why consider dual portfolio structure?

Harvest Gains to the hedged portfolio from performance portfolio

- Harvesting gains reduces risk over time
- Timing Interest Rates does not work
- Buying opportunities on upward movements in interest rates
- Pre-set trigger points adds discipline to the process

## IV. Dual Portfolio: GlidePath

### **Shift**

5% of fund to Hedged portfolio when:

Performance portfolio up 15% (trough to peak), or

Interest rates increase more than 50 bps (trough to peak)

### **Simulations:**

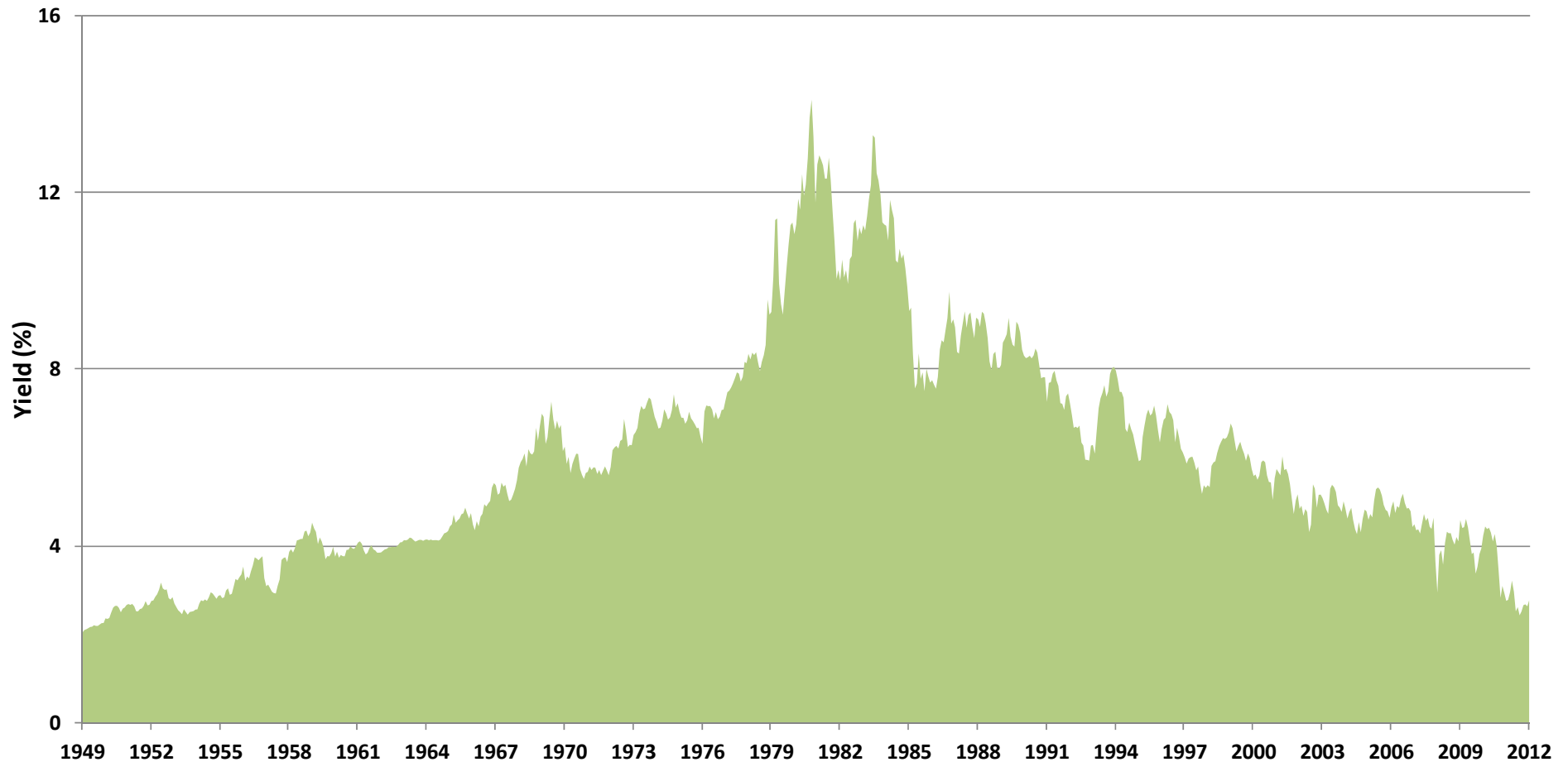
Different starting periods

60% S&P 500 & 40% BC Aggregate index (Traditional)

Starting Funded Ratio = 70% and \$1mn Annual Contribution

# Historical Yields: Betting on Yields → Fools Game

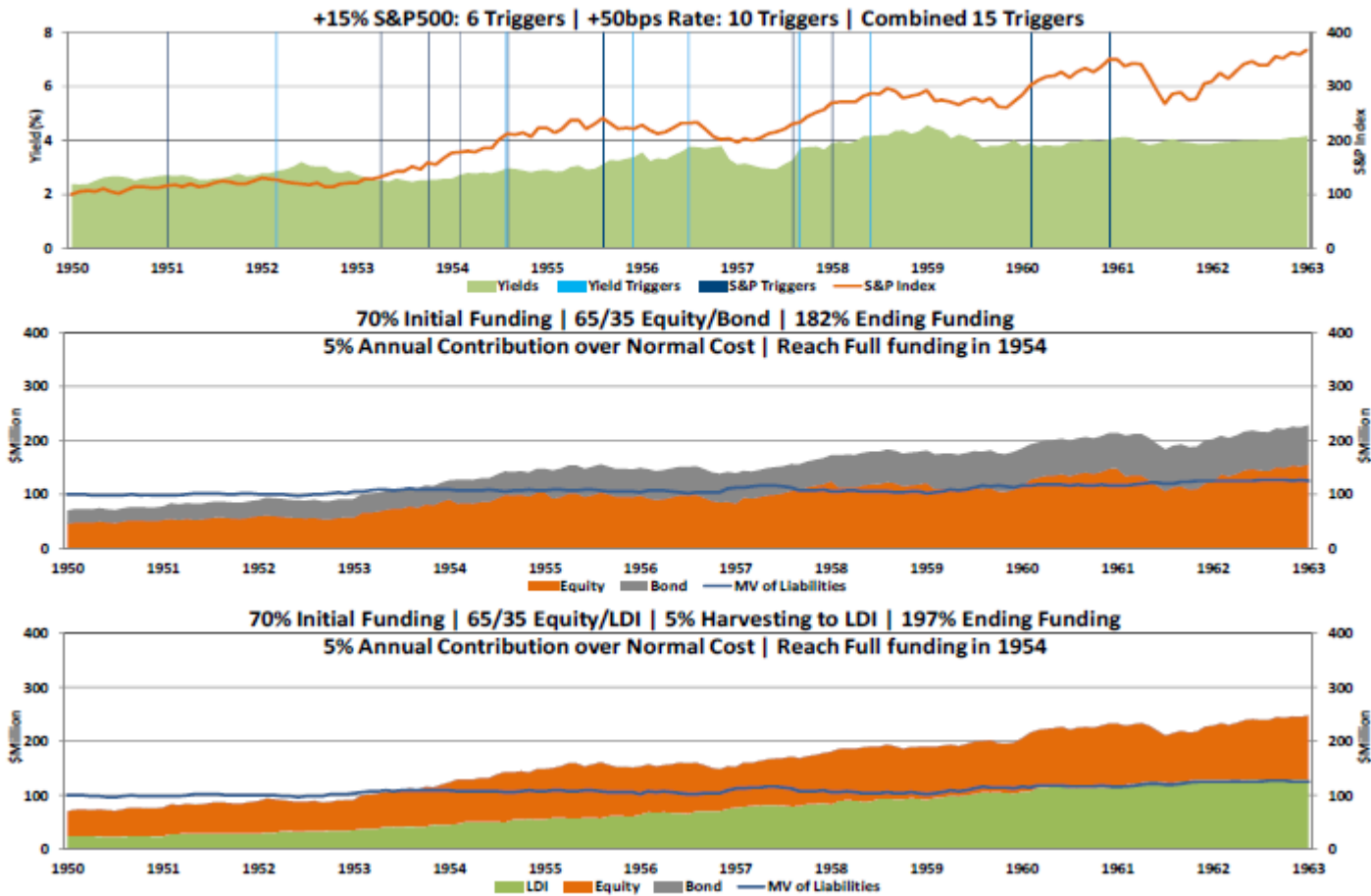
Core Theory: Capitalize on Volatile Rate moves



Source: Ryan Labs Treasury Composite

# Glide Path: 1950 to 1963: Traditional Allocation vs Dual Portfolio

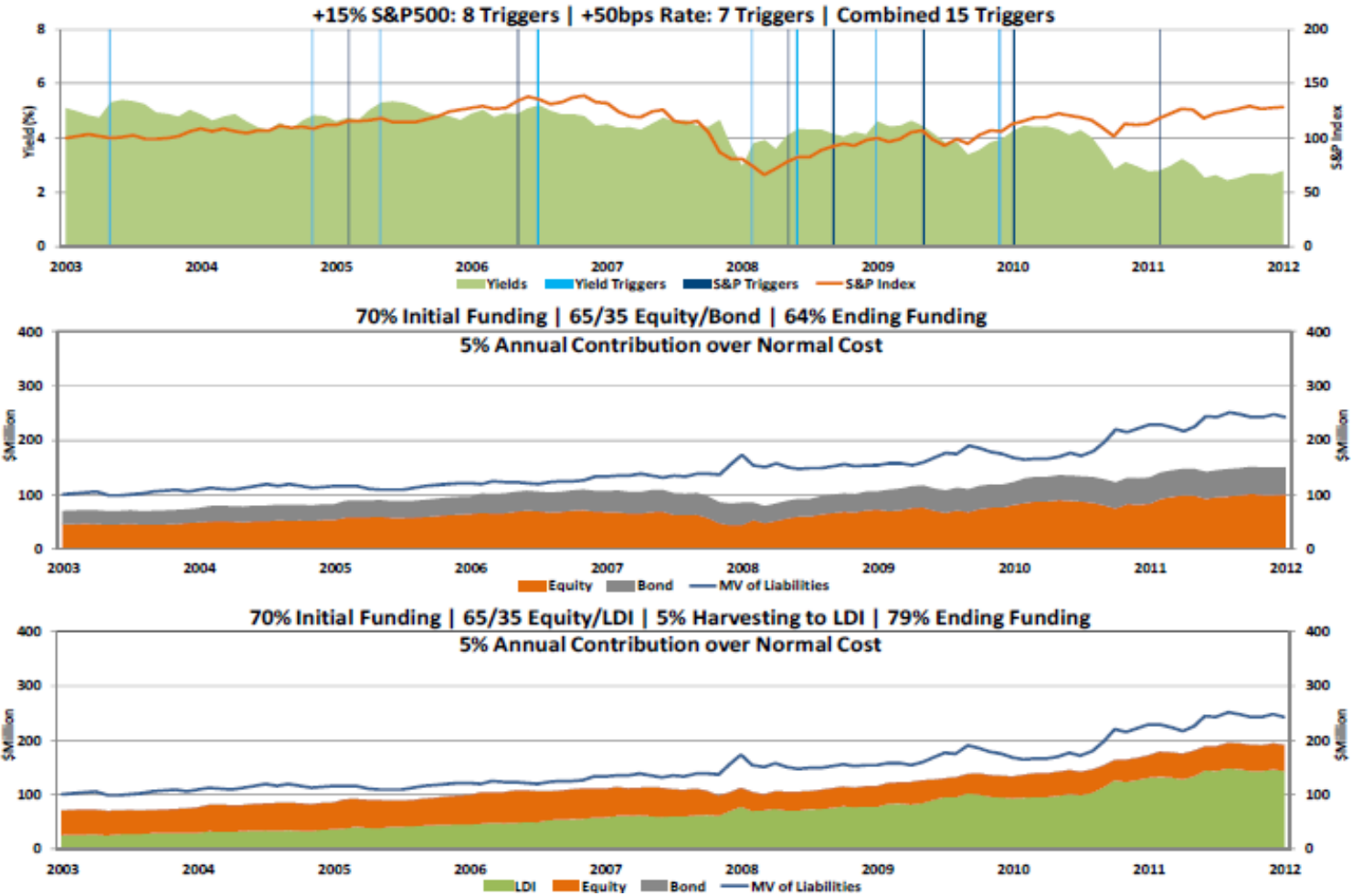
## LDI Glide Path from 1950 to 1963





# Glide Path: 2003 to 2012: Traditional Allocation vs Dual Portfolio

## LDI Glide Path from 2003 to 2012



## Conclusion: Key Thoughts

- Separate the collateral (assets) and the promises (liabilities)  
    Separate risk/reward assumptions for Asset & Liabilities
- Understand | Model | Quantify risks of the Sponsor and Plan
- Understand liquidity needs
- Establish triggers between “Dual” portfolios
- Define strategy and time period to meet asset allocation goals

# Disclosures

The information contained herein employs proprietary projections of expected returns of assets and liabilities, as well as estimates of their future volatility. The relative relationships and forecasts contained herein are based upon proprietary research and are developed through analysis of historical data and capital markets theory. These estimates have certain inherent limitations, and unlike an actual performance record, they do not reflect actual trading, liquidity constraints, fees and other costs. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. The forecasts contained herein are for illustrative purposes only and are not to be relied upon as advice or interpreted as a recommendation. Performance results represent the investment performance record for a size-weighted composite of similarly managed, unconstrained discretionary accounts.

Performance results are gross of investment management fees. The deduction of an advisory fee reduces an investor's return. Actual account performance will vary depending on individual portfolio security selection and the applicable fee schedule. Past performance is not a guarantee of comparable future results. Fees are described in Part II of the Advisor's ADV which is available upon request.

The following is an example of the effect of compounded advisory fees over a period of time on the value of a client's portfolio: A portfolio with a beginning value of \$100 million, gaining an annual return of 10% per annum would grow to \$259 million after 10 years, assuming no fees have been paid out. Conversely, a portfolio with a beginning value of \$100 million, gaining an annual return of 10% per annum, but paying a fee of 1% per annum, would only grow to \$235 million after 10 years. The annualized returns over the 10 year time period are 10.00% (gross of fees) and 8.91% (net of fees). If the fee in the above example was 0.25% per annum, the portfolio would grow to \$253 million after 10 years and return 9.73% net of fees. The fees were calculated on a monthly basis, which shows the maximum effect of compounding. The investment strategy described in this presentation is managed by Ryan Labs Asset Management's opinions and estimates offered constitute our judgment and are subject to change without notice, as are statements of financial market trends, which are based on current market conditions.

We believe the information provided here is reliable, but do not warrant its accuracy or completeness. This material is not intended as an offer or solicitation for the purchase or sale of any financial instrument. The views and strategies described may not be suitable for all investors. This material has been prepared for informational purposes only, and is not intended to provide, and should not be relied on for, accounting, legal or tax advice.