

Fresno County Employees' Retirement Association
Asset/Liability Study
October 6th & 7th, 2004

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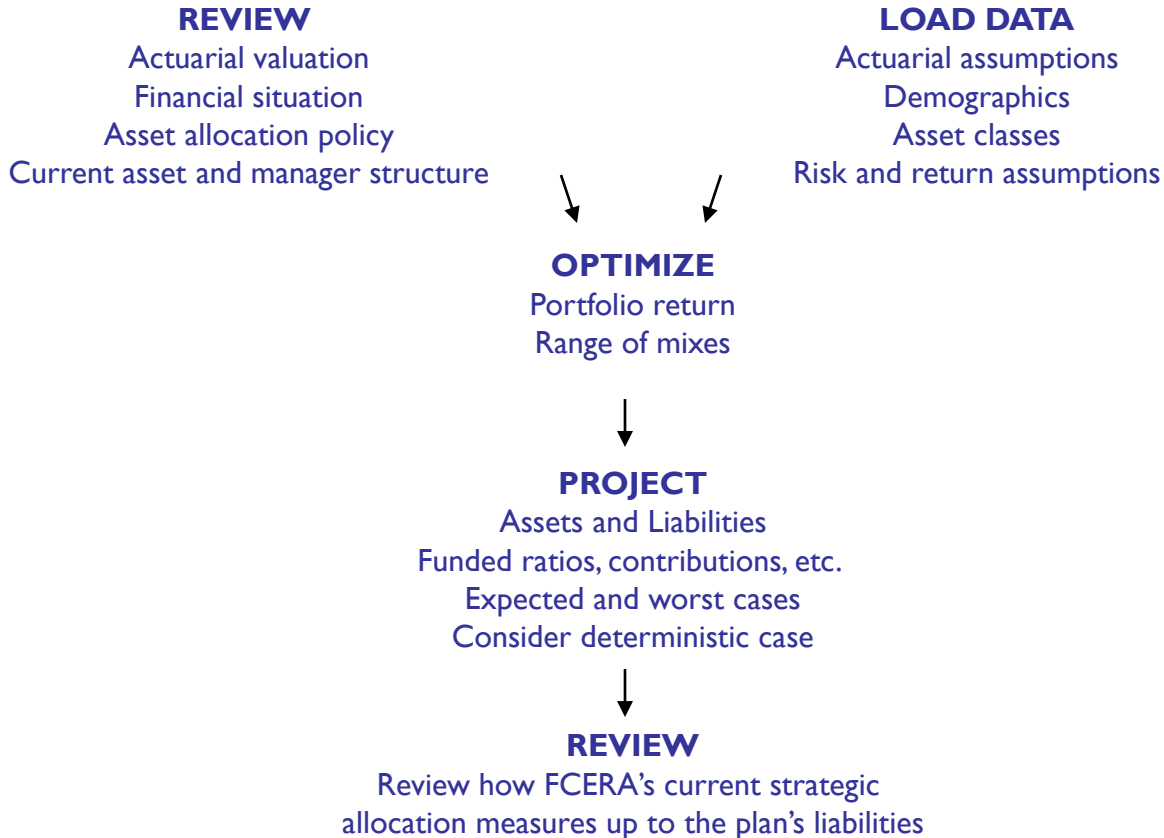
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INTRODUCTION

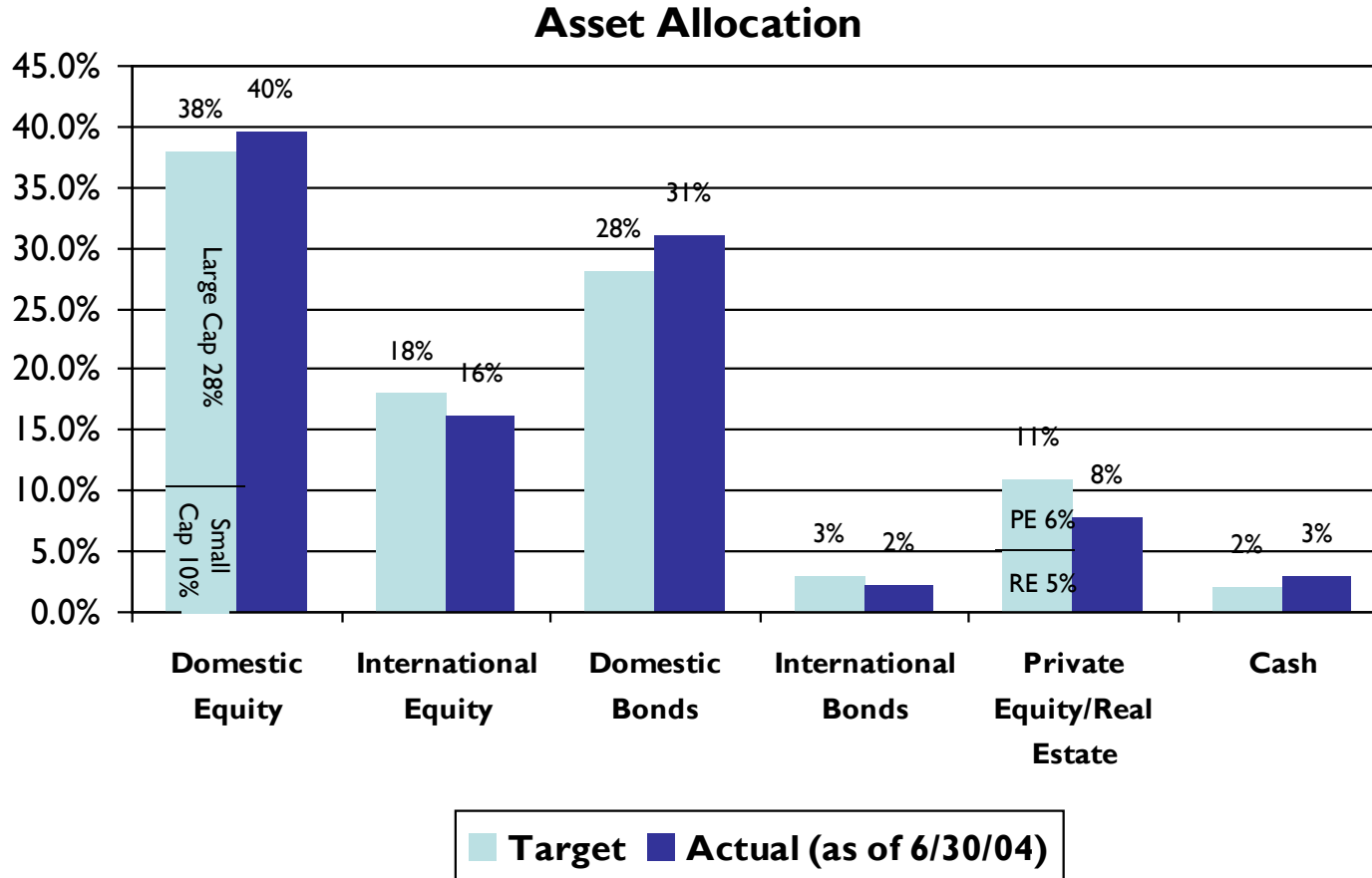
Introduction

- Fresno County Employee Retirement Association (FCERA) has engaged Wurts & Associates and Public Pension Professionals, Inc. (P³) to conduct an asset-liability study for its public pension fund for the purpose of gaining an in-depth understanding of its liabilities and its current asset allocation. Other stock and bond mixes were observed to offer a comparative analysis with FCERA's current allocation. Results of the analysis is provided in this report.
- P³ provided the liability files in ProVal format to Wurts and Associates. ProVal is the software used to do the asset-liability study.
- The asset assumptions were developed using the building block method. Wurts & Associates employed a risk premium method to assign expected returns for equities. Risk and correlation assumptions were developed from Wurts & Associates' analysis of these historic relationships. Six efficient portfolios ranging from 55/45 to 80/20 were identified using Mean Variance Optimization.
- We observed a deterministic case and stochastic cases:
 - In a deterministic case we assume we know what will happen in the future. We make our assumption and project *the* scenario.
 - In a stochastic case we make assumptions about input parameters and vary them projecting *many* scenarios (in this case, 2000 scenarios) and then summarizing the results by looking at the distribution (percentiles) of the results. The projection is from 2003-2013 (fiscal years).
- For the study, we considered the asset classes that FCERA currently holds in its portfolio. We modeled six (including current allocation) portfolios, ranging from 20% to 45% allocated to fixed income. We show comparative results for these six portfolios for various measures such as:
 - Required funding contributions and
 - Funded status

P rocess Overview

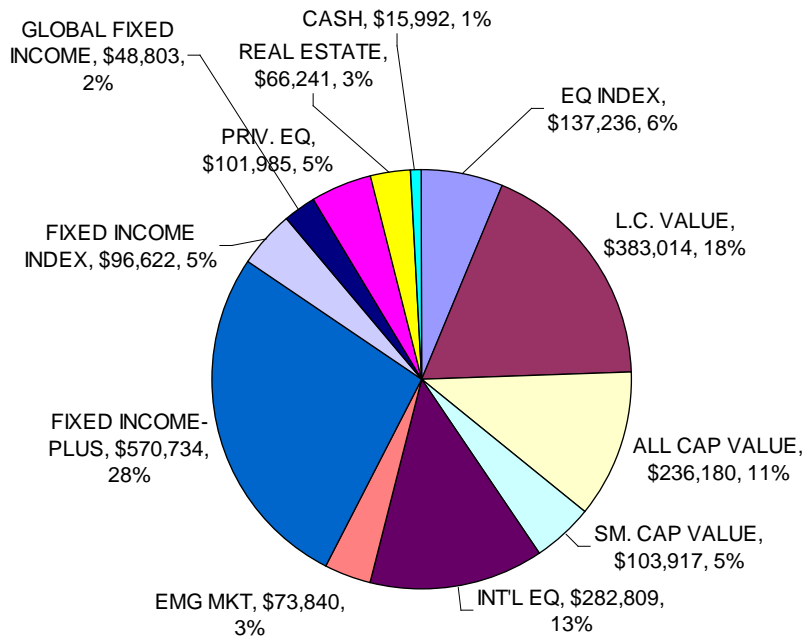


Current vs. Policy Allocation as of 6/30/04:

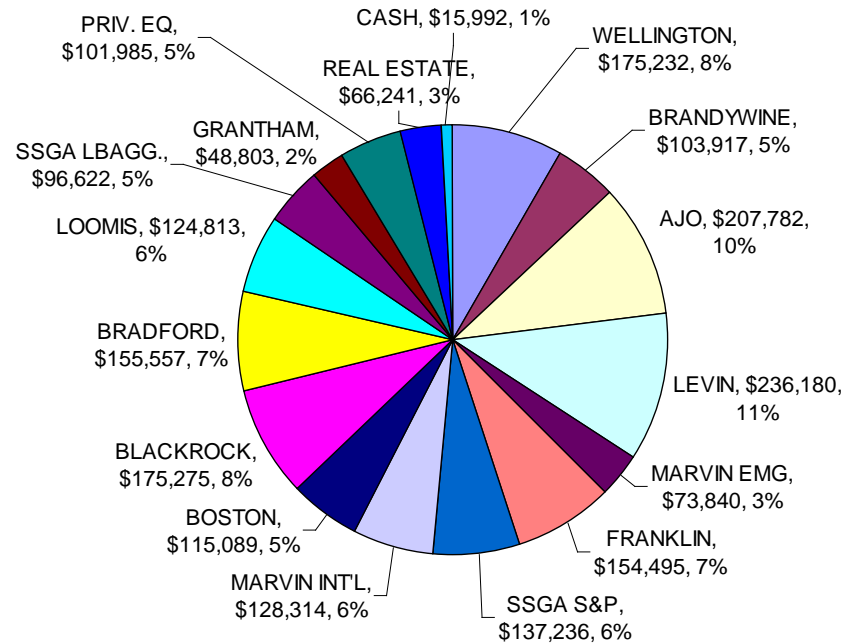


Asset Allocation as of June 30, 2004

Asset Allocation by Asset Class (000's)



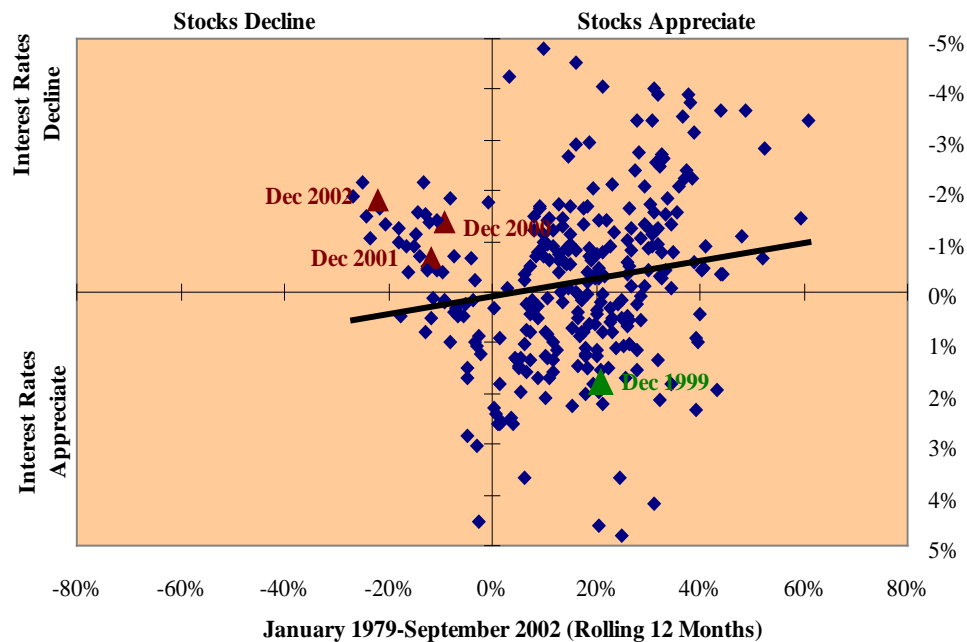
Asset Allocation by Manager (000's)



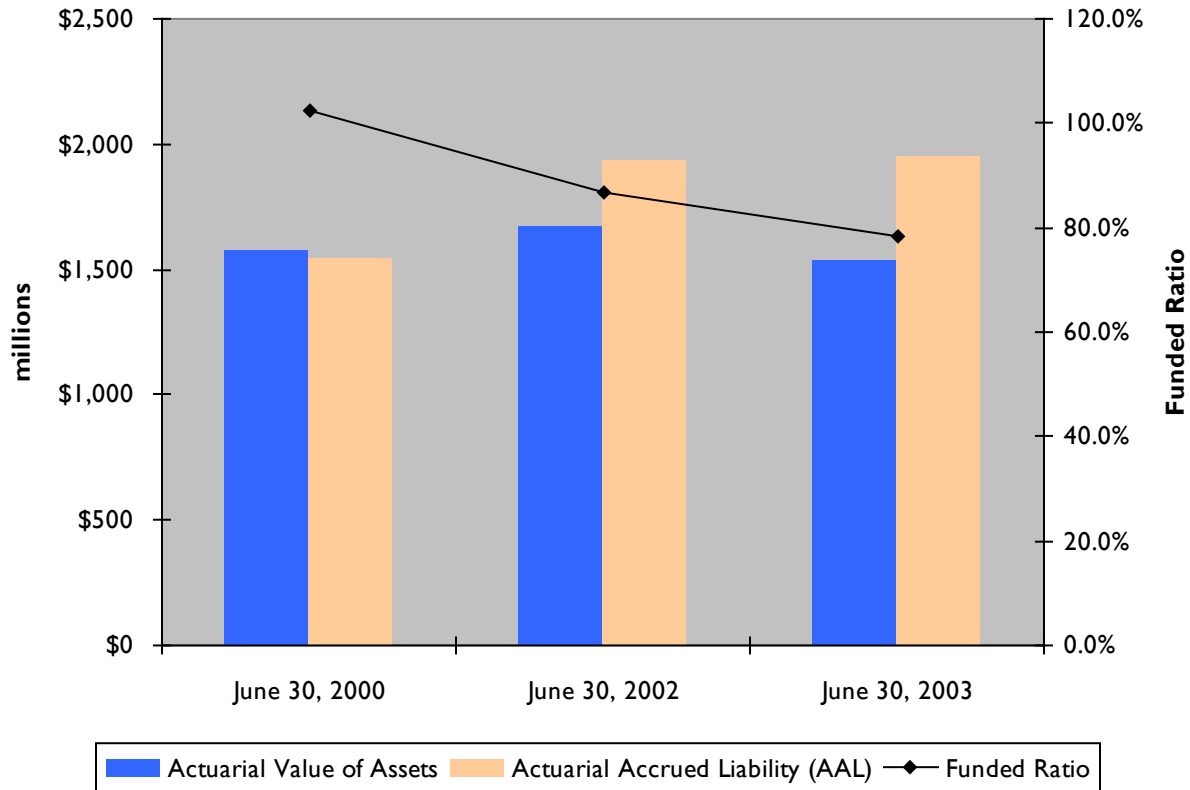
Total Market Value as of 6/30/04: \$2.117 billion

Nature of Pension Liabilities

- The liabilities of a pension plan are interest rate-sensitive because the liabilities represent the present value of future benefit payments. The duration of a pension plan's liabilities measures the sensitivity of the liabilities to a change in interest rates. For example, if the duration of a plan's pension liabilities is 20 years, then a 1% change in interest rates will result in a 20% change to the value of the liabilities.
- The worst case scenario for a defined benefit pension plan is an environment in which interest rates decline and investment returns are negative. This unusual environment persisted throughout 2000, 2001, and 2002. Notably, there has never previously been such an occurrence for three consecutive years.



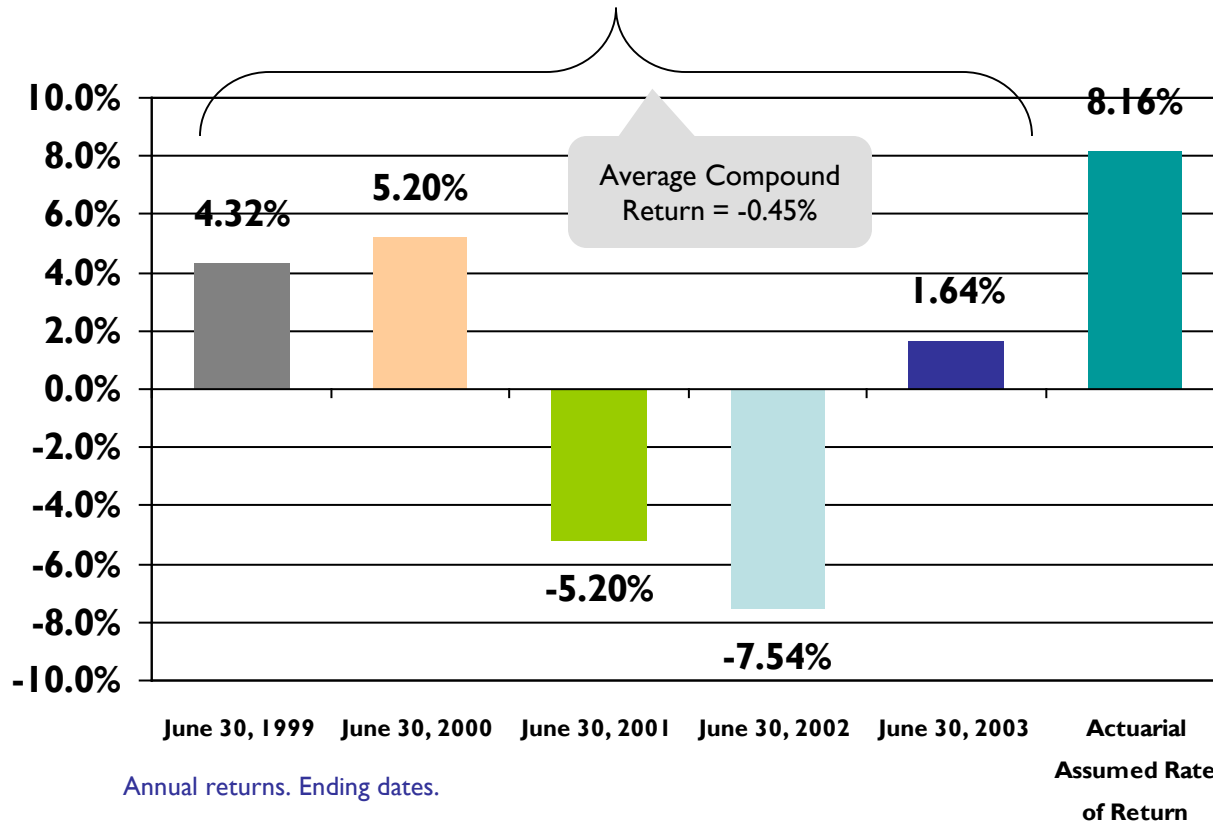
Funded Status of the Retirement Plan



Note: AAL includes Regular and Settlement Benefits.

As stated by Public Pension Professionals, Inc. (P³), the major events that affected the funded ratio were: Investments, demographics, and assumptions/methodologies changes.

Investment Experience



Disconnect between the actuarial assumed rate of return and the actual investment experience has been a major cause for the declining funded status.

Demographics and Assumption Changes

Demographics

- Average Pay increased
- The number of participants receiving checks increased
- Average monthly benefit check increased

Assumption Changes

Economic Change

- Salary increase for both Safety and General

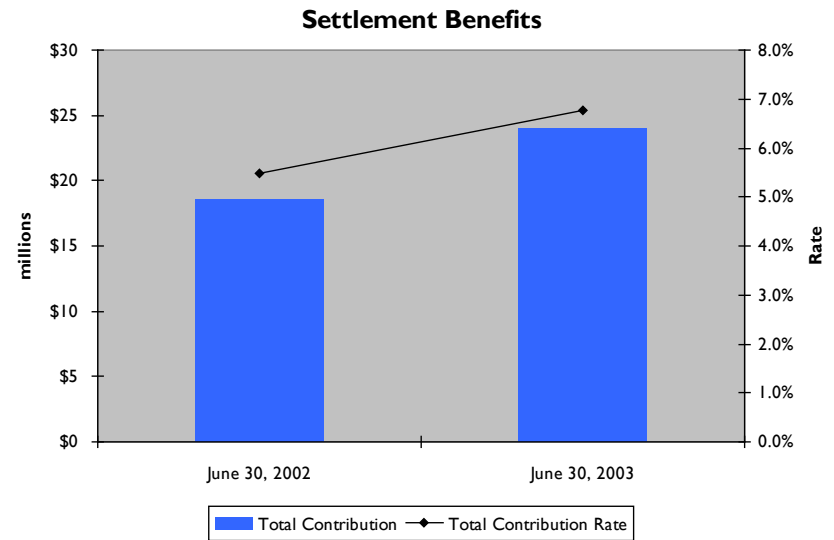
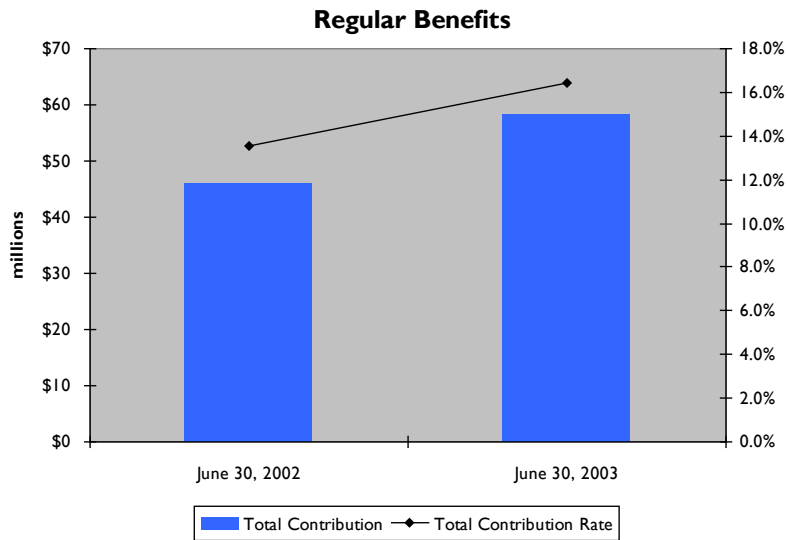
Demographic Change

- *Withdrawal* rates adjusted for both Safety and General
- Increased the *deferred vested* rates to reflect plan experience
- Adjusted incidence of *disabilities* at various ages to reflect plan experience
- A slight change in *retirement* rates to better match future expectations
- Adjusted *pre-retirement mortality* rates
- Adjusted *post-retirement mortality* rates (using a newer mortality table RP-2000)

Other Change

- The FCERA board also made a change in the amortization period, resetting it to 30 years for the Fiscal '03 valuation

Employer Contributions

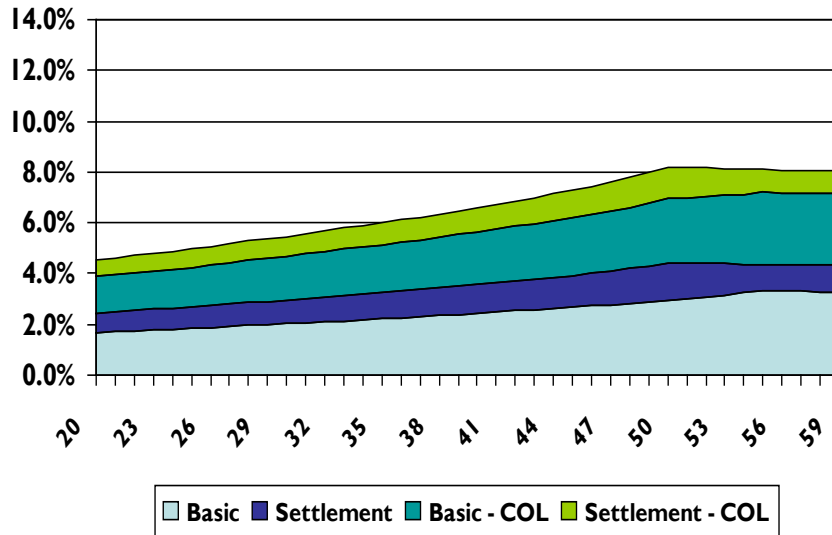


Note: Total = General + Safety.

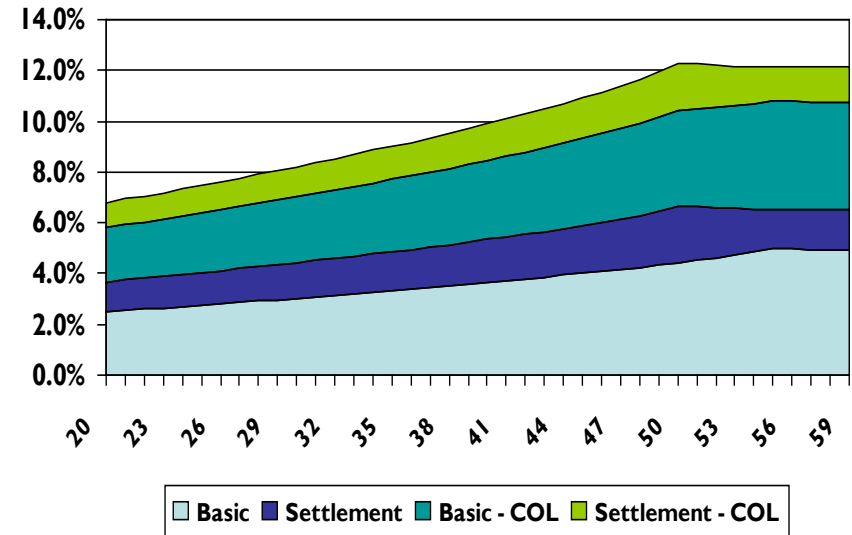
As stated by P³ there are no assets available from Undistributed Earnings as of June 30, 2003, therefore the contributions for the settlement benefits were required from the county for fiscal year 2003-2004.

Employee Contributions – General Members

Rate on First \$350 of Monthly Compensation



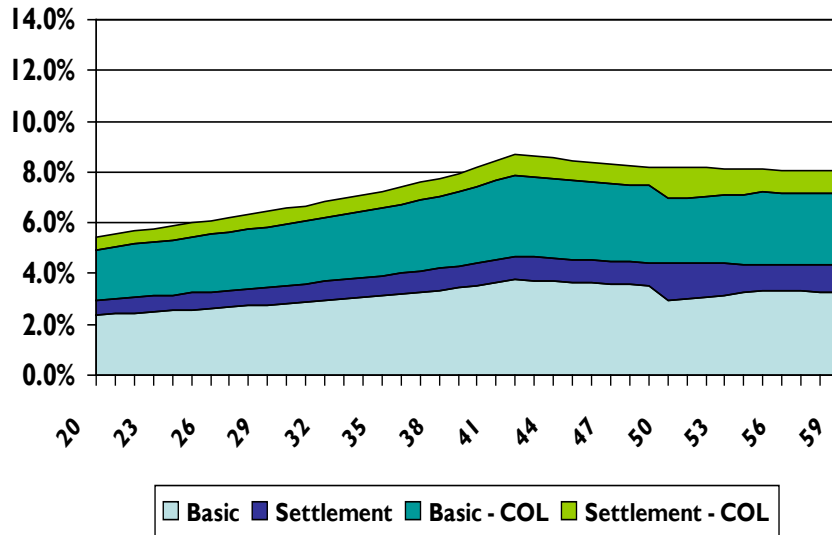
Rate on Compensation in Excess of \$350 per Month



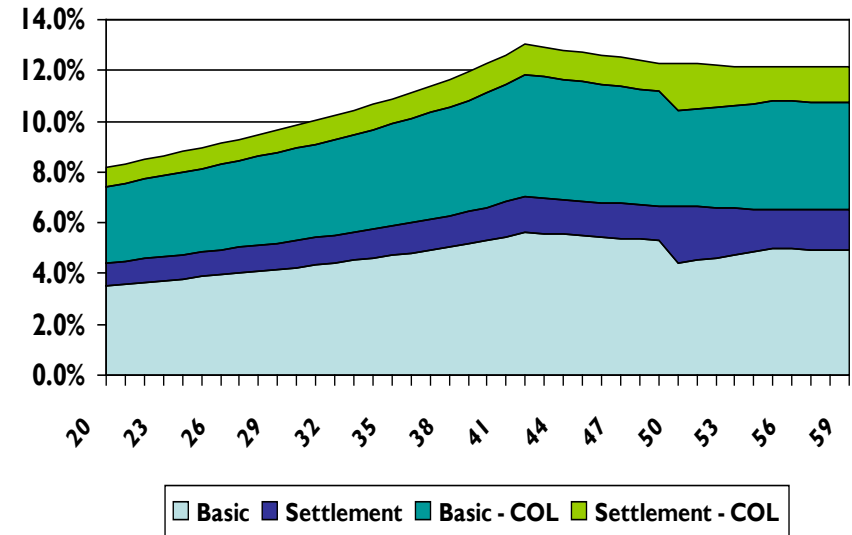
The increase in the total contribution is due to a combination of the increased life expectancy assumption, greater COL contribution, and the requirement of the settlement contributions, which were paid last year from Undistributed Earnings.

Employee Contributions – Safety Members

Rate on First \$350 of Monthly Compensation



Rate on Compensation in Excess of \$350 per Month



The increase in the total contribution is due to a combination of the increased life expectancy assumption, greater COL contribution, and the requirement of the settlement contributions, which were paid last year from Undistributed Earnings.

ASSET ASSUMPTIONS

Asset Class Selection

Asset Class	Return Enhancement	Risk Reduction	Include (Y/N)
Large Cap U.S. Equity	●	○	Y
Small / Mid Cap U.S. Equity	●	○	Y
International Equity	●	◐	Y
U.S. Core / International Fixed Income	○	●	Y
Fixed Income – High Yield	●	◐	N
Real Estate Equity	◐	●	Y
Real Estate REITs	◐	○	N
Liquid Alternatives / Hedge Funds	◐	●	N
Private Equity / Venture Capital	○	○	Y
Cash	○	●	Y

- High Impact
- ◐ Moderate Impact
- Low Impact

Wurts' Future Return and Risk Assumptions

<u>Asset Class</u>	<u>Historical Returns (Period)</u>	<u>10 Year Estimates</u>		
		<u>Avg. Consensus Returns</u>	<u>2004 Wurts' Returns</u>	<u>2004 Wurts' Standard Deviation</u>
Large Cap U.S. Equity	10.42% (1926-2003)	8.27%	8.20%	16.00%
Small / Mid Cap U.S. Equity	12.67% (1926- 2003)	9.03%	9.70%	22.00%
International Equity	10.82% (1970-2003)	8.67%	8.80%	19.00%
Core Fixed Income ¹	5.89% (1926-2003)	4.94%	5.25%	6.00%
Real Estate	9.31% (1978-2003)	8.42%	7.40%	12.00%
Private Equity / Venture Capital	11.72% (1987-2002)	11.03%	11.50%	35.00%
Cash	3.75% (1926-2003)	3.33%	3.00%	1.50%
Inflation	3.03% (1926-2003)	2.55%	2.70%	1.50%

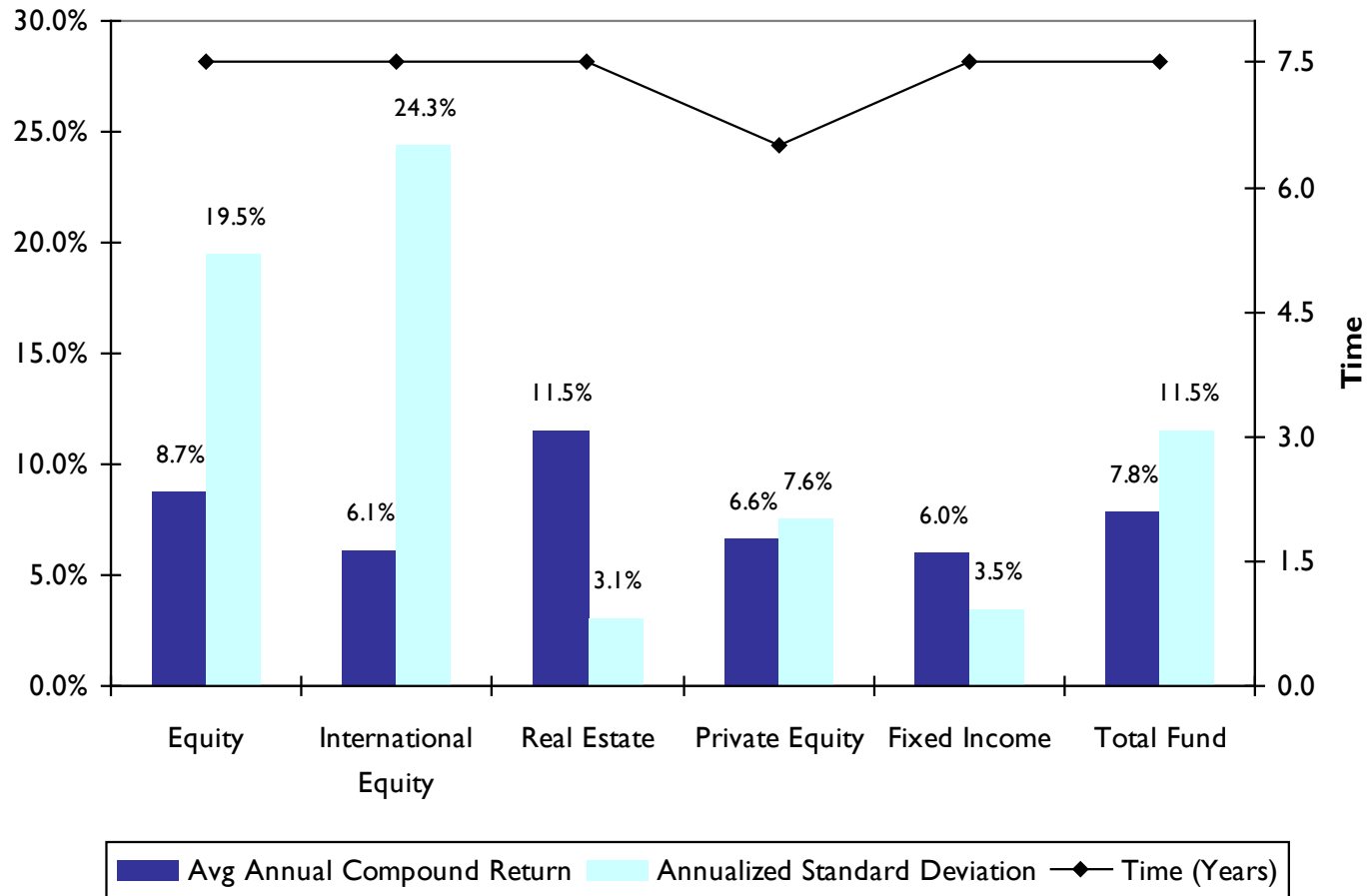
1. Our assumption for international fixed income is the same as the Core Fixed Income.
Source: Ibbotson.

Alpha and Total Return Assumptions

	Large Cap US Equity	Small Cap US Equity	International Equity	Real Estate	Private Equity	Core Fixed Income
Return	8.20%	9.70%	8.80%	7.40%	11.50%	5.25%
Alpha¹	0.50%	1.25%	1.25%	1.00%	0.00%	0.25%
Total Return	8.70%	10.95%	10.05%	8.40%	11.50%	5.50%

1. Further analysis can be found in the appendix.

F CERA's Historical Performance

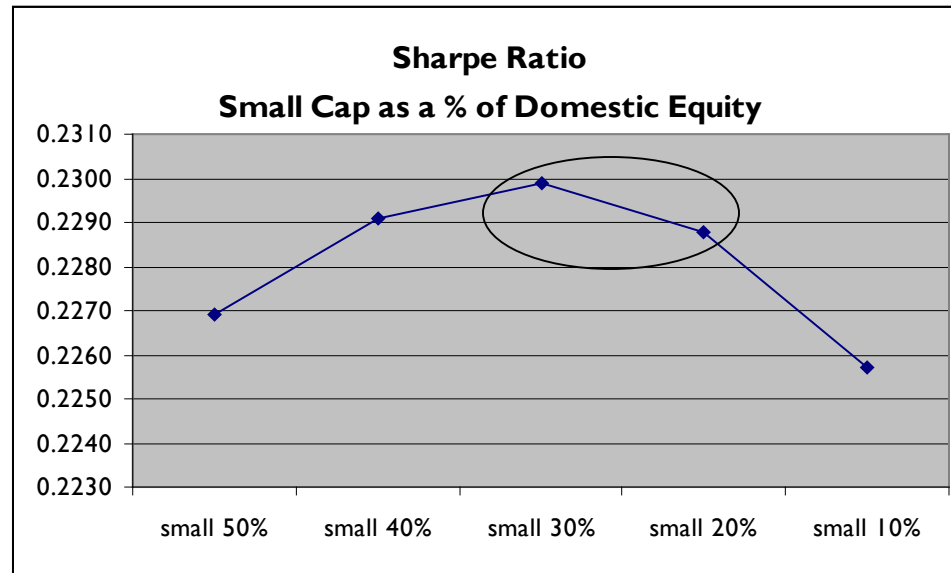


Source: Quarterly observations. Fixed income performance was a cap-weighted calculation of the domestic and global fixed income composites.

Wurts' Correlation Assumptions

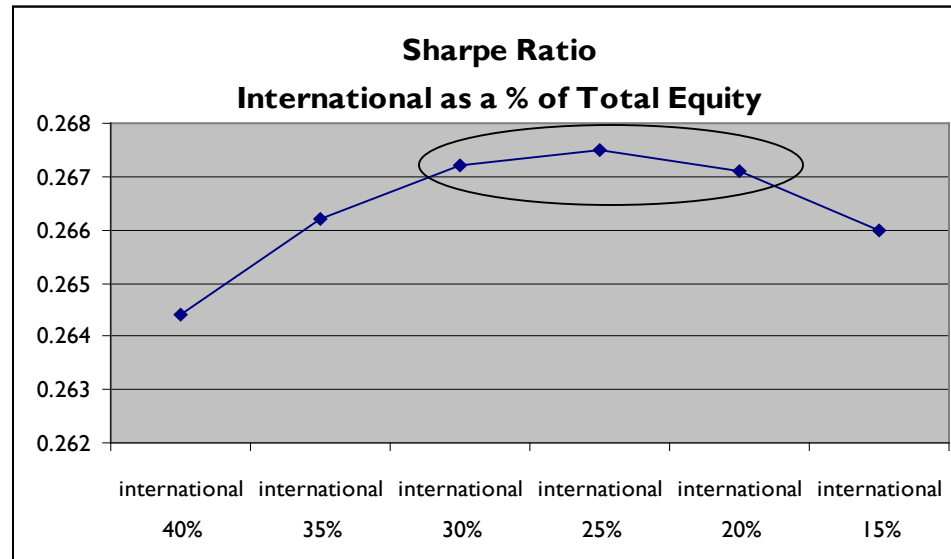
	Large Cap U.S. Equity	Small / Mid Cap U.S. Equity	International Equity	Venture/Private Equity	Real Estate Equity	Cash	Domestic/International Fixed Income
Large Cap U.S. Equity	1.00						
Small/Mid Cap U.S. Equity	0.85	1.00					
International Equity	0.70	0.60	1.00				
Venture/Private Equity	0.60	0.75	0.20	1.00			
Real Estate Equity	0.25	0.05	0.20	0.20	1.00		
Cash	0.00	0.05	0.20	-0.20	0.00	1.00	
Domestic/International Fixed Income	0.20	0.10	0.20	-0.30	-0.30	0.20	1.00

Small Cap Constraint



- A 30% small/70% large cap allocation exhibits the highest Sharpe ratio. Sharpe ratios were obtained by observing portfolios with varying combinations of large cap stocks (S&P 500) and small cap stocks (Ibbotson Small Stocks) going back to Jan 1926 to June 2004.
- According to Ibbotson, small cap stocks represent approximately 15 to 20 percent of the total domestic market. According to FCERA's policy, the small cap allocation relative to the domestic equity allocation is approximately 26%.
- Given these facts, we constrained the small cap allocation to be between 20 to 30 percent of the domestic equity allocation.

International Constraint



- International allocations between 20-30 percent exhibited the highest Sharpe ratios. Sharpe ratios were obtained by observing portfolios containing large and small cap stocks (Russell 3000) and international stocks (MSCI EAFE) with different weights starting from Jan 1970 to June 2004.
- According to FCERA's policy, the international allocation relative to total equity is 32%. Due to FCERA's higher risk tolerance, we constrained the international allocation to be between 25 and 35 percent of the total equity allocation.

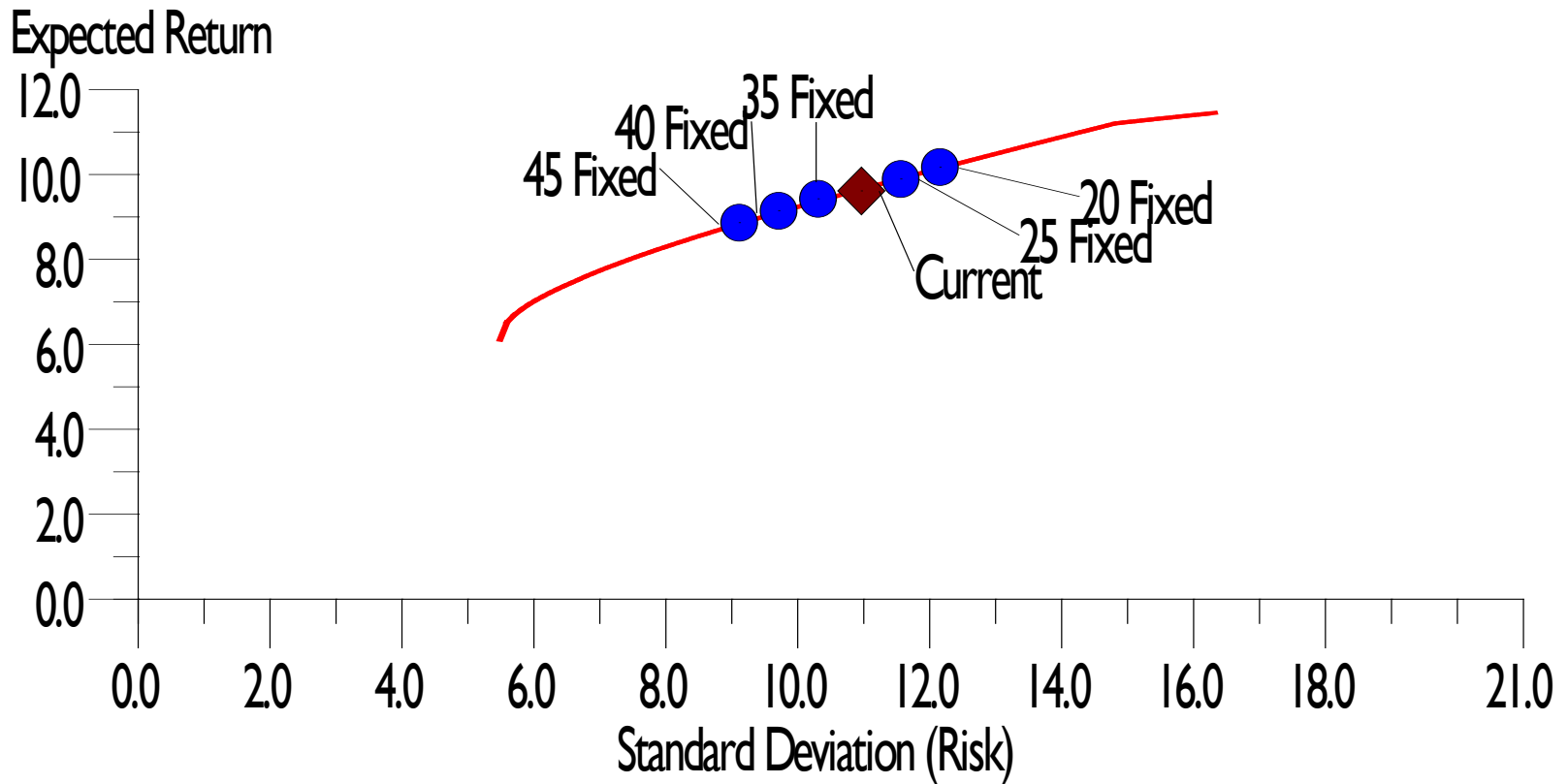
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Private Equity and Real Estate Constraints

Currently, the FCERA portfolio has an 11% allocation to private equity and real estate combined. The total equity allocation is 56% (28% Large Cap, 10% Small Cap, and 18% International). The combined private equity and real estate allocation is approximately 20% (11% / 56%) of the total equity allocation. We constrained private equity and real estate combined to be no more than 20% of the total equity portfolio due to the following reasons.

- **Private Equity** (capped at 5% of total portfolio)
 - Liquidity issues
 - Lack of transparency
 - High volatility and fees
 - Relatively high correlation with equities
- **Real Estate**
 - Liquidity issues

Efficient Frontier

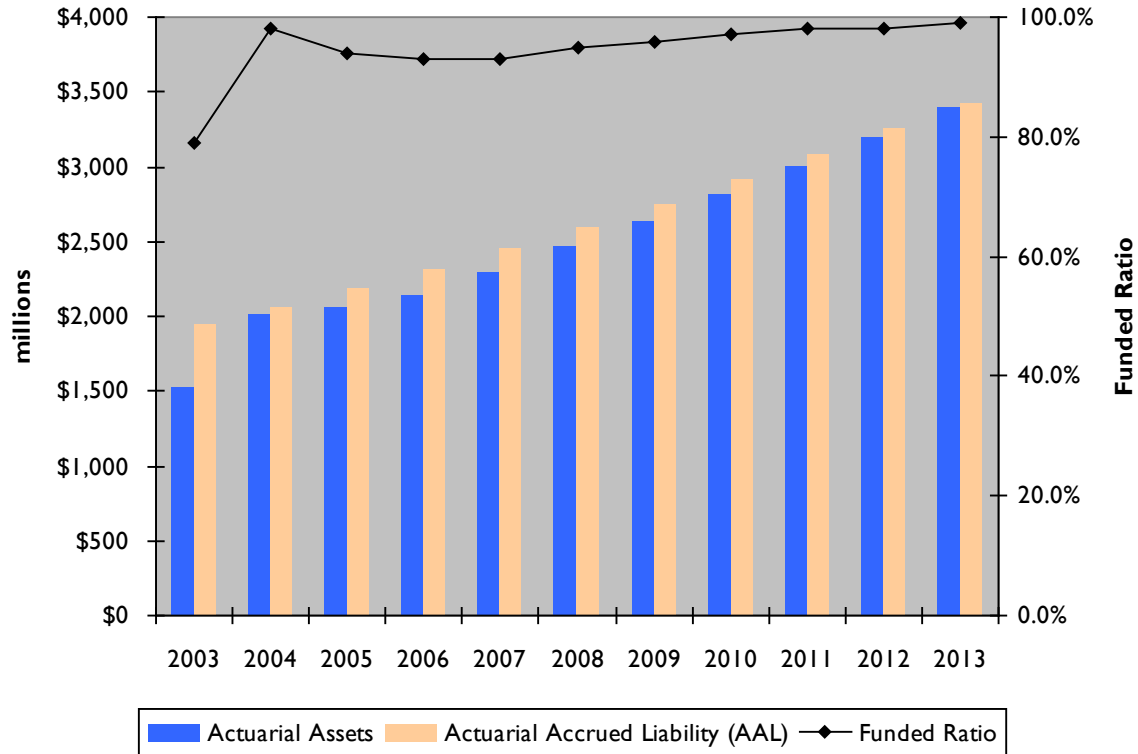


	45 Fixed	40 Fixed	35 Fixed	30 Fixed (Current)	25 Fixed	20 Fixed
Large Cap US Equity	20.06%	21.97%	23.87%	28.00%	27.68%	29.55%
Small Cap US Equity	8.60%	9.41%	10.23%	10.00%	11.86%	12.66%
International Equity	15.43%	16.90%	18.36%	18.00%	21.29%	22.73%
Real Estate	3.82%	4.65%	5.49%	5.00%	7.17%	7.99%
Private Equity	5.00%	5.00%	5.00%	6.00%	5.00%	5.00%
Fixed Income	45.09%	40.07%	35.05%	31.00%	24.99%	20.07%
<u>Cash</u>	<u>2.00%</u>	<u>2.00%</u>	<u>2.00%</u>	<u>2.00%</u>	<u>2.00%</u>	<u>2.00%</u>
Expected Return (Geometric/Compound)	8.42%	8.63%	8.83%	9.00%	9.23%	9.41%
Standard Deviation	9.10%	9.68%	10.28%	10.94%	11.53%	12.16%
Sharpe Ratio¹	0.60	0.58	0.57	0.55	0.54	0.53

1. Assumed the risk free rate = 3.0%.

DETERMINISTIC SCENARIO

Deterministic Case: Funded Ratio

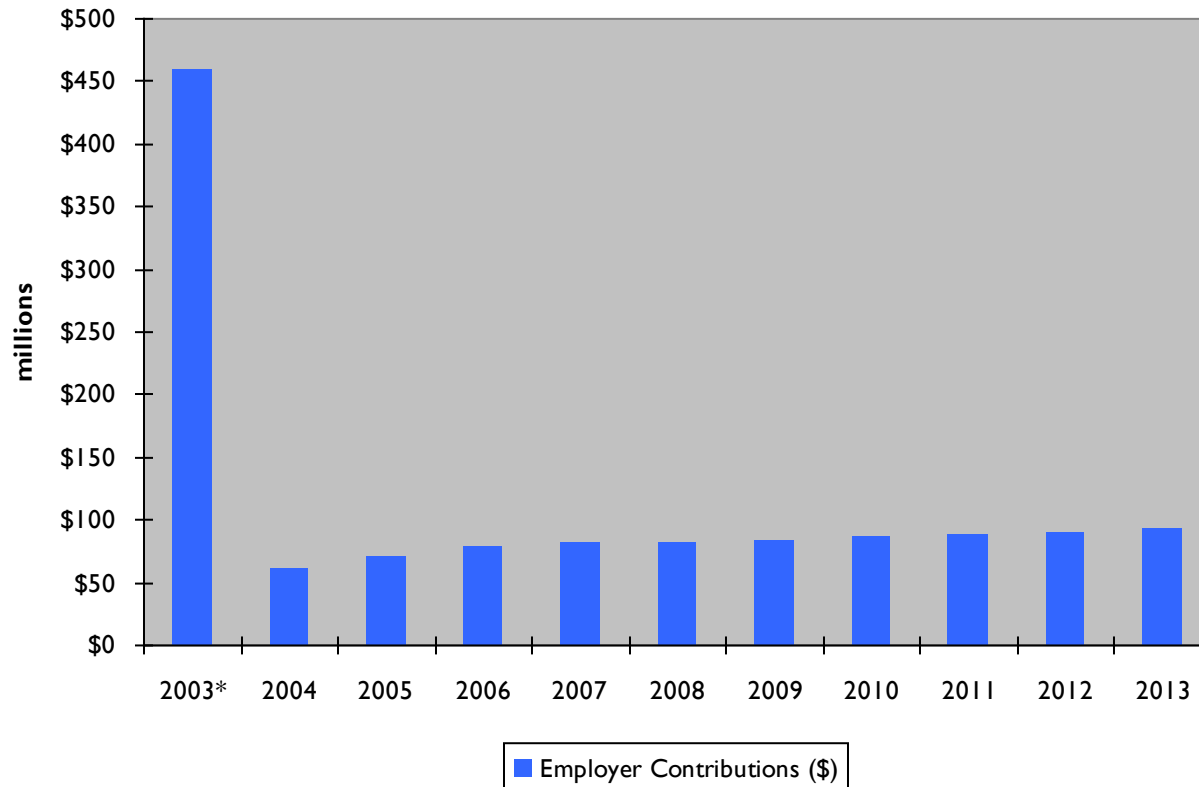


The key actuarial assumptions for FCERA’s plan are the following:

Assumed Rate of Return = 8.16%, Inflation = 4.0%, Average Salary Increase: General = 6.4% and Safety = 5.5%

- This deterministic case assumed that all actuarial assumptions were attained: rate of return, inflation, salary increases, demographics, etc... (Used the actual 2003 return, since it was known when the study was done.)
- This includes both regular and settlement benefits.

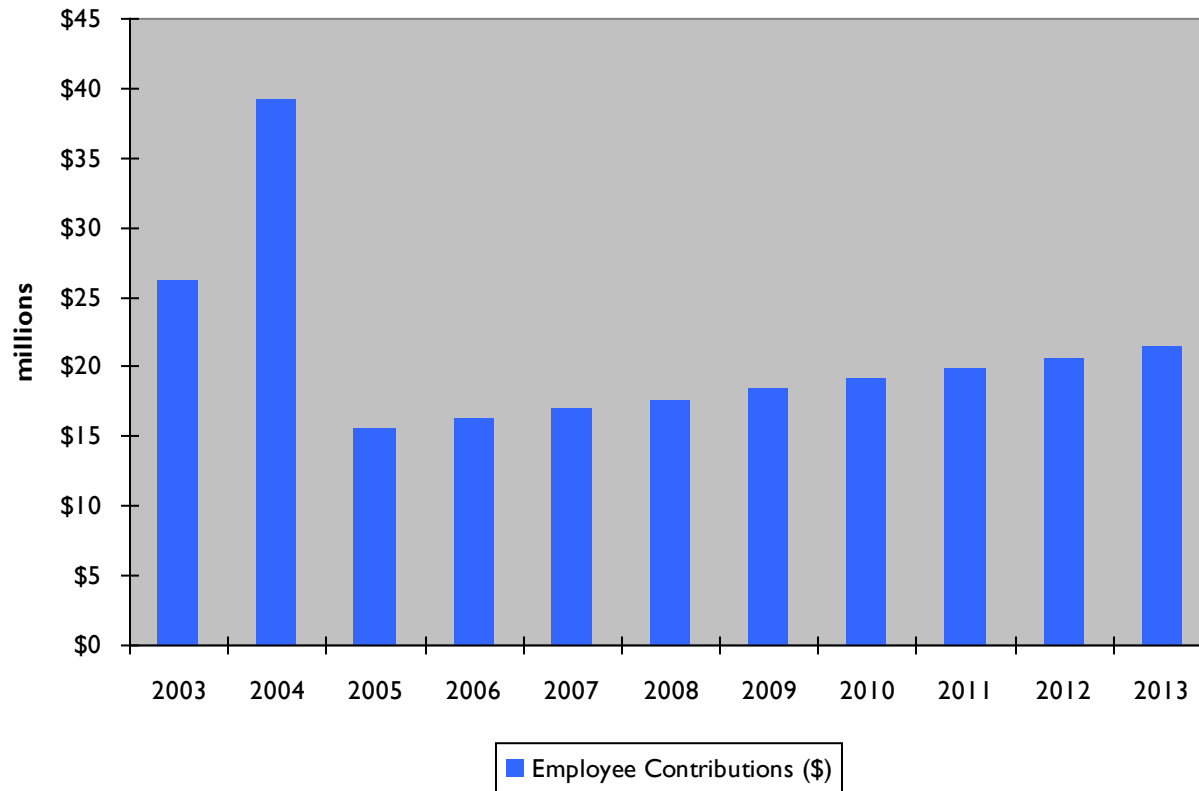
Deterministic Case: Employer Contributions



- This deterministic case assumed that all actuarial assumptions were attained: rate of return, inflation, salary increases, demographics, etc... (Used the actual 2003 return, since it was known when the study was done.)
- This includes both regular and settlement benefits.

* The 2003 contribution includes the \$398 million pension obligation bond.

Deterministic Case: Employee Contributions



- This includes both general and safety (regular and settlement benefits).

Note: Fiscal Years

STOCHASTIC SCENARIO

Stochastic Case

- The Stochastic Case uses the asset assumptions to simulate different return scenarios and incorporates that information with the liabilities.
- The liabilities that get projected along with the assets were inputted into ProVal by P³, since they use ProVal for their own clients.
- Once the forecast is done, funded ratios and contributions are measured.
- The forecast consists of 2,000 scenarios. Each scenario is a potential path of what could happen in the next 10 years for asset returns.
- Since there are 2,000 scenarios, ranges (percentiles) for funded ratios and contributions are measured.

Key:

5 th Percentile:	Best Case
25 th Percentile:	Optimistic
50 th Percentile:	Most Probable
75 th Percentile:	Pessimistic
95 th Percentile:	Worst Case

- The funded ratios and contributions are total numbers: Regular + Settlement Benefits.

Stochastic Case: Cumulative Compound Returns

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
45 Fixed											
5%: Best Case	15.3%	18.7%	16.9%	15.7%	15.0%	14.1%	13.9%	13.5%	13.2%	12.8%	12.8%
25%: Optimistic	15.3%	14.6%	13.0%	12.1%	11.7%	11.3%	10.9%	10.6%	10.5%	10.3%	10.2%
50%: Most Probable	15.3%	11.5%	10.2%	9.6%	9.2%	9.0%	8.8%	8.7%	8.5%	8.4%	8.4%
75%: Pessimistic	15.3%	8.2%	7.2%	6.7%	6.7%	6.5%	6.5%	6.4%	6.5%	6.6%	6.7%
95%: Worst Case	15.3%	3.0%	2.6%	2.9%	3.1%	3.3%	3.3%	3.5%	3.7%	3.7%	3.9%
40 Fixed											
5%: Best Case	15.3%	19.3%	17.6%	16.3%	15.6%	14.7%	14.4%	14.0%	13.7%	13.4%	13.2%
25%: Optimistic	15.3%	15.0%	13.4%	12.5%	12.1%	11.7%	11.2%	11.0%	10.8%	10.6%	10.5%
50%: Most Probable	15.3%	11.7%	10.4%	9.8%	9.4%	9.1%	9.0%	8.8%	8.7%	8.6%	8.5%
75%: Pessimistic	15.3%	8.2%	7.1%	6.8%	6.7%	6.6%	6.5%	6.4%	6.5%	6.7%	6.7%
95%: Worst Case	15.3%	2.5%	2.1%	2.6%	2.8%	3.1%	3.2%	3.3%	3.6%	3.6%	3.9%
35 Fixed											
5%: Best Case	15.3%	20.1%	18.1%	17.0%	16.2%	15.2%	14.9%	14.4%	14.2%	13.9%	13.7%
25%: Optimistic	15.3%	15.4%	13.7%	12.9%	12.5%	12.0%	11.5%	11.3%	11.2%	11.0%	10.8%
50%: Most Probable	15.3%	11.9%	10.6%	9.9%	9.6%	9.3%	9.2%	9.0%	8.9%	8.9%	8.8%
75%: Pessimistic	15.3%	8.2%	7.1%	6.8%	6.7%	6.6%	6.6%	6.5%	6.6%	6.8%	6.8%
95%: Worst Case	15.3%	2.0%	1.8%	2.4%	2.5%	2.8%	3.1%	3.1%	3.5%	3.5%	3.8%

Note: Fiscal Years.

Stochastic Case: Cumulative Compound Returns

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
30 Fixed (Current)											
5%: Best Case	15.3%	20.6%	18.8%	17.7%	16.8%	15.7%	15.4%	14.9%	14.7%	14.4%	14.1%
25%: Optimistic	15.3%	15.8%	14.1%	13.3%	12.9%	12.4%	11.9%	11.6%	11.5%	11.2%	11.1%
50%: Most Probable	15.3%	12.0%	10.7%	10.1%	9.8%	9.5%	9.4%	9.1%	9.1%	9.0%	8.9%
75%: Pessimistic	15.3%	8.0%	7.1%	6.7%	6.7%	6.5%	6.6%	6.5%	6.6%	6.8%	6.9%
95%: Worst Case	15.3%	1.4%	1.2%	1.9%	2.3%	2.5%	3.0%	2.9%	3.4%	3.2%	3.6%
25 Fixed											
5%: Best Case	15.3%	21.3%	19.3%	18.3%	17.5%	16.3%	16.0%	15.5%	15.2%	14.9%	14.6%
25%: Optimistic	15.3%	16.1%	14.5%	13.7%	13.2%	12.7%	12.2%	12.0%	11.9%	11.6%	11.5%
50%: Most Probable	15.3%	12.2%	10.9%	10.3%	10.0%	9.7%	9.6%	9.4%	9.4%	9.2%	9.1%
75%: Pessimistic	15.3%	8.0%	7.0%	6.7%	6.6%	6.7%	6.7%	6.6%	6.7%	6.9%	6.9%
95%: Worst Case	15.3%	1.1%	1.1%	1.7%	2.0%	2.3%	2.7%	2.8%	3.3%	3.2%	3.5%
20 Fixed											
5%: Best Case	15.3%	22.0%	20.0%	18.9%	18.1%	16.9%	16.6%	16.0%	15.7%	15.4%	15.1%
25%: Optimistic	15.3%	16.5%	14.9%	14.1%	13.6%	13.1%	12.6%	12.3%	12.2%	11.9%	11.8%
50%: Most Probable	15.3%	12.3%	11.1%	10.5%	10.1%	9.9%	9.8%	9.6%	9.6%	9.4%	9.3%
75%: Pessimistic	15.3%	7.9%	6.9%	6.7%	6.7%	6.6%	6.7%	6.6%	6.8%	6.9%	7.0%
95%: Worst Case	15.3%	0.5%	0.7%	1.3%	1.8%	2.2%	2.5%	2.7%	3.2%	3.1%	3.3%

Note: Fiscal Years.

Stochastic Case: Funded Ratios

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
45 Fixed											
5%: Best Case	79%	98%	98%	100%	105%	112%	118%	123%	127%	131%	136%
25%: Optimistic	79%	98%	96%	96%	99%	103%	106%	108%	110%	112%	113%
50%: Most Probable	79%	98%	95%	94%	94%	97%	98%	98%	99%	100%	101%
75%: Pessimistic	79%	98%	94%	91%	90%	90%	90%	89%	89%	89%	89%
95%: Worst Case	79%	98%	92%	86%	83%	81%	79%	78%	77%	76%	76%
40 Fixed											
5%: Best Case	79%	98%	98%	101%	106%	113%	120%	125%	130%	135%	140%
25%: Optimistic	79%	98%	96%	97%	99%	104%	107%	110%	112%	114%	116%
50%: Most Probable	79%	98%	95%	94%	95%	97%	98%	99%	100%	101%	102%
75%: Pessimistic	79%	98%	94%	91%	90%	90%	90%	89%	89%	89%	90%
95%: Worst Case	79%	98%	92%	86%	83%	81%	78%	77%	76%	76%	76%
35 Fixed											
5%: Best Case	79%	98%	98%	101%	107%	115%	122%	128%	134%	140%	145%
25%: Optimistic	79%	98%	96%	97%	100%	105%	108%	112%	114%	116%	118%
50%: Most Probable	79%	98%	95%	94%	95%	98%	99%	100%	101%	102%	104%
75%: Pessimistic	79%	98%	94%	91%	90%	90%	90%	89%	89%	89%	90%
95%: Worst Case	79%	98%	91%	86%	82%	80%	78%	76%	75%	75%	75%

Note: Fiscal Years

Stochastic Case: Funded Ratios

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
30 Fixed (Current)											
5%: Best Case	79%	98%	98%	102%	109%	117%	125%	132%	138%	145%	151%
25%: Optimistic	79%	98%	96%	97%	101%	106%	110%	113%	115%	118%	120%
50%: Most Probable	79%	98%	95%	94%	95%	98%	99%	100%	102%	103%	104%
75%: Pessimistic	79%	98%	94%	91%	90%	90%	89%	89%	89%	89%	90%
95%: Worst Case	79%	98%	91%	85%	81%	79%	77%	75%	75%	75%	74%
25 Fixed											
5%: Best Case	79%	98%	99%	103%	110%	119%	127%	134%	142%	150%	157%
25%: Optimistic	79%	98%	97%	98%	101%	107%	111%	115%	118%	120%	123%
50%: Most Probable	79%	98%	95%	94%	96%	99%	100%	101%	103%	104%	106%
75%: Pessimistic	79%	98%	94%	91%	90%	90%	90%	89%	90%	90%	90%
95%: Worst Case	79%	98%	91%	85%	81%	79%	76%	75%	75%	74%	74%
20 Fixed											
5%: Best Case	79%	98%	99%	103%	111%	121%	130%	138%	147%	155%	164%
25%: Optimistic	79%	98%	97%	98%	102%	108%	113%	117%	120%	123%	126%
50%: Most Probable	79%	98%	95%	95%	96%	99%	101%	102%	104%	105%	107%
75%: Pessimistic	79%	98%	94%	91%	90%	90%	89%	89%	90%	90%	91%
95%: Worst Case	79%	98%	90%	84%	81%	78%	76%	74%	74%	73%	73%

Note: Fiscal Years

Wurts & Associates

Stochastic Case: Total Contributions (Employer + Employee)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
45 Fixed										
5%: Best Case	101.20	77.57	73.86	66.42	56.55	47.63	40.44	35.20	33.39	33.36
25%: Optimistic	101.20	105.62	83.85	80.64	77.95	76.19	74.86	72.06	68.91	65.15
50%: Most Probable	101.20	109.83	110.01	95.25	103.31	103.46	105.30	106.45	107.04	107.69
75%: Pessimistic	101.20	113.36	121.95	124.29	131.54	133.83	137.86	142.51	148.96	152.87
95%: Worst Case	101.20	118.96	135.40	148.18	161.51	172.29	184.54	194.77	204.53	213.13
40 Fixed										
5%: Best Case	101.20	77.57	73.86	66.42	56.55	47.63	39.27	34.93	32.87	33.07
25%: Optimistic	101.20	105.05	83.85	80.62	77.78	75.86	74.61	71.62	68.85	64.80
50%: Most Probable	101.20	109.74	109.44	95.19	102.76	103.02	104.97	106.18	106.91	107.30
75%: Pessimistic	101.20	113.34	121.86	124.07	130.93	133.62	137.44	142.06	148.22	152.68
95%: Worst Case	101.20	118.94	135.23	147.85	161.26	172.11	184.54	194.66	205.10	212.84
35 Fixed										
5%: Best Case	101.20	76.51	72.30	62.64	50.57	39.32	32.37	31.15	31.08	31.41
25%: Optimistic	101.20	103.68	82.07	78.14	73.47	69.57	66.63	61.88	56.17	52.10
50%: Most Probable	101.20	109.43	107.32	93.03	99.27	98.68	99.86	100.67	99.57	100.01
75%: Pessimistic	101.20	113.43	121.56	123.66	130.57	131.74	134.55	139.39	143.99	151.17
95%: Worst Case	101.20	119.57	136.02	149.34	163.25	174.21	187.24	197.29	205.48	215.75

Note: Fiscal Years, millions

Wurts & Associates

Stochastic Case: Total Contributions (Employer + Employee)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
30 Fixed (Current)										
5%: Best Case	101.20	75.99	71.12	60.96	47.51	35.13	31.15	30.66	30.68	30.89
25%: Optimistic	101.20	102.35	81.24	76.92	71.50	67.12	62.98	56.88	51.50	48.83
50%: Most Probable	101.20	109.18	104.30	92.16	96.82	96.81	97.94	98.72	97.08	96.68
75%: Pessimistic	101.20	113.40	121.56	123.03	130.62	131.23	135.40	139.02	143.52	150.16
95%: Worst Case	101.20	119.99	136.92	149.87	164.57	176.80	189.38	198.19	208.24	218.39
25 Fixed										
5%: Best Case	101.20	75.49	70.46	59.17	44.00	32.91	30.60	30.34	30.21	30.65
25%: Optimistic	101.20	99.18	80.42	75.57	69.35	63.64	58.84	52.52	46.40	45.67
50%: Most Probable	101.20	108.78	100.18	90.92	94.02	94.18	95.44	95.41	92.46	92.50
75%: Pessimistic	101.20	113.31	121.11	121.60	128.88	129.54	133.11	136.81	140.74	147.69
95%: Worst Case	101.20	120.19	136.80	149.97	165.13	177.55	189.75	198.70	206.72	217.44
20 Fixed										
5%: Best Case	101.20	75.15	69.38	56.88	40.73	31.46	30.17	29.85	29.83	30.14
25%: Optimistic	101.20	83.79	79.68	74.61	67.37	60.88	54.22	48.45	43.52	43.20
50%: Most Probable	101.20	108.48	96.41	90.25	92.17	92.15	92.90	92.13	89.22	88.28
75%: Pessimistic	101.20	113.30	121.03	121.33	127.97	129.02	131.39	135.11	139.22	146.16
95%: Worst Case	101.20	121.01	137.28	150.73	165.73	177.44	190.39	199.77	206.72	218.25

Note: Fiscal Years, millions

Stochastic Case: Employer Contributions

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
45 Fixed										
5%: Best Case	61.92	49.39	45.58	37.54	27.32	16.74	4.35	0.00	0.00	0.00
25%: Optimistic	61.92	65.90	54.24	50.57	46.51	43.03	39.58	35.96	31.78	27.32
50%: Most Probable	61.92	69.36	69.72	62.48	65.31	65.35	66.22	66.80	66.76	66.37
75%: Pessimistic	61.92	72.49	79.92	82.03	87.63	90.44	94.55	98.83	102.60	107.91
95%: Worst Case	61.92	77.26	92.12	103.61	114.66	124.93	134.74	144.94	151.81	160.55
40 Fixed										
5%: Best Case	61.92	49.39	45.58	37.54	27.32	16.74	4.35	0.00	0.00	0.00
25%: Optimistic	61.92	65.90	54.24	50.57	46.51	43.03	39.58	35.96	31.78	27.32
50%: Most Probable	61.92	69.36	69.72	62.48	65.31	65.35	66.22	66.80	66.76	66.37
75%: Pessimistic	61.92	72.49	79.92	82.03	87.63	90.44	94.55	98.83	102.60	107.91
95%: Worst Case	61.92	77.26	92.12	103.61	114.66	124.93	134.74	144.94	151.81	160.55
35 Fixed										
5%: Best Case	61.92	48.40	43.90	34.27	21.34	8.12	0.00	0.00	0.00	0.00
25%: Optimistic	61.92	64.22	52.58	48.31	42.66	36.79	31.57	25.80	19.34	13.46
50%: Most Probable	61.92	68.97	67.56	60.66	62.75	61.73	61.80	61.03	59.96	58.95
75%: Pessimistic	61.92	72.46	79.75	81.64	86.97	89.02	92.79	97.04	99.77	105.52
95%: Worst Case	61.92	77.89	92.83	104.60	117.20	126.81	137.73	147.53	154.98	162.44

Note: Fiscal Years, millions

Wurts & Associates

Stochastic Case: Employer Contributions

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
30 Fixed (Current)										
5%: Best Case	61.92	47.84	42.87	32.39	18.32	2.30	0.00	0.00	0.00	0.00
25%: Optimistic	61.92	63.00	51.81	47.19	40.58	34.03	27.78	21.74	14.52	7.48
50%: Most Probable	61.92	68.83	65.61	60.01	61.05	60.35	60.03	59.26	57.59	56.87
75%: Pessimistic	61.92	72.51	79.58	81.36	86.95	88.79	93.01	96.27	99.59	105.06
95%: Worst Case	61.92	78.58	94.06	105.55	118.19	128.88	140.25	150.04	156.30	166.01
25 Fixed										
5%: Best Case	61.92	47.64	41.94	29.93	14.83	0.00	0.00	0.00	0.00	0.00
25%: Optimistic	61.92	60.26	51.17	45.92	38.34	30.52	23.50	16.08	7.44	0.00
50%: Most Probable	61.92	68.51	63.73	59.04	59.26	58.44	57.58	56.07	53.23	51.12
75%: Pessimistic	61.92	72.45	79.38	80.20	86.02	87.61	91.43	95.07	97.96	102.15
95%: Worst Case	61.92	78.96	94.40	105.56	119.51	129.67	141.33	150.90	155.40	166.32
20 Fixed										
5%: Best Case	61.92	47.18	40.98	27.99	11.25	0.00	0.00	0.00	0.00	0.00
25%: Optimistic	61.92	54.67	50.58	44.94	36.33	27.65	19.68	11.10	1.25	0.00
50%: Most Probable	61.92	68.26	62.45	58.41	57.94	56.88	55.10	53.81	50.56	47.51
75%: Pessimistic	61.92	72.44	79.42	79.68	85.45	87.00	91.03	93.99	96.48	101.10
95%: Worst Case	61.92	79.64	94.72	106.39	119.80	131.17	143.30	151.54	156.90	167.79

Note: Fiscal Years, millions

Stochastic Case: Employee Contributions

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
30 Fixed (Current)										
5%: Best Case	39.28	28.01	27.86	27.73	27.87	28.01	28.17	28.21	28.38	28.60
25%: Optimistic	39.28	39.17	29.29	29.60	30.58	31.55	32.32	33.04	33.57	34.54
50%: Most Probable	39.28	40.29	39.09	31.70	34.93	36.35	38.09	38.93	39.81	41.15
75%: Pessimistic	39.28	40.95	41.85	41.87	43.65	44.59	45.48	46.15	47.07	48.49
95%: Worst Case	39.28	41.78	43.79	45.40	48.17	50.35	52.46	54.72	57.57	59.84
25 Fixed										
5%: Best Case	39.28	27.94	27.82	27.70	27.78	27.98	28.09	28.11	28.23	28.57
25%: Optimistic	39.28	38.38	29.22	29.54	30.43	31.34	32.17	32.81	33.39	34.38
50%: Most Probable	39.28	40.24	32.58	31.53	34.04	35.70	37.58	38.48	39.19	40.90
75%: Pessimistic	39.28	40.93	41.76	41.72	43.47	44.44	45.17	45.95	46.52	48.15
95%: Worst Case	39.28	41.75	43.75	45.32	48.12	50.30	52.34	54.73	57.36	59.73
20 Fixed										
5%: Best Case	39.28	27.91	27.80	27.69	27.71	27.93	27.96	28.02	28.19	28.39
25%: Optimistic	39.28	29.14	29.18	29.52	30.31	31.22	32.05	32.58	33.24	34.07
50%: Most Probable	39.28	40.20	31.42	31.45	33.59	35.32	37.03	38.06	38.85	40.50
75%: Pessimistic	39.28	40.91	41.70	41.55	43.20	44.17	44.92	45.64	46.27	47.96
95%: Worst Case	39.28	41.74	43.75	45.24	47.98	50.18	52.36	54.77	57.19	59.72

Note: Fiscal Years, millions

Wurts & Associates

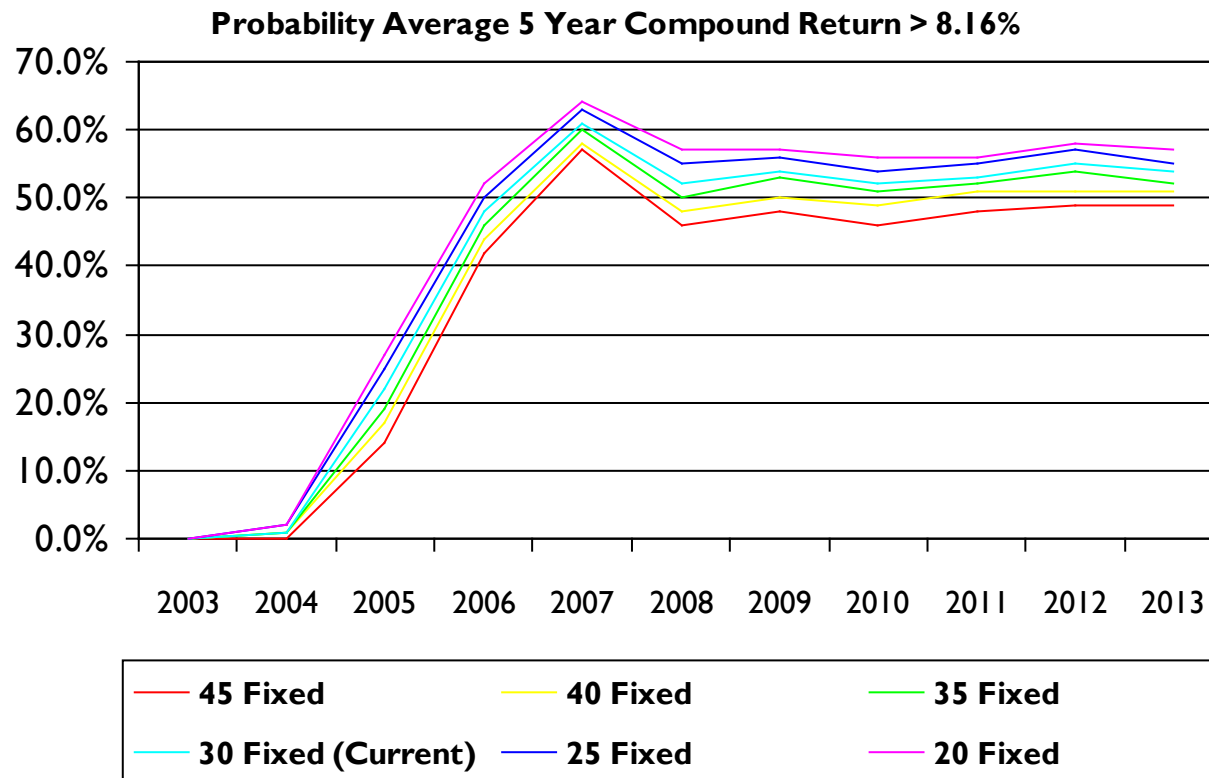
Stochastic Case: Employee Contributions

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
45 Fixed										
5%: Best Case	39.28	28.17	27.99	27.90	28.21	28.61	28.84	28.58	28.74	28.91
25%: Optimistic	39.28	39.65	29.56	29.75	31.10	32.09	33.09	33.61	34.47	35.62
50%: Most Probable	39.28	40.42	40.13	32.28	38.99	38.59	39.65	40.04	40.99	42.21
75%: Pessimistic	39.28	41.01	42.03	42.24	43.92	45.08	45.97	46.69	47.63	48.90
95%: Worst Case	39.28	41.81	43.87	45.55	48.19	50.35	52.63	54.77	57.57	59.69
40 Fixed										
5%: Best Case	39.28	28.10	27.97	27.84	28.09	28.34	28.48	28.51	28.54	28.71
25%: Optimistic	39.28	39.56	29.49	29.69	30.96	31.85	32.73	33.34	34.28	35.22
50%: Most Probable	39.28	40.37	39.89	32.03	38.19	37.75	38.93	39.53	40.61	41.78
75%: Pessimistic	39.28	40.98	41.96	42.16	43.80	44.92	45.69	46.38	47.42	48.77
95%: Worst Case	39.28	41.79	43.85	45.41	48.19	50.35	52.48	54.72	57.58	59.78
35 Fixed										
5%: Best Case	39.28	28.05	27.91	27.80	28.04	28.10	28.25	28.26	28.41	28.66
25%: Optimistic	39.28	39.39	29.40	29.63	30.79	31.62	32.45	33.16	33.78	34.86
50%: Most Probable	39.28	40.33	39.49	31.85	36.77	36.81	38.33	39.18	40.00	41.47
75%: Pessimistic	39.28	40.97	41.90	42.09	43.76	44.72	45.52	46.21	47.11	48.56
95%: Worst Case	39.28	41.79	43.81	45.41	48.19	50.31	52.44	54.70	57.51	59.78

Note: Fiscal Years, millions

Stochastic Case: Probability Contributions May Be less

When FCERA earns more than its assumed rate of return (8.16%), the fund generates Undistributed Earnings. These Undistributed Earnings are then used to pay for Settlement Contributions for employees and employers. To understand the likelihood of this occurring in the future, we measured the probability that the annual rate of return on the actuarial value of assets exceeded the assumed rate of return.



APPENDIX

Building Block Approach: Description

Wurts & Associates utilizes a combination of fundamental analysis and a building block approach to construct projected returns for key asset classes.

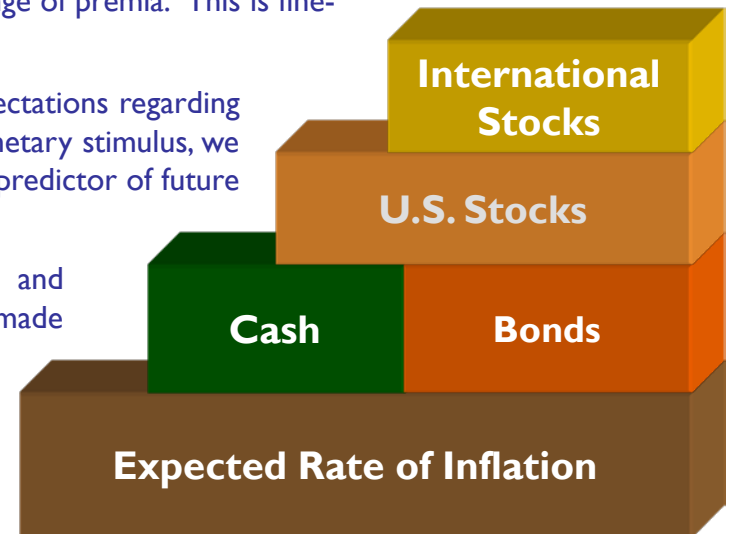
International Stocks: The historical relationship between returns for international and U.S. stocks is examined to determine if a premium should exist for international stocks. An overlay of fundamental analysis is applied for minor adjustments.

U.S. Stocks: We estimate an Equity Risk Premium based upon the historic range of premia. This is fine-tuned with fundamental returns decomposition.

Bonds: We believe that a bond's yield is an unbiased measure of market expectations regarding future returns. Given historically low rates and the high level of fiscal and monetary stimulus, we believe rates will rise over time, and the current yield should be adjusted as a predictor of future returns.

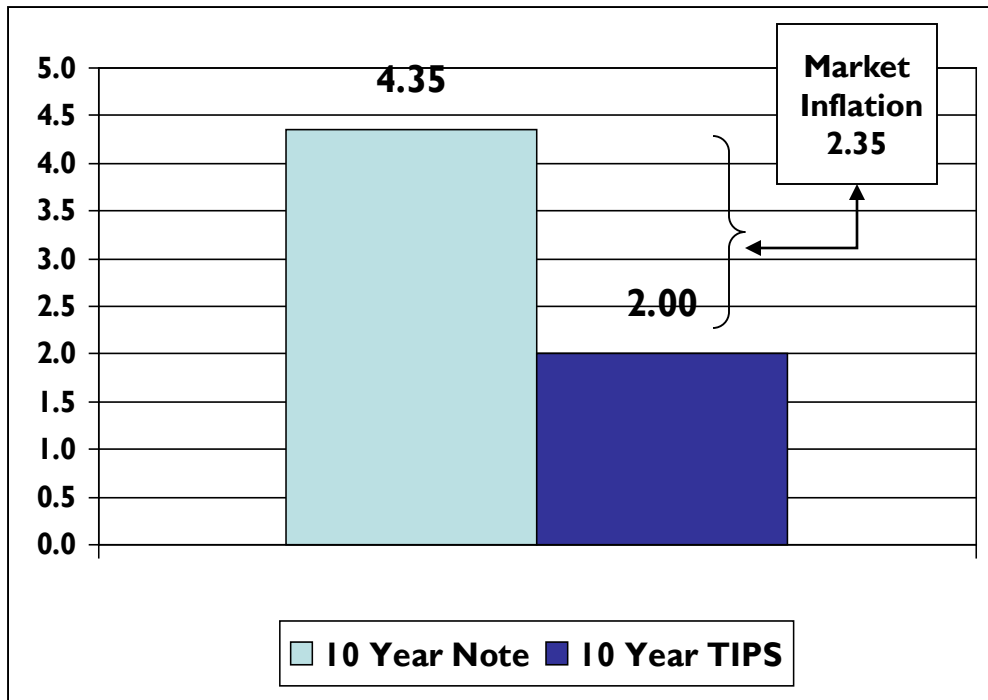
Cash: We examine the historic premium of cash instruments to inflation and compare to the current yield and inflation rate. A qualitative judgment is made about the size and sustainability of the premium given today's environment.

Inflation: We utilize the break-even inflation rate between the ten-year TIPS and conventional Treasuries as a starting point. Adjustments are made based upon our view of the macroeconomic environment.



Return Assumptions - Inflation

Market Implied 10 Year Inflation Estimate:

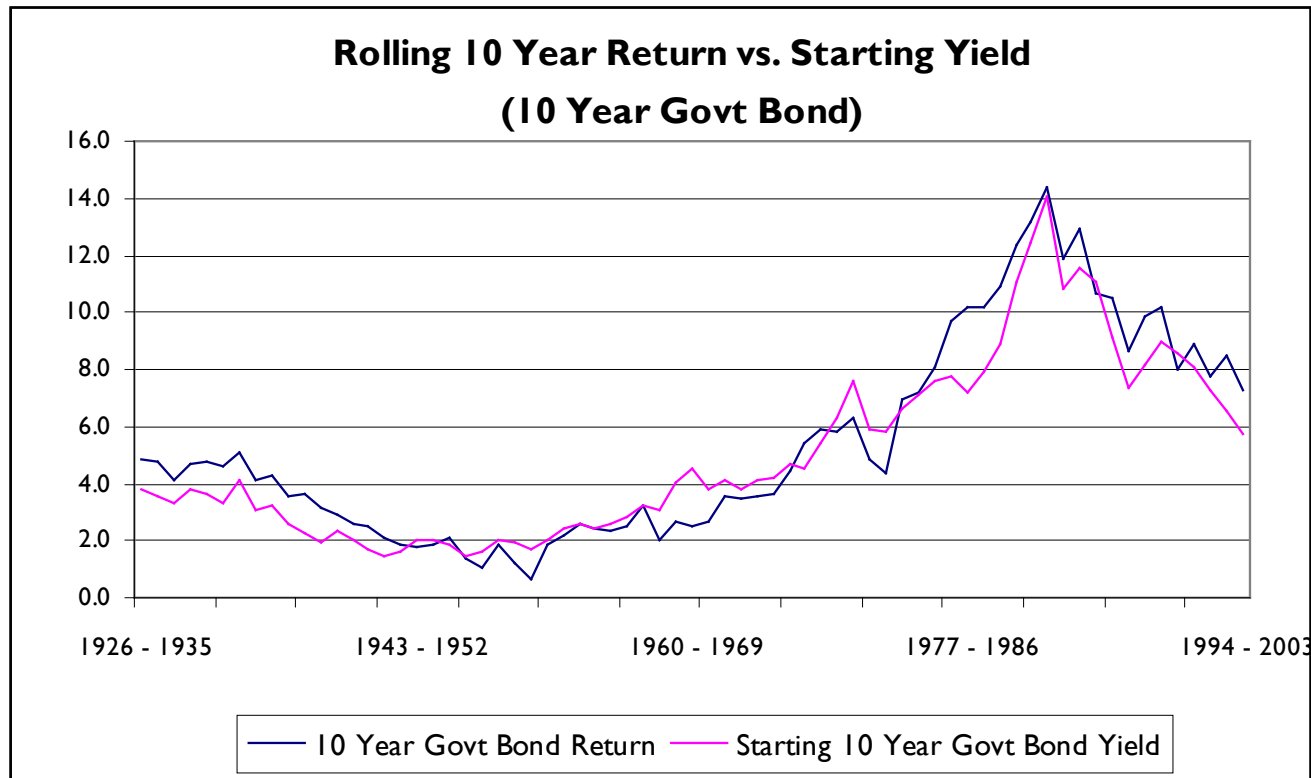


- Market expects inflation of 2.35% over next ten years.
- We believe that this measure is too low:
 - Fiscal and monetary stimulus
 - Need to “reflate away” large public and private debt levels.
- We revise the consensus forecast up to 2.70%.

Source: WSJ as of 1/6/04
10 Year Note matures on Aug 2013
10 Year TIPS matures July 2013

Return Assumptions - Bonds

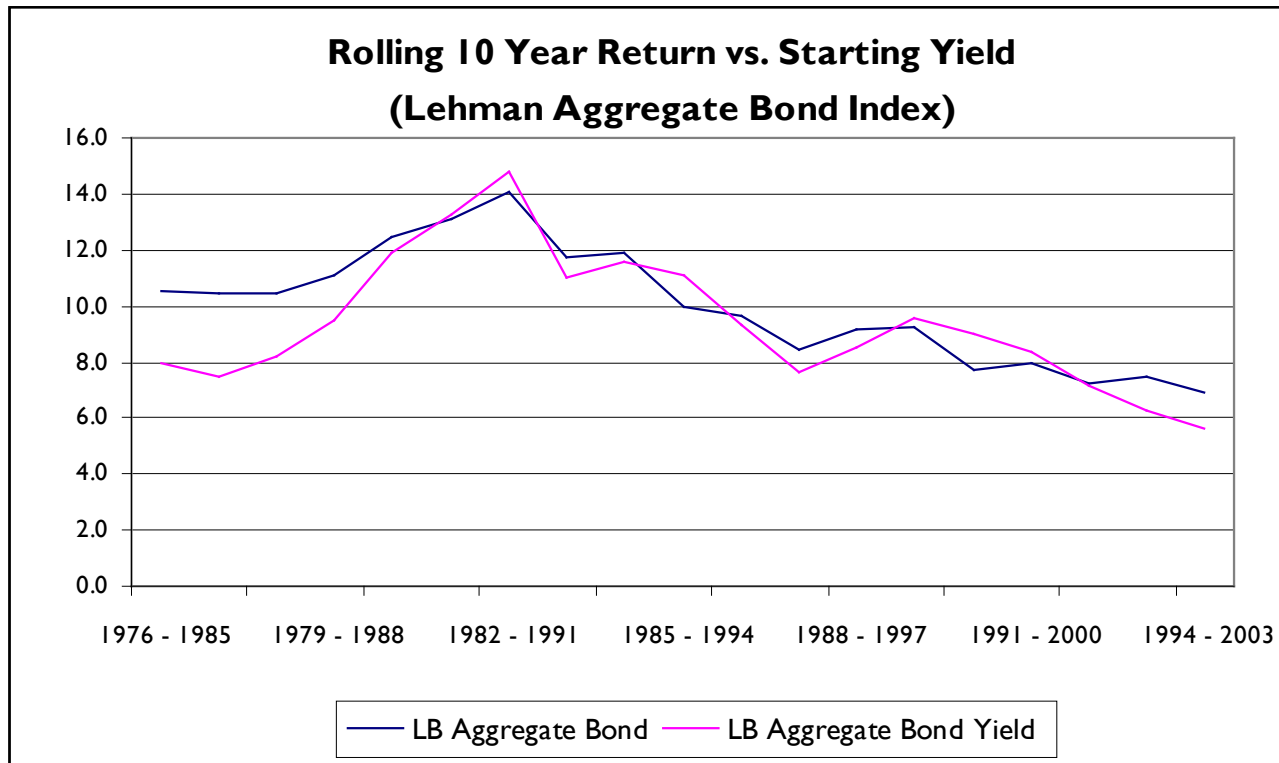
Starting bond yield is an excellent predictor of subsequent ten-year performance:



Source: Ibbotson. Data ending 12/2003.
10 Year Govt Bond Return: 50% Int Govt & 50 LT Govt.
Starting 10 Year Govt Bond Yield: 50% Int Govt Yield & 50% LT Govt Yield.

Return Assumptions - Bonds

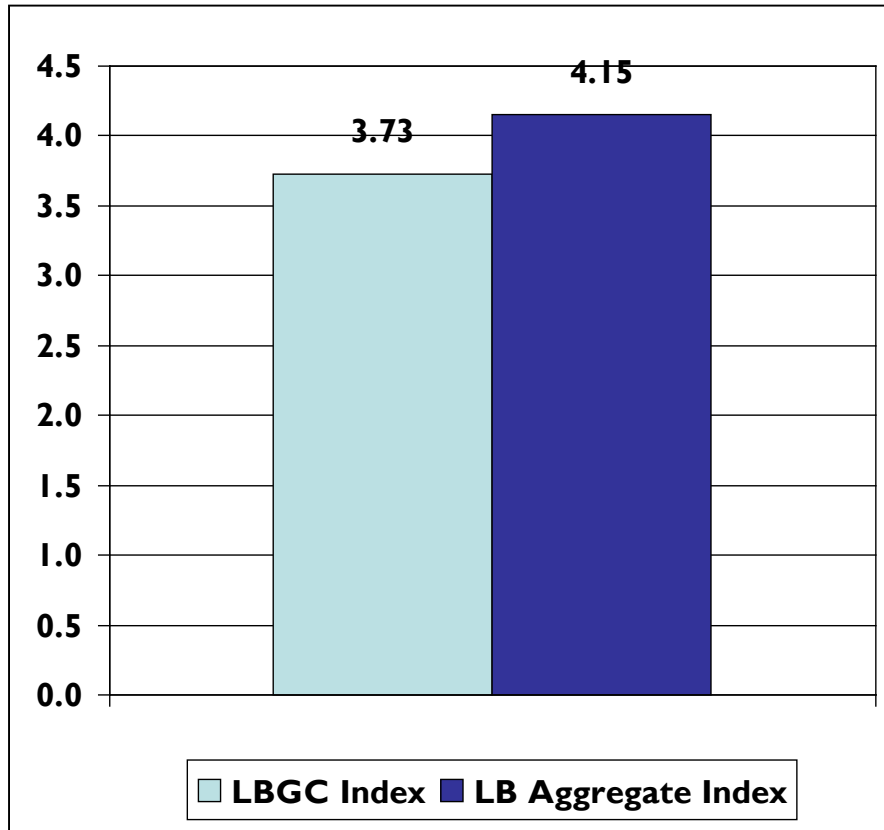
Relationship also holds for Lehman Aggregate Index over shorter time period:



Source: Ibbotson. Data ending 12/2003.

Return Assumptions - Bonds

Current Yield to Maturity:



Source: Ibbotson. Data as of 12/2003.

- We believe the yields will rise moderately in response to inflation.
- Higher reinvestment rate will, over latter portion of next ten years, compensate for shorter-term price losses.
- We estimate a 5.25% return for (Lehman Aggregate Index) core bonds.

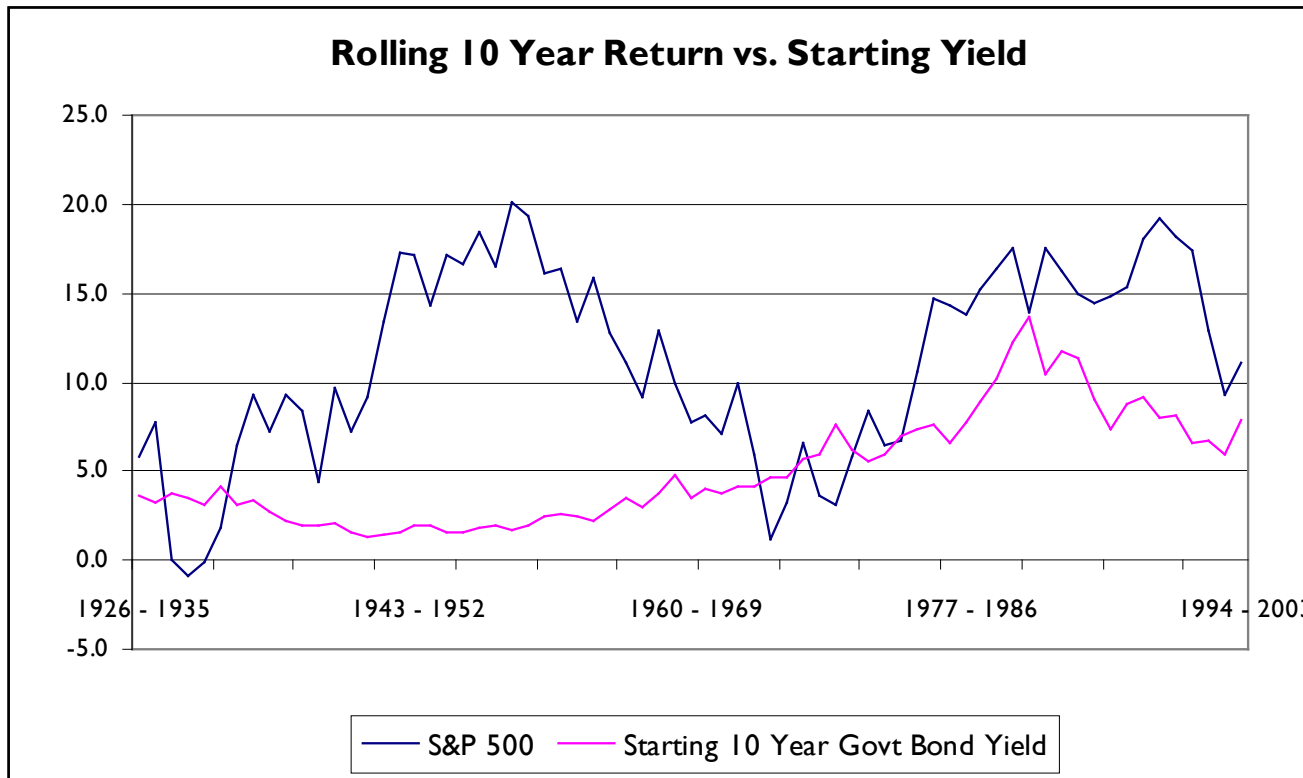
Return Assumptions - Equity

The equity risk premium is the most important number in investing.

- Stocks are inherently more risky than bonds. In order to be a valid investment choice, stocks must offer a higher rate of return than bonds to attract investor capital.
- This demanded incremental difference in return is the equity risk premium and is typically defined as the long run (ten years in this case) return difference between US equities and US government bonds.
- Since 1926, this number has averaged approximately 6.0%.
- We begin our 2004 estimate with a historic look at the premium over time. The following chart displays the starting yield of a ten-year government bond and the subsequent ten years of stock performance as measured by the S & P 500:

Return Assumptions - Equity

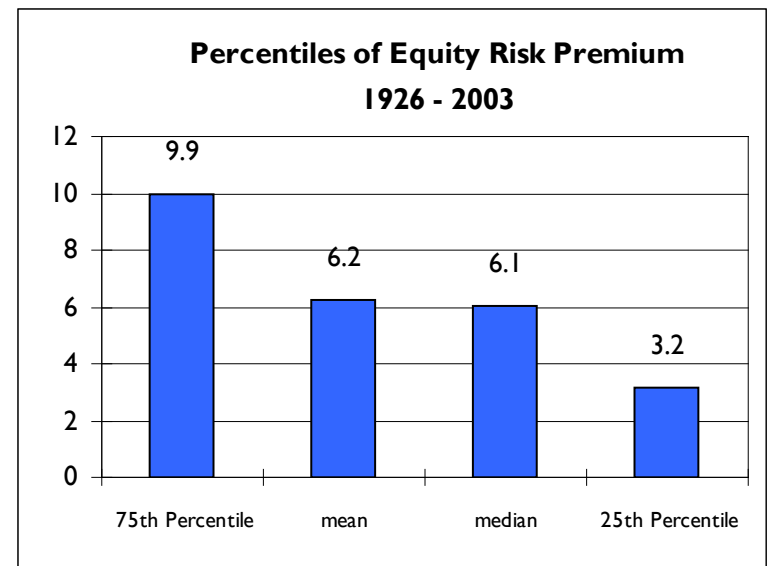
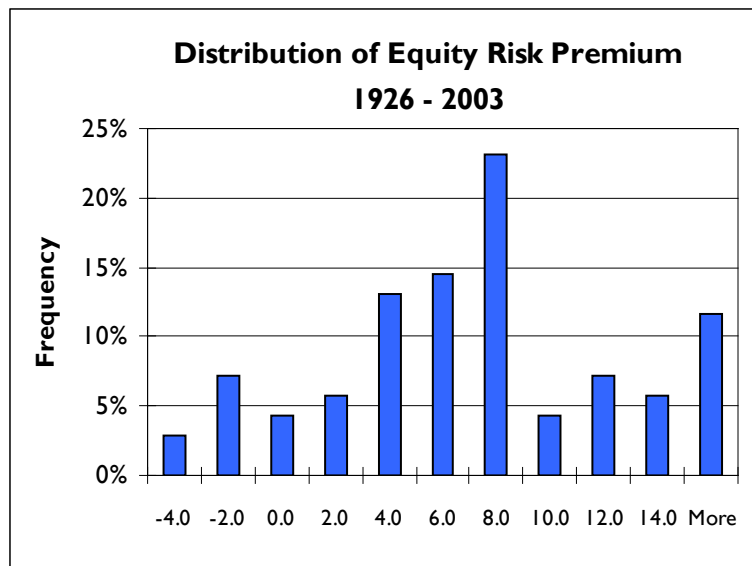
Stocks usually (but not always) reward investors for their greater volatility:



Source: Ibbotson. Data ending 12/2003.
10 Year Govt Bond Return: 50% Int Govt & 50 LT Govt.
Starting 10 Year Govt Bond Yield: 50% Int Govt Yield & 50% LT Govt Yield.

Return Assumptions - Equity

The distribution of the ten-year equity risk premium around a starting government bond yield can vary widely. Valuations, dividend yields, investor behavior and a number of other factors can cause the number over any ten-year period to dramatically deviate from the 6% average.



Equity Risk Premium: Is the arithmetic difference of the S&P 500 10 year return and the 10 year starting yield.

Our preference over the next ten years is towards the lower end of the distribution due to high valuations and low dividend yields. However, we need a more precise estimate to model. Therefore, we will look at key fundamental components of long run stock returns.

Return Assumptions - Equity

We estimate a 8.2% nominal return for stocks. This implies an equity risk premium of about 4.00% over a starting 10-Year Treasury bond yield.

- About 2.00% less than 6.0% average of last 76 years.
- Lower end of historical risk premium distribution.

Breakdown of the Return Composition:

Dividends: We take the 1.9% dividend yield of the S & P 500 Index and add 1.1% based upon the index's payout ratio rising from its current 33% to 50% (approximately its long term average).

Real Earnings Growth: over the 1990's averaged 5.5% and 2.5% from 1950-2000. We feel the moderately higher 3.0% is appropriate and in line with a reasonable rate of real GDP growth.

P/E Contraction: Ratios increased from 10 to 30 over the last 76 years. Most of the increase occurred in the last 20 years. Last year, we assumed no change in valuation levels over the next ten years. P/E's have subsequently risen causing us to project some contraction in equity prices. Assuming a contraction from today's level to last year's implies an annualized contraction loss of 1.2%. We adjust this to -0.5% as contraction will be cushioned by lower tax rates and inflation levels.

Return Assumptions - Equity

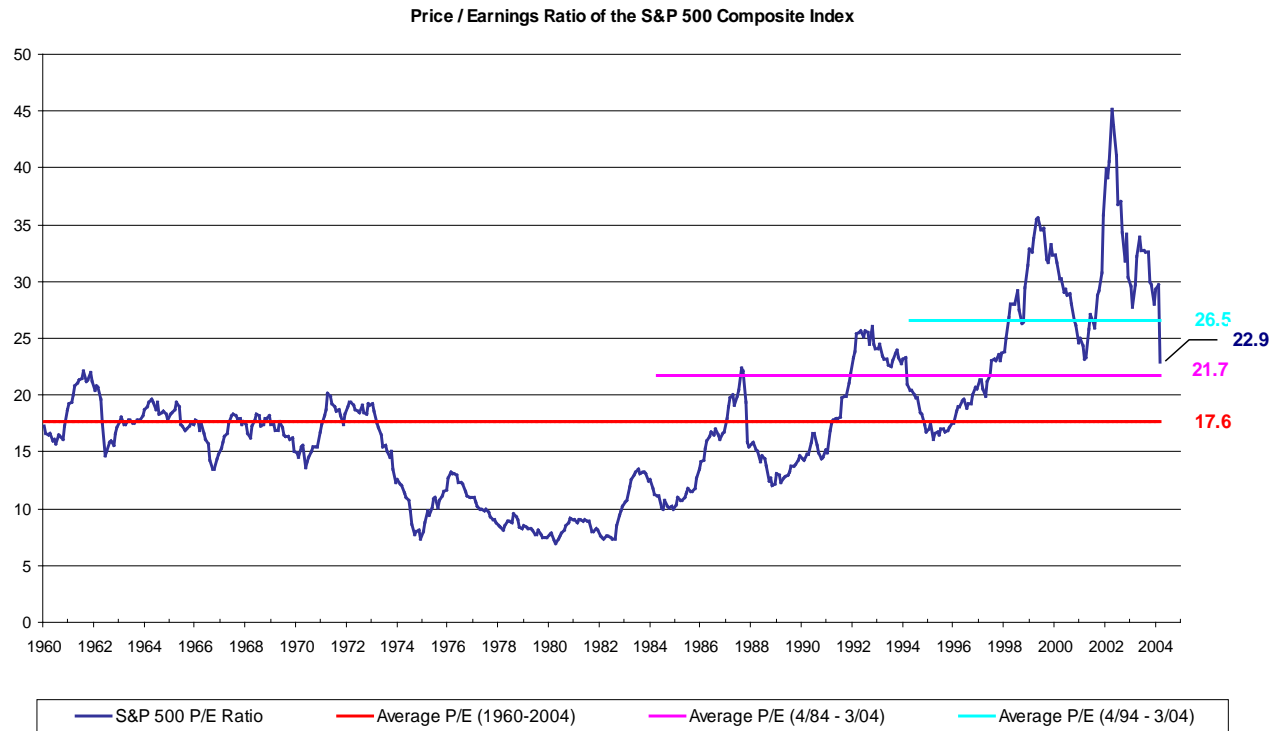
To better understand where the risk premium will fall over the next ten years, it is important to decompose the average return of the stock market over the last 76 years:

S & P 500 Return Composition		
	1926-2001 ¹	2004-2013 Est.
Dividends	4.4%	3.0%
Real Earnings Growth	1.7%	3.0%
P/E Expansion/Contraction	1.5%	-0.5%
Inflation	3.1%	2.7%
Total	10.7%	8.2%

1. Source: Ibbotson

Return Assumptions - Equity

Why we think P/Es will contract...

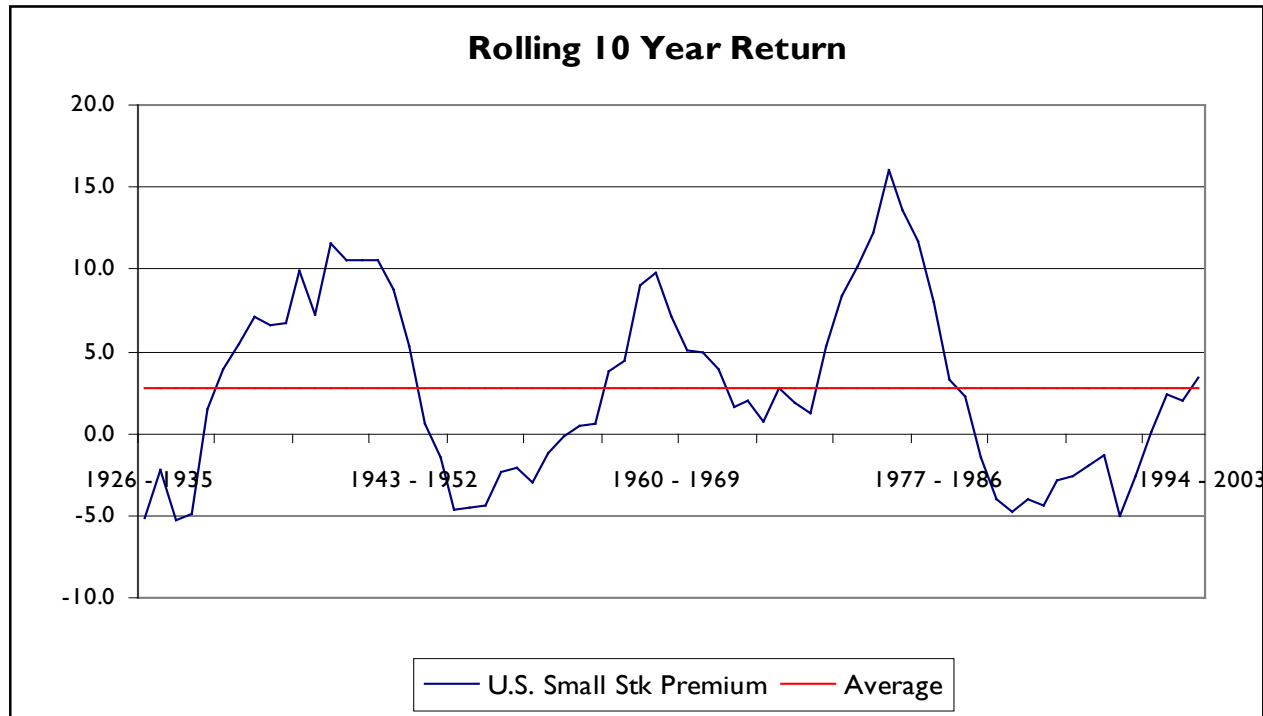


- The S&P 500 Index dropped below its 10-year average P/E in March, yet it still remains above its longer-term averages.

P/E Source: Standard & Poors: Security Price Index Record (re-calculated using reported earnings)
Data provided by www.FreeLunch.com - <http://www.economy.com/freelunch>
Revised 04/13/2004

Return Assumptions – Small Stocks

Small stocks have historically displayed a risk premium of their own to large cap stocks given their historical higher volatility.

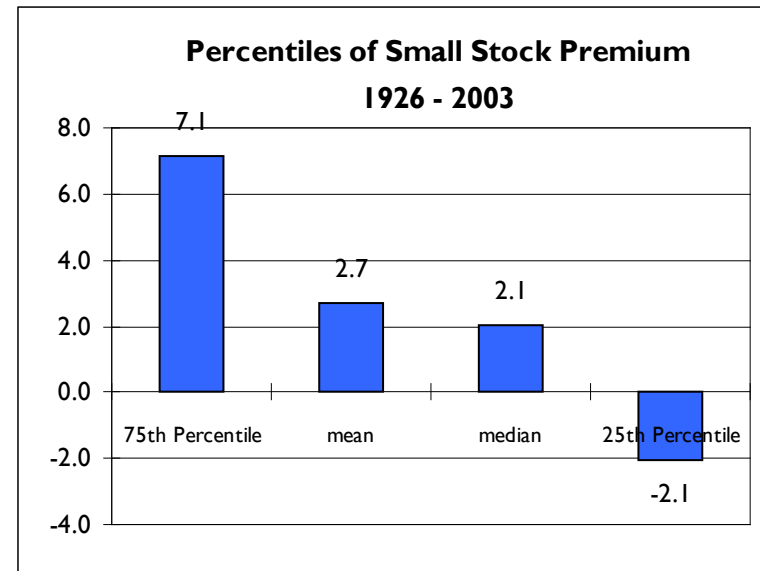
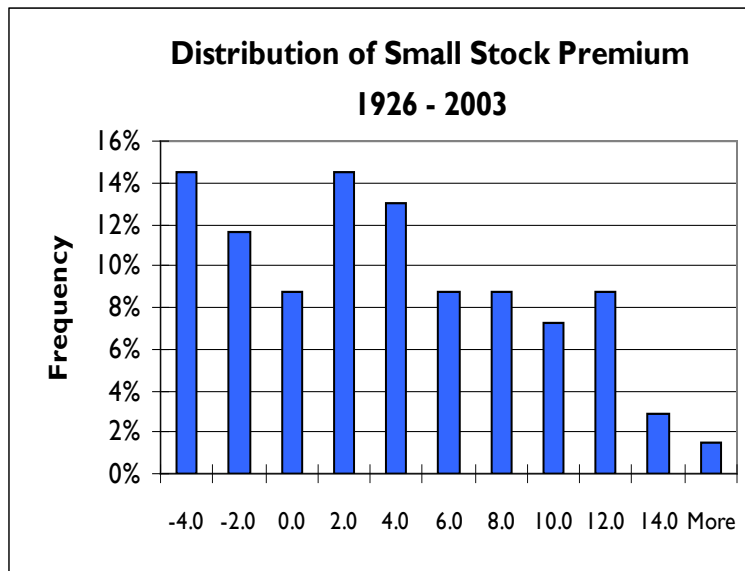


Source: Ibbotson. Data ending 12/2003.

U.S. Small Stock Premium: The historical small stock premium is derived as the geometric difference between U.S. Small Stocks total returns and S&P 500 total returns.

Return Assumptions – Small Stocks

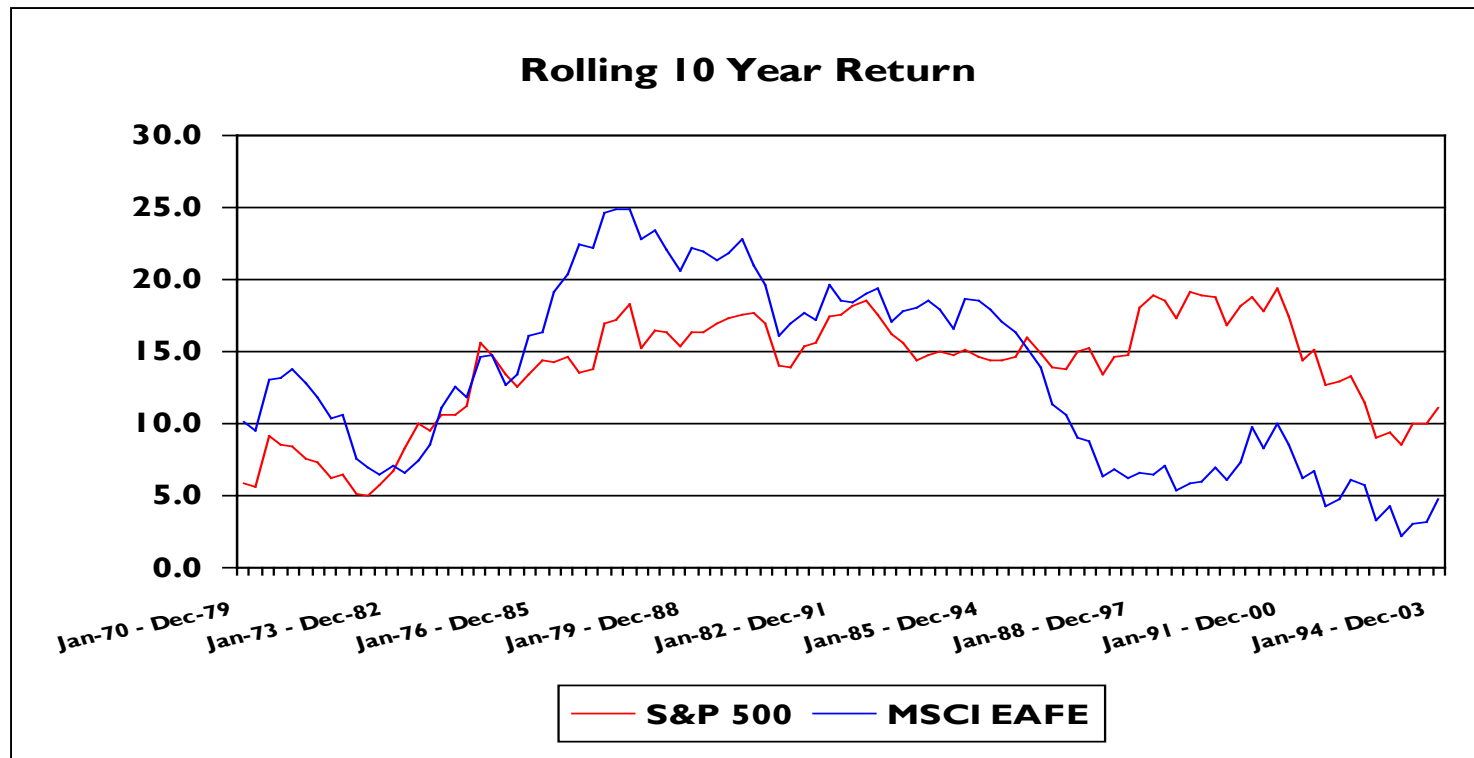
The distribution is rather flat, indicating less predictability and that the average has been skewed upwards by a few periods of dramatic outperformance. We believe the small cap premium will hold over the next ten years but at a rate closer to 1.5%.



Source: Ibbotson

Return Assumptions – International

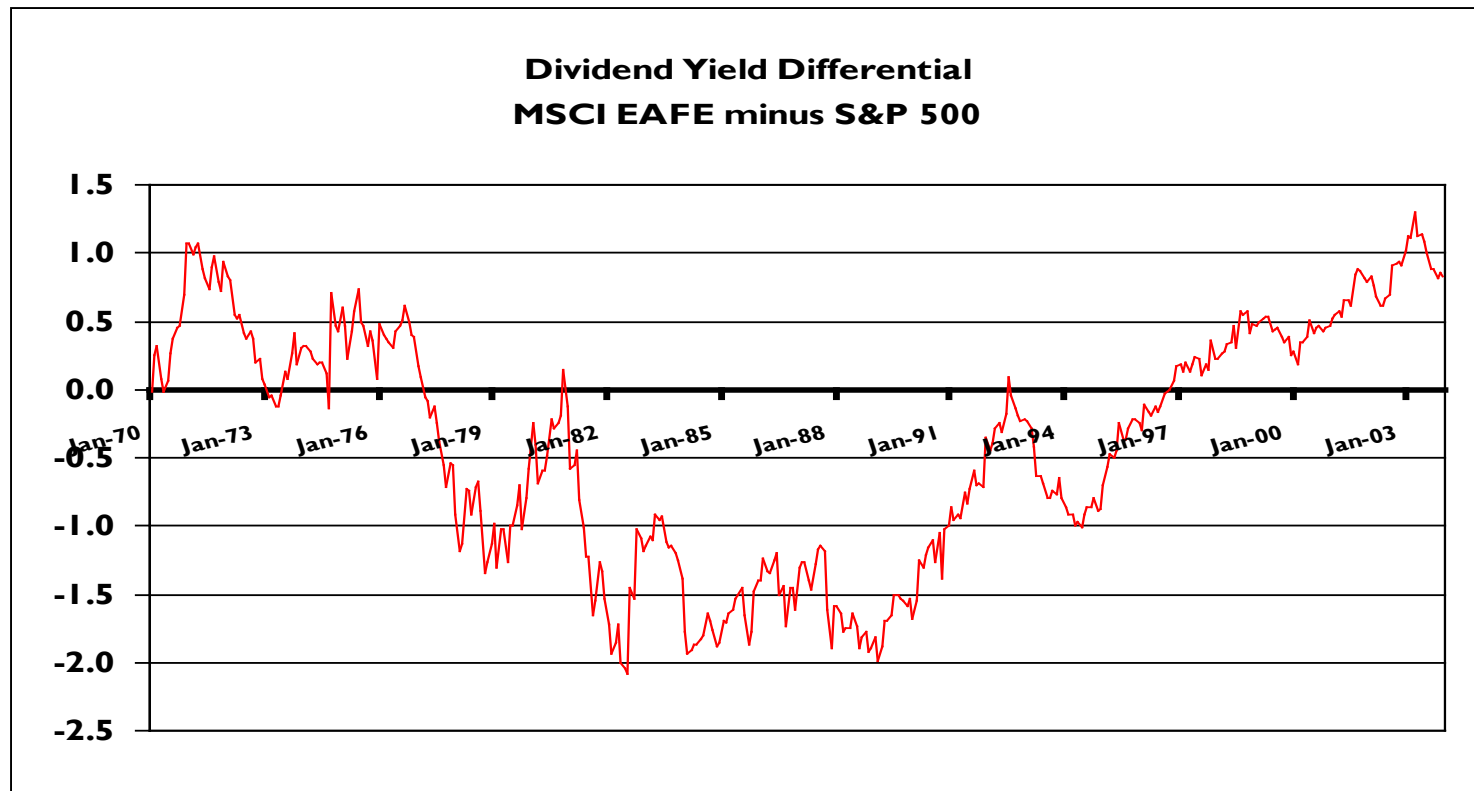
Previously, we examined long term (20 years) results of international and domestic stocks that showed no distinct premium. However, when measured in 10-year periods, international stocks and U.S. stocks show shifting leadership characteristics.



Source: Ibbotson. Data ending 12/2003.

Return Assumptions – International

We begin our assessment of relative performance differential over the next ten years by looking at the difference in dividend yields. Beginning in the late 90's, international stocks began to show a distinct premium in annual dividend yields.



Source: GMO

Return Assumptions – International

What impact does a starting dividend premium have on the next ten years of performance? We compared 10-year performance and the starting dividend yield differential. The table below summarizes monthly 10-year periods from 1970-2003:

Dividend Advantage (EAFE over S&P)	% Time EAFE Outperformed
Over .75%	100%
.75% to .25%	83%
.25% to (-.25%)	52%
(-.25%) to (-.75%)	53%
(-.75%) to (-1.25%)	58%
(-1.25%) to (1.75%)	37%
Under (-1.75%)	54%

**Average
Return
Differential =
4.6%**

(e.g. The Jan 70 – Dec 79 (10 year) performance coincides with the Jan 70 dividend yield differential).

Today's higher dividend yield and lower valuations point to a return premium from international equities of 0.60%. This translates to a nominal return expectation of 8.8%.

Consensus Expectations

<u>Asset Class</u>	<u>Wurts</u>	<u>Hewitt</u>	<u>Towers Perrin</u>	<u>Commonfund</u>	<u>Callan Associates¹</u>	<u>Greenwich²</u>	<u>Avg. Consensus</u>
Large Cap U.S. Equity	8.2%	8.7%	8.3%	8.0%	8.7%	7.7%	8.3%
Small/Mid Cap U.S. Equity	9.7%	9.7%	8.3%	9.2%	10.3%	7.7%	9.0%
International	8.8%	8.7%	8.3%	8.6%	9.6%	8.2%	8.7%
U.S. Core/Core Plus Fixed Income	5.3%	5.6%	4.2%	4.2%	4.8%	5.9%	4.9%
Inflation	2.7%	2.5%	n/a	n/a	2.6%	n/a	2.6%

1. <http://www.apfc.org/Invesments/CallanMktAssump.cfm?s=3>

2. 5 Year expectations. Fixed income and equity include alpha. Their equity expectation was for all equity (large & small).

Active Management Alpha Assumptions

<u>Asset Class</u>	<u>Ten Year ICC Universe Median Return (A)</u>	<u>Ten Year Benchmark Return (B)</u>	<u>Average Mgmt. Fee (C)</u>	<u>Alpha¹ = Excess Net Return (=A-B-C)</u>	<u>Ten Year Forecasts of Active Mgmt. Alpha</u>
Large Cap U.S. Equity	11.87%	11.83%	0.60%	-0.56%	0.50%
Small / Mid Cap U.S. Equity	15.13%	10.93%	0.85%	3.35%	1.25%
International Equity	8.66%	4.38%	0.75%	3.53%	1.25%
Real Estate	9.93%	10.36%	1.00%	-1.43%	1.00%
Private Equity ²	n/a	n/a	1.0 -2.0%	n/a	0.00%
Core Fixed Income	7.59%	7.39%	0.35%	-0.15%	0.25%

Data as of 6/30/04.

¹Alpha is the excess return of a portfolio after adjusting for market risk, calculated as Portfolio Return – Benchmark Return.

²Fund of funds level. Excess net return is not applicable since the index return and median return are the same.

FCERA's Alpha Experience

<u>Asset Class</u>	<u>FCERA's Return (A)</u>	<u>Benchmark³ Return (B)</u>	<u>Average Mgt Fee (C)</u>	<u>Alpha = Excess Net Return (=A-B-C)</u>	<u>Wurts' Ten Year Forecasts of Active Mgmt. Alpha</u>
Equity ¹	8.74%	7.55%	0.67%	0.52%	0.70%
International	6.14%	3.61%	0.75%	1.79%	1.25%
Real Estate	11.52%	10.98%	1.00%	-0.46%	1.00%
Fixed Income ²	5.98%	6.86%	0.35%	-1.23%	0.25%

1. Equity was not divided into large and small due to insufficient data. Estimated Fee and Alpha using policy weights for large and small cap.

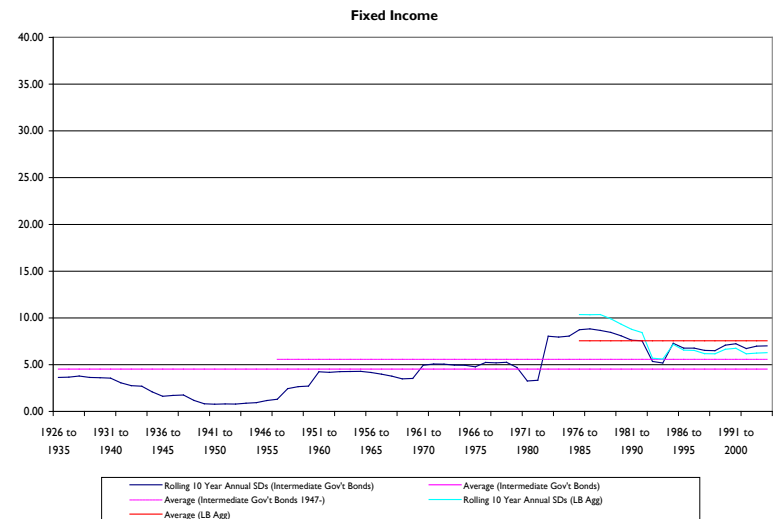
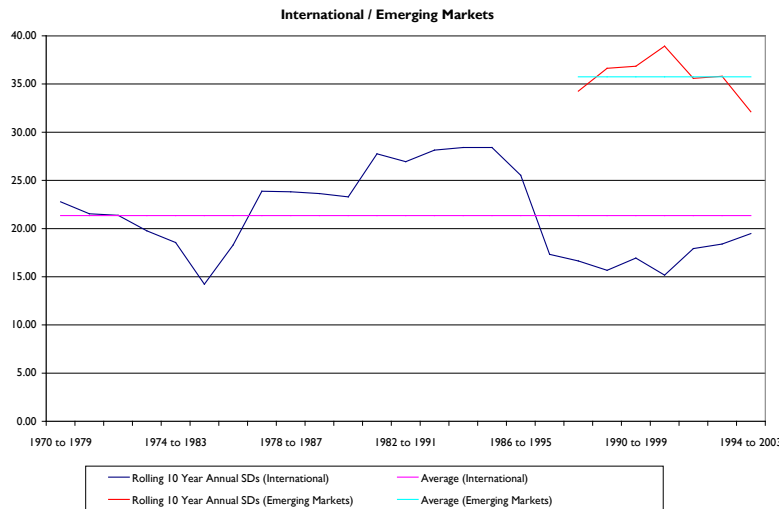
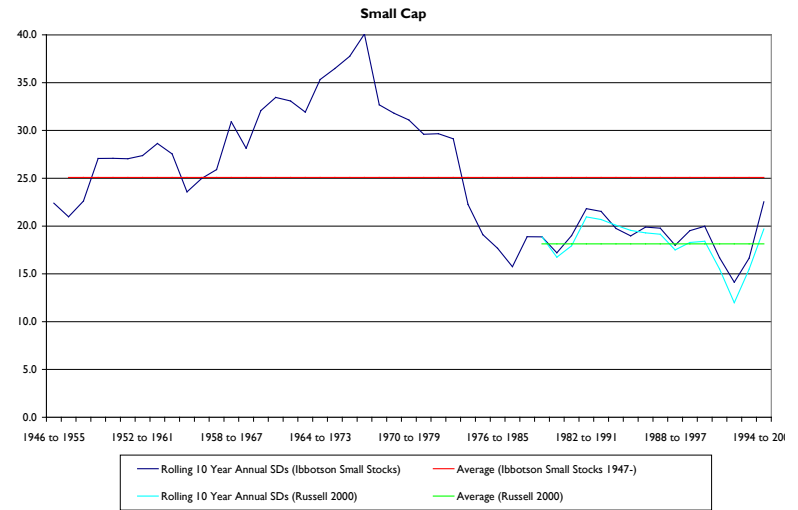
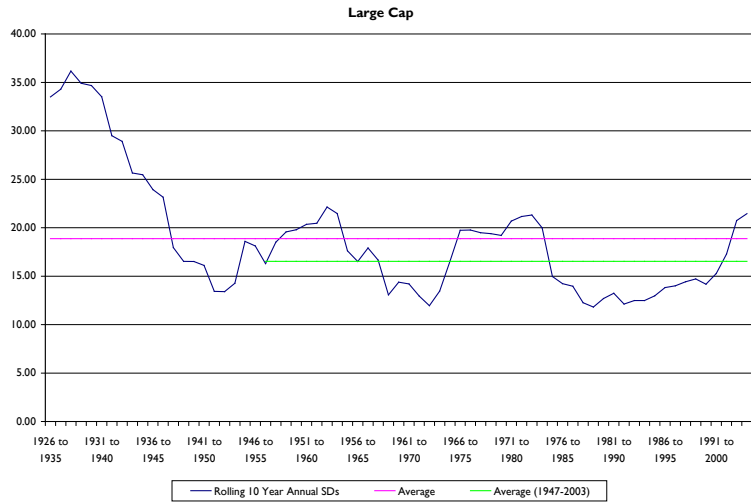
2. Fixed Income is a cap-weighted return of the domestic and international fixed income performance.

3. Benchmarks: Equity: Russell 3000, International: MSCI EAFE, Real Estate: NCREIF Property, and Fixed Income: LB Aggregate.

Note: The Alpha calculation uses 7.5 years of history and Wurts' Alpha assumptions are 10 year numbers.

Data as of 6/30/04.

Rolling 10 Year Annual Standard Deviations



Source: Ibbotson.

Wurts & Associates

Assumptions for the Study

For Simulation

- Inflation: 2.7% (Standard Deviation = 1.5%)
- Interest Rate = 8.16%
- Active Population Growth: New entrants replace retirements/terminations on a 1-for-1 basis keeping the active participant groups stable:

	Number of Actives	Average Age	Average Service	Average Payroll
General	6,660	43.3	8.6	\$42,985
Safety	939	39.0	9.5	\$59,321
Total	7,599	42.7	8.7	\$45,003

All of the following projections of financial results reflect the following:

- Percentiles are from 5th (best case; 1 chance in 20) to 95th (worst case; 1 chance in 20); 25th and 75th percentiles represent a 1 in 4 probability of occurring; 50th percentile is the most likely “median” result.
- Results are projected over a 10-year horizon. The “baseline” for the asset and liability projections is the June 30, 2003 actuarial valuation.

Glossary of Terms

General Terms

Active Management: A method of portfolio management that is based on the assumption that security prices do not always reflect their true value and that this discrepancy will eventually be corrected over time. Managers engaging in active management are trying to find securities that they feel are currently priced below their true value. As the rest of the market realizes that the security is selling for less than it is really worth, the forces of supply and demand will drive the price up and the manager will make money.

Asset Allocation: The choice of which asset classes to invest in and in what proportion. It has been shown that greater than 90% of the return on a portfolio is due to asset allocation.

Index: A passively manager portfolio of securities that remains constant from one period to the next. Indexed are used to gauge the performance of sectors of the market or the market as a whole. In addition, indexes are used as a benchmark for measuring the performance of investment managers.

Information Ratio: Information ratio is a measure of value added by the manager. It is the ratio of (annualized) excess return above the benchmark to (annualized) tracking error. ($IR = \text{Excess Return} / \text{Tracking Error}$)

Passive Management: A method of portfolio management that is based on the belief that all securities are fairly priced and that there are no additional returns to be made from security selection. Often called a buy and hold strategy or indexing, this method calls from purchasing a well diversified portfolio of securities and holding on to them indefinitely.

Policy Index: A performance benchmark for the total fund that is customized for each plan. The policy index represents the return that would have been produced by passively investment in the target asset allocation of the plan.

Portfolio Turnover: The percentage of a portfolio that is sold and replaced (turned over) during a given time period. Low portfolio turnover is indicative of a buy and hold strategy while high portfolio turnover is symptomatic of a more active, trading form of management.

Risk-Free Rate: The rate of interest that one can earn on an investment with no default risk. It is generally assumed to be the interest rate on a 91 day T-Bill.

Sharpe Ratio: A risk-adjusted return that is calculated by taking the excess return of a portfolio above the risk-free rate and dividing that by the standard deviation of the portfolio. The Sharpe Ratio gives you the amount of return you receive for each unit of risk, standard deviation, that you take on.

Standard Deviation: A measure of total risk, systematic and unsystematic, of a security or portfolio. Standard deviation is the square root of variance and is a measure of volatility about the mean of a distribution.

Total Fund: Computed by aggregating the returns from each of the individual investment managers of a plan. It is the total return of the plan's investments taken as a whole.

Tracking Error: A measure of how closely a manager's returns track the returns of a benchmark. The tracking error is the annualized standard deviation of the differences between the manager's and the benchmark's quarterly returns. If a manager tracks a benchmark closely, then tracking error will be low. If a manager tracks a benchmark perfectly, then tracking error will be zero.

Universe: Also called a peer group, a universe is a large number of portfolios of a similar style. These portfolios can be divided into deciles or quartiles and then used for performance measurement and comparative purposes. Portfolios are given a rank within the universe that tells you how well the manager of that portfolio has done relative to their peers.