TEACHERS' RETIREMENT BOARD

INVESTMENT COMMITTEE

SUBJECT: Investment Insight Session
Revisiting Return Expectations

ITEM NUMBER: 8

ATTACHMENT(S): 4

ACTION: X

MEETING DATE: June 5, 2002

INFORMATION: ____

PRESENTER: Christopher J. Ailman
Allan Emkin, PCA and Mark Johnson, Milliman USA

Executive Summary

This is the third and final Investment Insight session for the 2001-2002 fiscal year. During the past year, we have discussed global demographics and broad economic theory of the past half century. This presentation is more focused on the future and it's effects on CalSTRS. Over the past several meetings, the Committee, consultants, and staff have discussed the decline in investment returns across all asset classes and particularly the impact on the funded status of the plan. This presentation brings together for the first time in years, both the System's investment consultant, Allan Emkin of Pension Consulting Alliance and the external Actuary, Mark Johnson of Milliman USA. Biographies are enclosed and labeled Attachment 1.

As we have discussed and presented graphically to the Committee, we are currently experiencing a prolonged bear market and face the potential of a protracted period of low capital market returns. This concern has been a reoccurring source of discussion within the general investment community and media. Attached are copies of client newsletters written by Robert Arnott of First Quadrant and Barton Biggs of Morgan Stanley, highlighting the potential of very low investment returns (Attachment 2). As noted by the letters, this is a significant departure from the past two decades. While lower returns are not a certainty, staff and the consultant feel this is a worthwhile contribution of the Committee's time to consider such a possibility and discuss the ramifications.

If the Committee finds the exercise worthwhile, and desires a more detailed understanding of the potential outcomes in the CalSTRS portfolio, then the CIO recommends engaging in a comprehensive stochastic asset liability review this fall. If the Committee concurs, the CIO will add the review to the fall semester of the Investment Committee Workplan. This type of simulation will push various asset portfolios through hundreds of different market environments in a Monte Carlo statistical simulation to gauge the effects to the Fund.

ALLAN EMKIN

Mr. Emkin founded PCA in 1988 and is currently a Managing Director. Mr. Emkin has eighteen years of general consulting experience, with an emphasis on public plan administration and investment policy, non-dollar investments and real estate investments. Before forming PCA, Mr. Emkin was a Vice-President at Wilshire Associates.

Before becoming a pension consultant, Mr. Emkin worked in the California's Governor's office; and, prior to that, he was a registered lobbyist for the Legal Aid Foundation in Los Angeles for ten years.

Mr. Emkin is a frequent speaker at various forums and educational seminars sponsored by the Institute for Fiduciary Education (IFE), Pensions 2000, Institutional Investor, and Pension and Investment Age.

MARK O. JOHNSON

Mr. Johnson, is currently a Principal in the Portland Office of Milliman USA. He serves clients from Alaska to California. Prior to joining the firm in 1977, he was an actuary for an insurance company. His primary area of expertise is the employee benefits field, particularly in defined benefit, defined contribution and nonqualified retirement plans.

The majority of Mark's practice involves providing actuarial services to public employee retirement systems. He is currently the consulting actuary for some of the largest and most complex retirement systems in the country.

He performs economic and demographic experience studies, actuarial valuations and projections, and consults on funding strategies and a range of other issues of interest to plan sponsors. He provides expert testimony to legislative bodies, arbitrators, and courts of law.

Mark has received high commendations for his ability to effectively communicate complex actuarial issues to a wide range of audiences.

Mark's professional designations are: Fellow, Society of Actuaries; Member, American Academy of Actuaries; Enrolled Actuary, ERISA; Member, Western Pension and Benefits Conference; Member, Portland Actuarial Club.

Mark received his BA from North Park University in Chicago, Illinois.

NOTE: Attachment 2 is not available in electronic form

Attachment 3

Investment Committee – Item 8

June 5, 2002

Asset Class Assumption Discussion

PENSION CONSULTING ALLIANCE, INC.

May 2002

Topics

I. Recent Dynamics Influencing Assumptions

II. PCA's Current Assumptions in Light of Current Dynamics

III. Implications of Lowered Investment Returns

Recent Dynamics Influencing Assumptions

- September 11th:
  - changed global perception of continued prosperity
  - negative growth two consecutive quarters, acknowledge U.S. recession
- Post-Tech Bubble: A continued questioning of equity valuations
- Inflation declining where "deflation" is a threat
  - Is the U.S. drifting toward a 'Japanese-like' outcome?
- Accounting issues raising concerns about corporate earnings

RESULT: A DAMPENING OF LONG-TERM EXPECATIONS

PCA's Current Assumptions

Average Annual Risk Premiums

Real Risk-Free Rate	2.00
Risk Premiums over Real Risk-free Rate:	
Treasury Inflation Protection Securities	0.50
Domestic Core Bonds	0.75
International Bonds	0.65
Hedged International Bonds	0.55
Global Bonds	0.70
Hedged Global Bonds	0.65
Real Estate*	3.00
Domestic Stocks	5.00
International Stocks	5.00
Hedged International Stocks	4.90
Alternative Investments/Venture Capital	9.00

Nominal & Real Return and Risk Estimates—2.5% long-term inflation assumption

	Expected Avg. Nominal Annual Return	Expected Avg. Real Annual Return	Expected Risk of Nominal Returns (Annlzd. SD)	Expected Risk of Real Returns (Annlzd. SD)
Cash	4.50	2.00	1.5	1.0
Treasury Inflation Protection Securities	5.00	2.50	4.0	4.0
Domestic Core Bonds	5.25	2.75	8.0	8.0
International Bonds	5.15	2.65	12.0	12.0
Hedged International Bonds	5.05	2.55	6.0	6.0
Global Bonds	5.20	2.70	10.0	10.0
Hedged Global Bonds	5.15	2.65	6.0	6.0
Real Estate*	7.50	5.00	13.0	13.0
Domestic Stocks	9.50	7.00	22.0	22.0
International Stocks	9.50	7.00	22.0	22.0
Hedged International Stocks	9.40	6.90	22.0	22.0
Alternative Investments/Venture Capital	13.50	11.00	35.0	35.0

***Real estate asset class assumes a mix of core real estate and a variable allocation of between 5% and 20% real estate securities.**

- Key differences versus last year:
  - equity returns reduced by 0.5% per year, expected risk premium unchanged
  - bond returns reduced by >1.0% per year, risk premiums reduced
  - volatilities about the same
  - real risk-free rate reduced by 20%, but double the historical norm

PCA's Current Assumptions

- Rationale for the real risk-free rate:
  - Right now, the *real* risk free rate (T-Bill yield minus inflation) is zero (i.e., the U.S. Treasury is able to borrow short-term at a 0% real rate)
  - The Fed Funds rate, after inflation, is also near zero (Banks borrow for free)
  - The yield curve is steep, meaning the U.S. financial system can produce profits
  - The above factors are "grease" that ignite profit growth
  - Over the next ten years, we expect the Fed to turn to managing growth, not igniting it
  - The Fed will increase the real risk free rate (through Fed Funds) to manage this growth

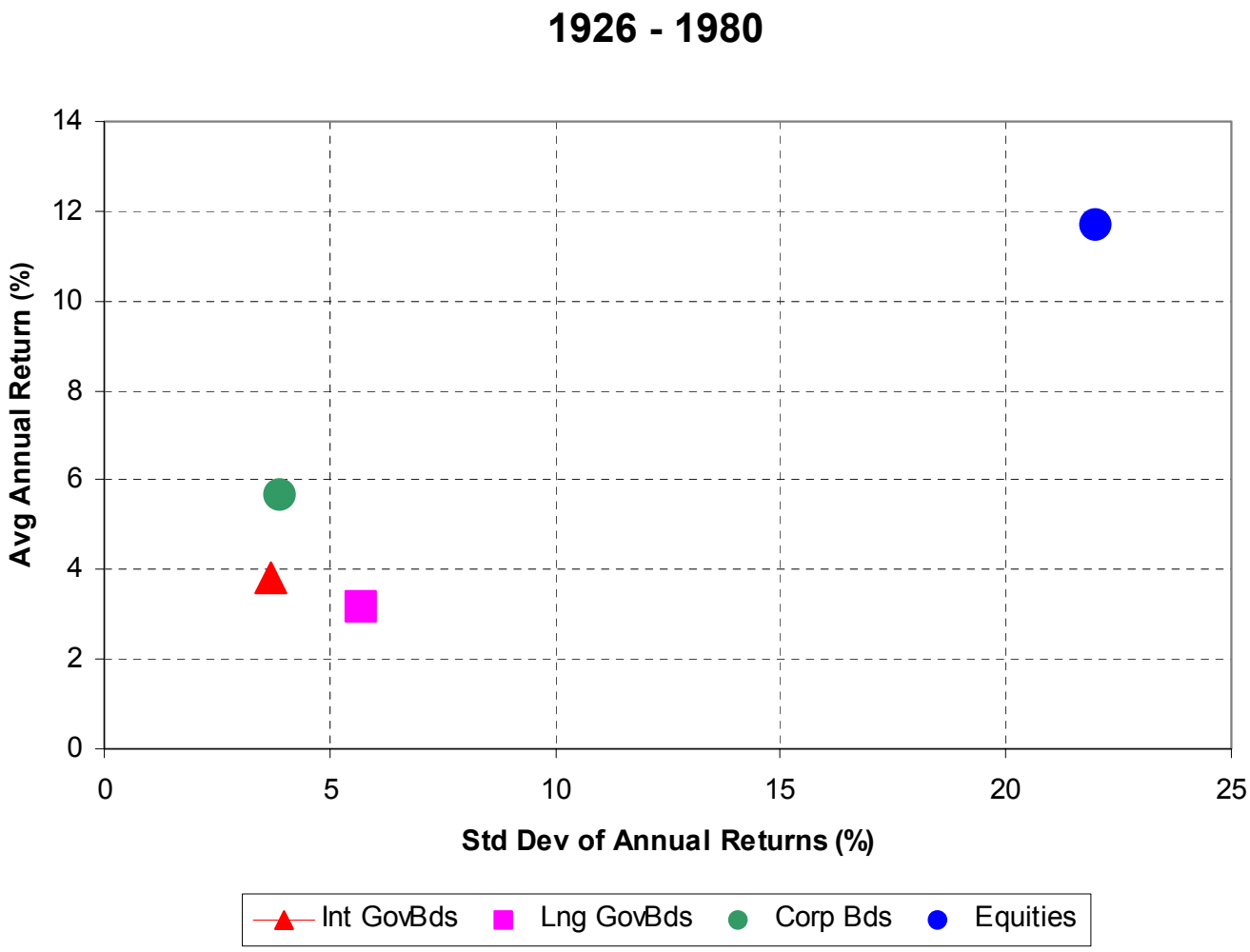
PCA's Current Assumptions

- Rationale for the equity return premium (equity return minus real risk free rate):
  - Many practitioners believe the equity risk premium should be lower. Why?
    - Investment returns were too high for a sustained period of time
    - Multiples are still too high
    - Dividends are no longer the factor they once were
    - Moderating economic growth

Historical Perspective: Over the Last 20 Years, the Equity Return Premium Actually *Declined*

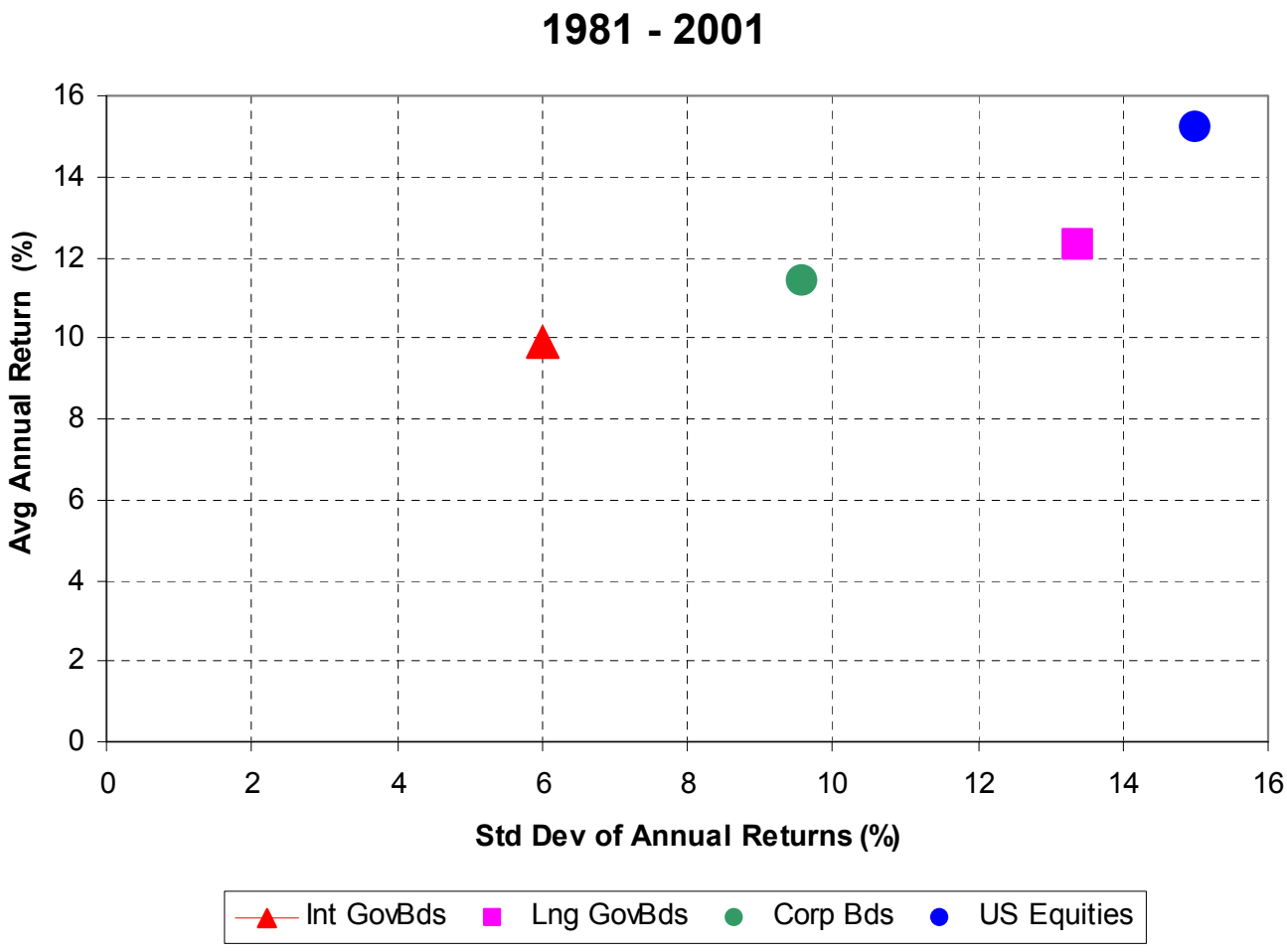
	Since 1925	1925-1980	1981-2001
vs. Tbills	8.7	8.8	8.4
vs. Int. Bds	7.2	7.9	**5.3**
vs. Long Bds	6.9	8.5	**2.9**

PCA's Current Assumptions



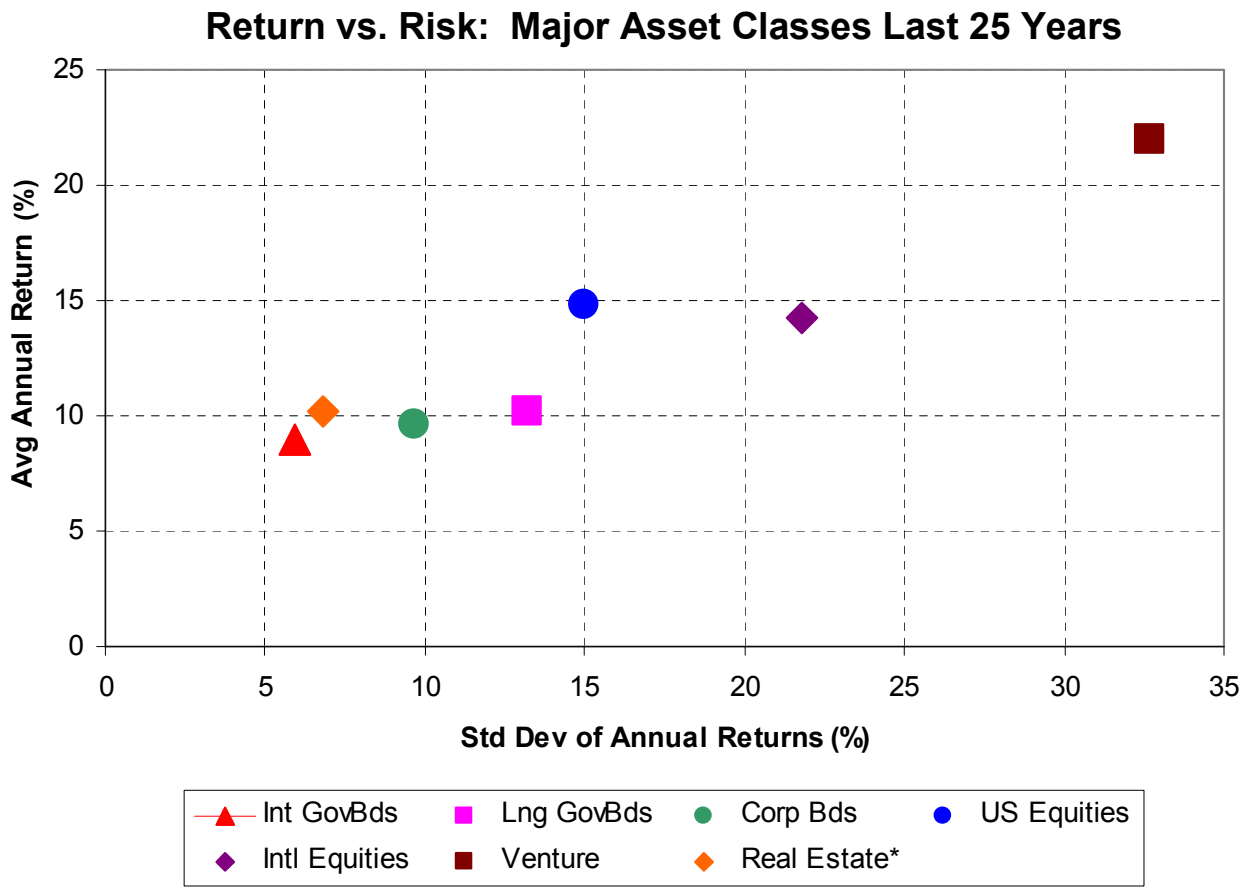
- **In the 55-year period before the "Incredible 1980's and 1990's," equities produced *at least* 6.0% more per year than bonds**

PCA's Current Assumptions



- **In the last two decades, equities produced only 2.5% - 5.0% more than bonds**

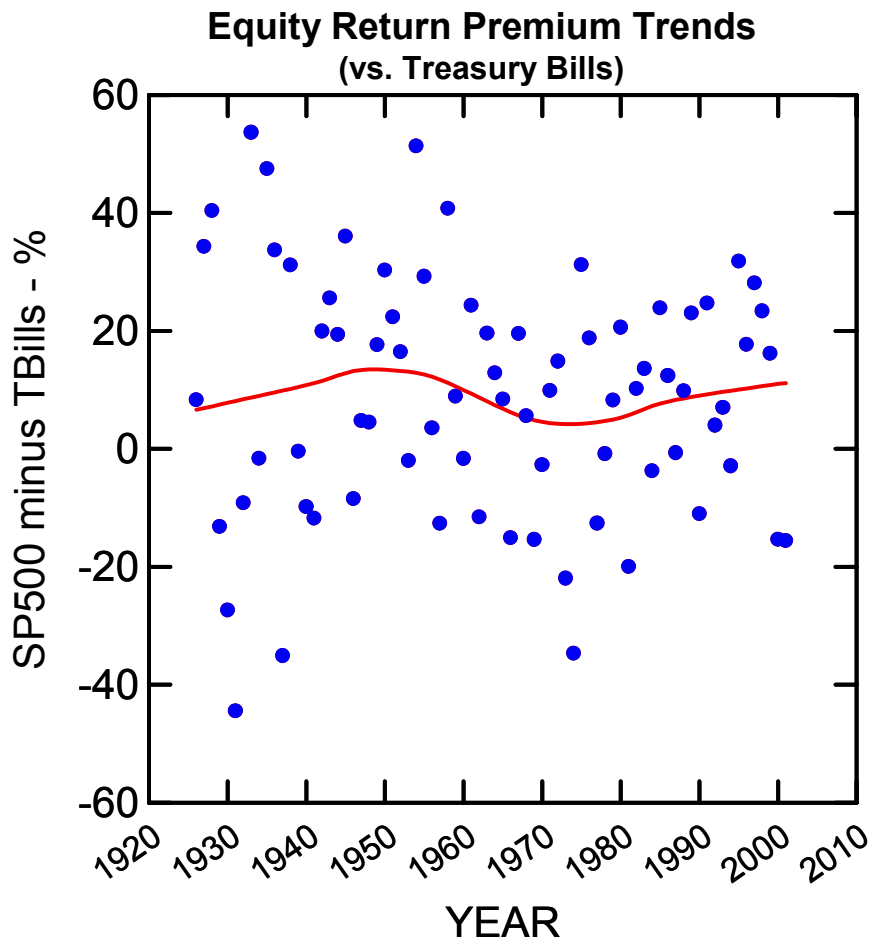
PCA's Current Assumptions



*Real estate is 24 years of data, back to 1978

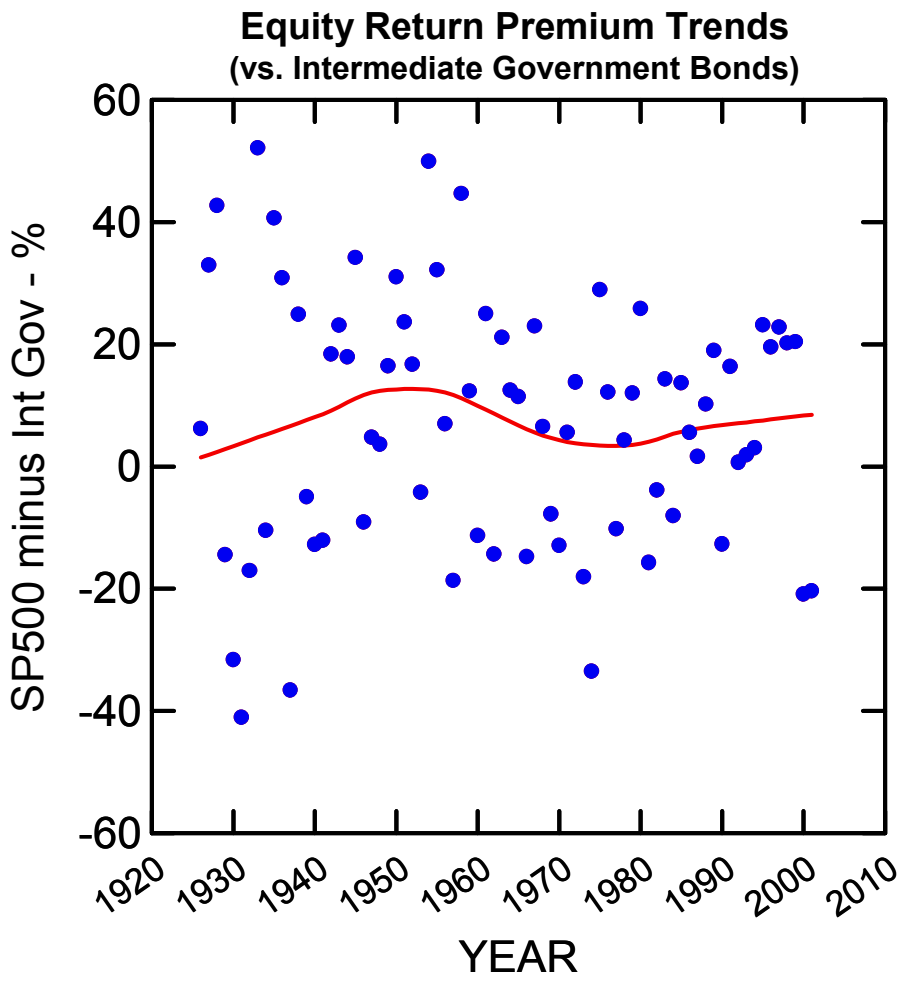
- **Over last 25 years, equities have produced 5.0% more per year than bonds**

PCA's Current Assumptions



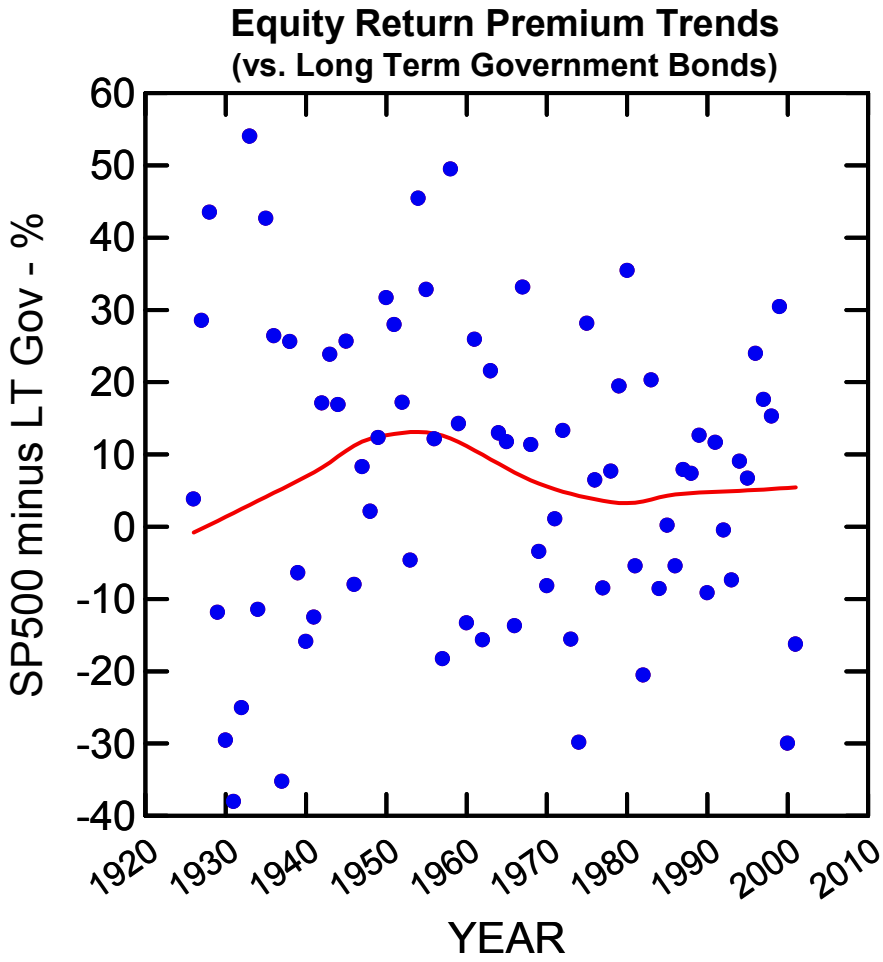
- **Versus T Bills, equity return premiums have reached a cyclical peak (will the '50's and 60's repeat?)**

PCA's Current Assumptions



- **Versus Int Gvts, equity return premium cyclicality not as pronounced**

PCA's Current Assumptions



- **Versus LT Gvts, the 40's - 50's equity return premium looks like a bubble**

PCA's Current Assumptions

- Results during the last equity peak-to-trough period ('50's & 60's)

Historical Perspective: While the equity return premium declined, GDP growth was robust

	The Fifties	The Sixties	Both Decades
Excess vs. Tbills	18.8	4.7	11.8
Excess vs. Int. Bds	19.5	5.2	12.3
Excess vs. Long Bds	20.8	7.1	13.9
Inflation	2.2	2.5	2.4
Nominal GDP Growth	6.7	6.9	6.8
Real GDP Growth	4.2	4.4	4.3
T Bill Return – 1st Yr	1.4	2.1	1.4
T Bill Return – Last Yr	3.1	6.9	6.9
Int Gov Yield – 1st Yr	1.3	4.7	1.3
Int Gov Yield – Last Yr	5.0	8.3	8.3

- While inflation remained stable, short-term and long-term yields increased dramatically
- The average equity return premium declined, but to around 5.0%

PCA's Current Assumptions

- Important underlying issues:
  - With interest rates at historical lows, the risk to future bond returns is significant
  - Equity return premium has peaked and is expected to trend lower, *averaging* 5.0% vs. T Bills, nearly ½ its historical average
  - Lower equity returns and possibly significantly lower bond returns make it extremely challenging to meet today's actuarial forecasts

Implications of Lowered Investment Returns

Analysis of Current Policy Under Two Assumption Sets

	Old Assumptions*	New Assumptions*
Expected Annual Return	9.3	8.5
Annual SD	13.4	14.3
10-Year SD	4.3	4.5
Prob. < 8%	38.7	45.6
Avg. DD	3.0	3.4
Downside Deviation	2.3	2.9

* Current policy: US Equity, 38%; Non-US Equity, 20%; Private Equity, 8%; Real Estate, 7%; Fixed Income, 26%; Liquidity, 1%

- Under new assumptions downside risk increases significantly

CALIFORNIA STATE TEACHERS' RETIREMENT SYSTEM

Investment Return Studies

June 5, 2002

Three Techniques

- Revised Assumption for Future
  - Revise the assumed rate of return and look at the current valuation
  - We have calculated two examples today
- Deterministic Projections
  - Assumes all actuarial experience emerges just as assumed
- Stochastic Modeling
  - Introduces uncertainty in projections
  - Looks for optimal risk management strategies

Return Assumptions

- Revised Future Assumptions
  - Current 8.0%
  - What if … 7.5%
  - What if … 7.0%

Current Normal Cost

	Pct of Earned Salaries	
	Total	Change
2001 Actuarial Valuation	16.5%	

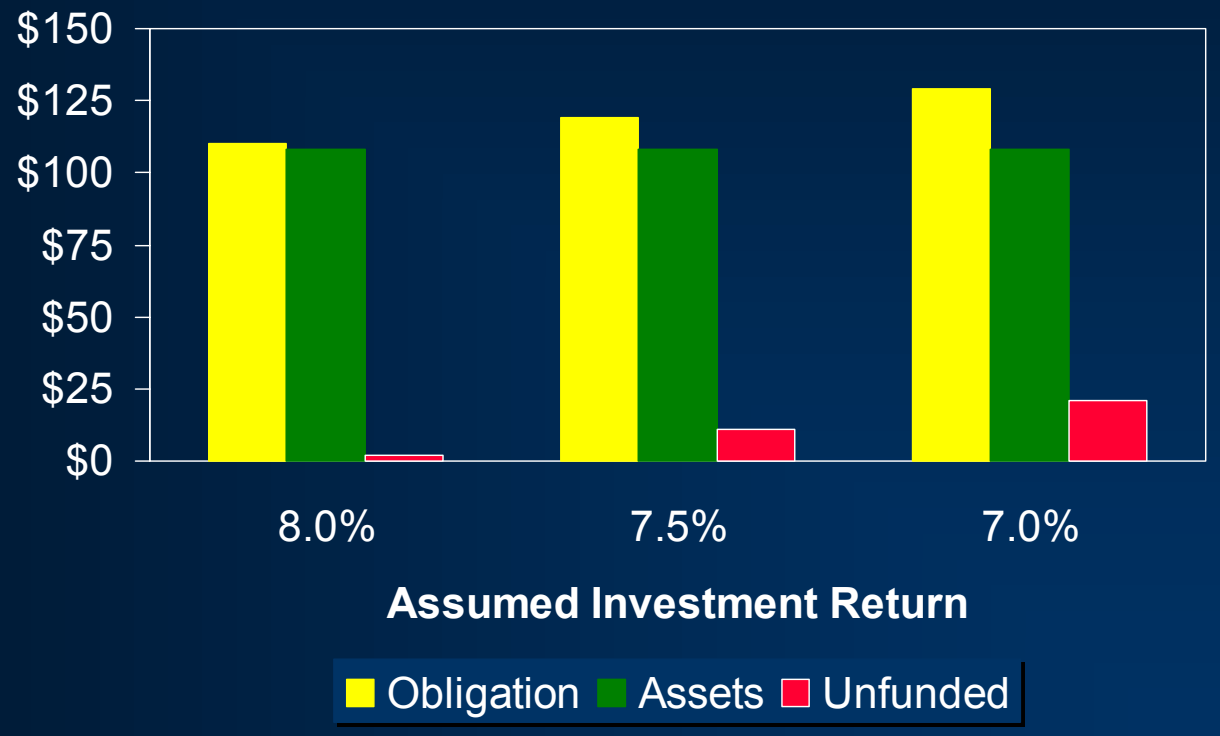
What if we change the Return Assumption?

From 8.0% to 7.5%	18.7%	+ 2.2%
From 8.0% to 7.0%	21.2%	+ 4.7%

Current Actuarial Obligation

$billions 2001 Valuation	Assumed Investment Return 8.0%	7.5%	7.0%
Value of Projected Benefits	$151	$165	$181
Value of Future Normal Costs	41	46	52
Actuarial Obligation	$110	$119	$129
Value of Assets	108	108	108
Unfunded Obligation	$ 2	$ 11	$ 21

Current Funded Status



Funding Sufficiency

	Assumed Investment Return		
	8.0%	7.5%	7.0%
Thirty-Year Funding Period			
Normal Cost Rate	16.5%	18.7%	21.2%
Amortization Rate	0.6	2.8	5.0
Total Level Rate	*17.1%*	*20.5%*	*26.2%*
Current Revenue Stream	*17.2%*		

Challenges identified if long-term returns are less than 8%.

Projections & Models

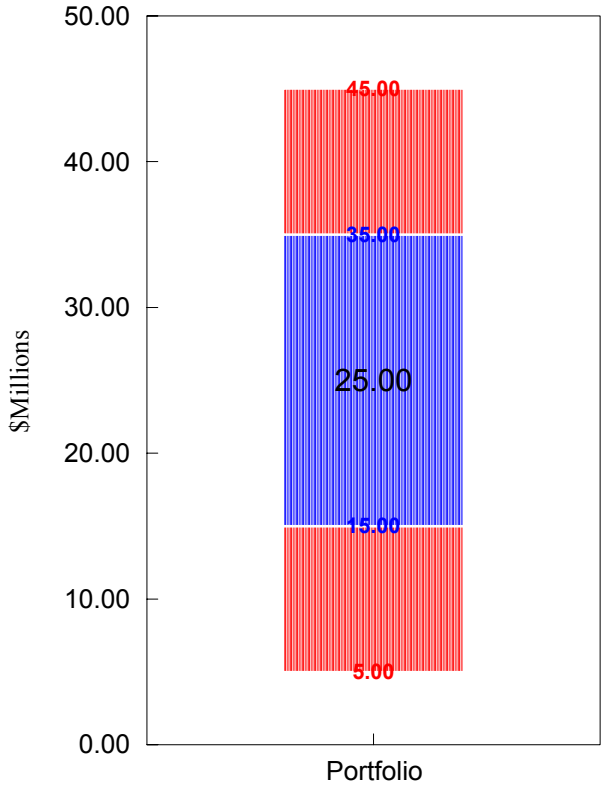
- Deterministic Projection
  - If we assume X% and only earn Y% for 10 years, what will be the Funded Status then?
- Stochastic Modeling
  - Given a certain asset allocation, and
  - Given assumptions about returns in each asset class, then
  - What will be the range of probable outcomes with respect to the future Funded Status

Floating Bar Chart Example

Red Shows 5th to 95th Percentile Range

Blue Shows 25th to 75th Percentile Range

The Median Amount is Shown in Black



The results of 500 projected scenarios are sorted from highest to lowest values and summarized by percentiles:

95th Percentile
(5% of Results Fall Above this Value)

75th Percentile

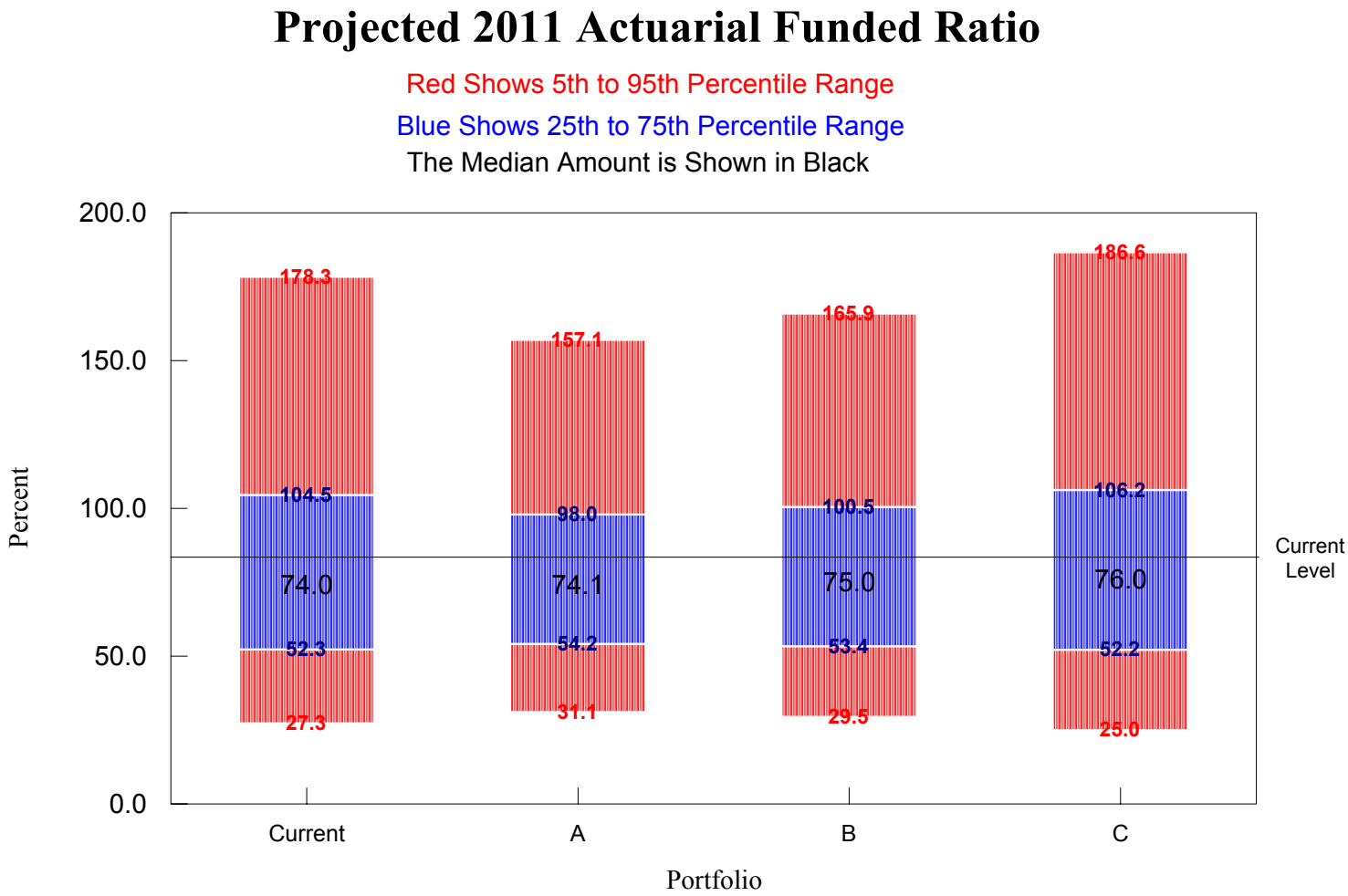
50th Percentile - (Median)

Most Likely Result (50-50 Chance)

25th Percentile

5th Percentile
(5% of Results Fall Below this Value)

50% of Results Fall Between these 2 Values

90% of Results Fall Between these 2 Values

Sample Projection