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Addressing Pension Plan Risks For an Active DB Plan

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Cheiron

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Discussion Topics

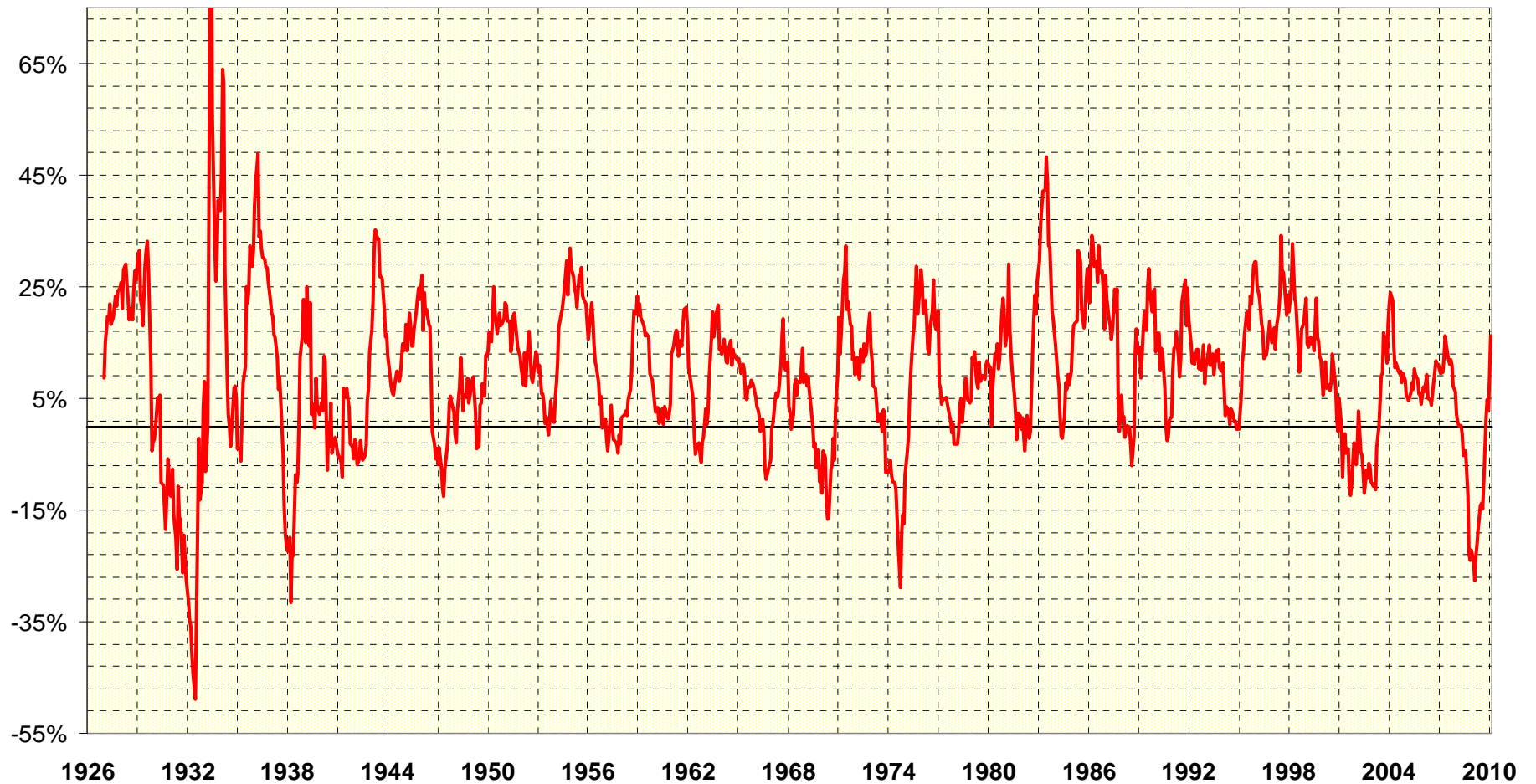
- Defined Benefit Pension Plan Crisis
 - The primary cause
 - What made this downturn so different?
- The Misunderstood Risks
 - Negative Cash Flows
 - “Super Leverage”
- New Plan Strategies Post Meltdown

Defined Benefit Pension Plan Crisis

2

- [The coming private *pension plan crisis*: the unavoidable ...](#)
- [Required Reading on Multi-Employer *Pension Plan Crisis* | The Truth ...](#)
- [Corporate *Pension Plan Shortfall Crisis* Brewing - How to Play It](#)
- [Massive *Pension Fund Crisis* in the US](#)
- [America's Coming *Pension Crisis* \(55, *pension plan*, move, social ...](#)
- [U.S. Pension Crisis: the \\$3 Trillion Crisis](#)
- [Issue: Is There a US Pension Crisis?](#)
- [Solving the Global Pension Crisis](#)
- [The Economist on the U.S. Pension Crisis](#)
- [The US Pension Crisis is here - now](#)
- [Massive Taxpayer Backlash Over Pension Crisis is Coming](#)

The Primary Cause



Extraordinary Market Environment

Fiscal Yr Ending	S&P 500 Return
6/30/1932	-67.6%
6/30/2009	-26.4%
6/30/1931	-23.4%
6/30/1930	-22.9%
6/30/1970	-22.8%
6/30/1938	-20.0%
6/30/2002	-18.0%

Fiscal Yr Ending	S&P 500 Return
6/30/2001	-14.8%
6/30/1974	-14.5%
6/30/1947	-13.3%
6/30/2008	-13.1%
6/30/1962	-12.7%
6/30/1982	-11.4%
6/30/1949	-9.5%

Fiscal Yr Ending	S&P 500 Return
6/30/1942	-9.3%
6/30/1988	-6.9%
6/30/1934	-6.1%
6/30/1984	-4.6%
6/30/1940	-2.7%
6/30/1939	-1.9%
6/30/1958	-0.6%

Number of negative July fiscal years by decade

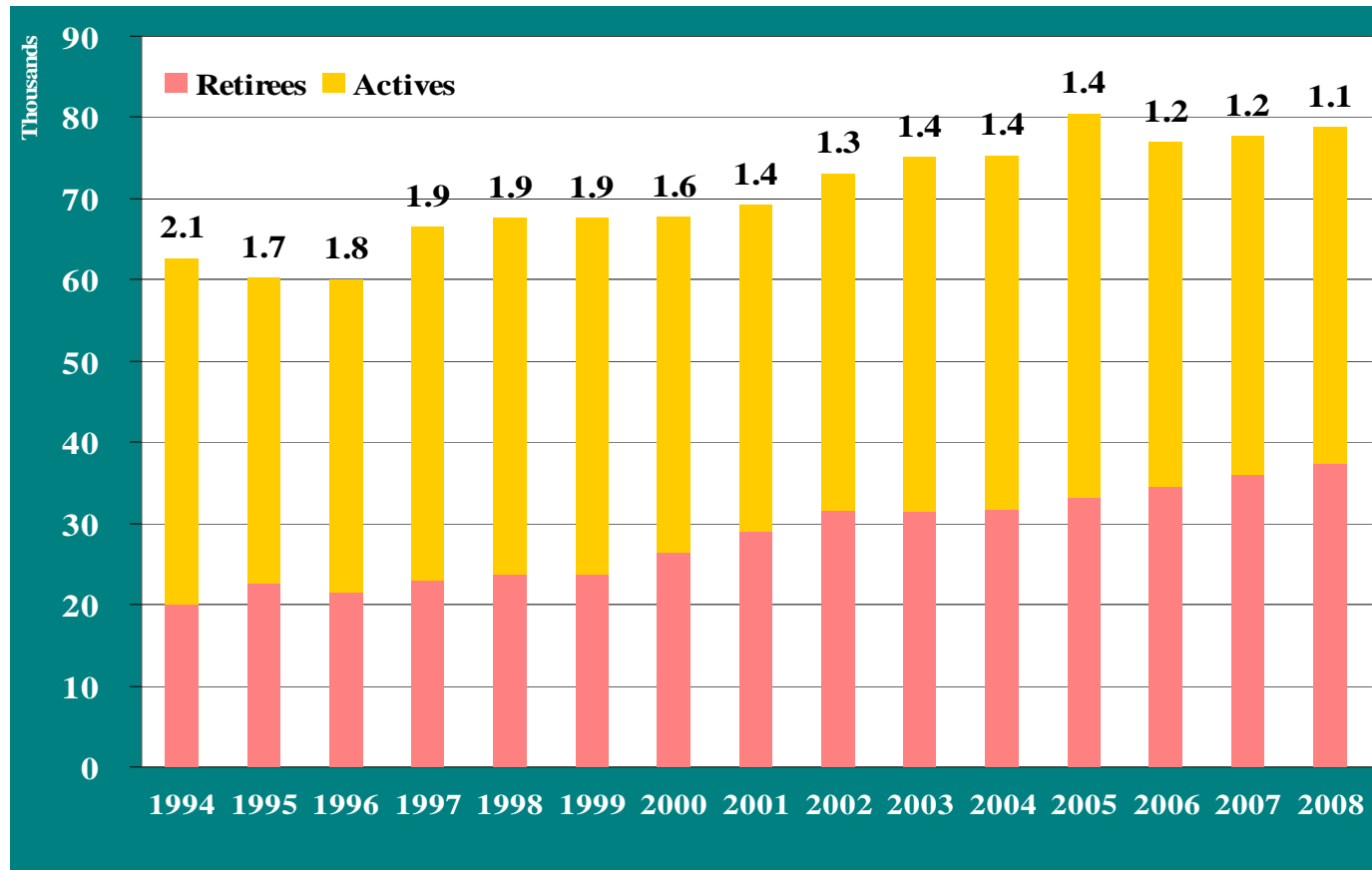
1930's	6	1970's	2
1940's	4	1980's	3
1950's	1	1990's	0
1960's	1	2000-2009	4

What Made This Downturn So Different?

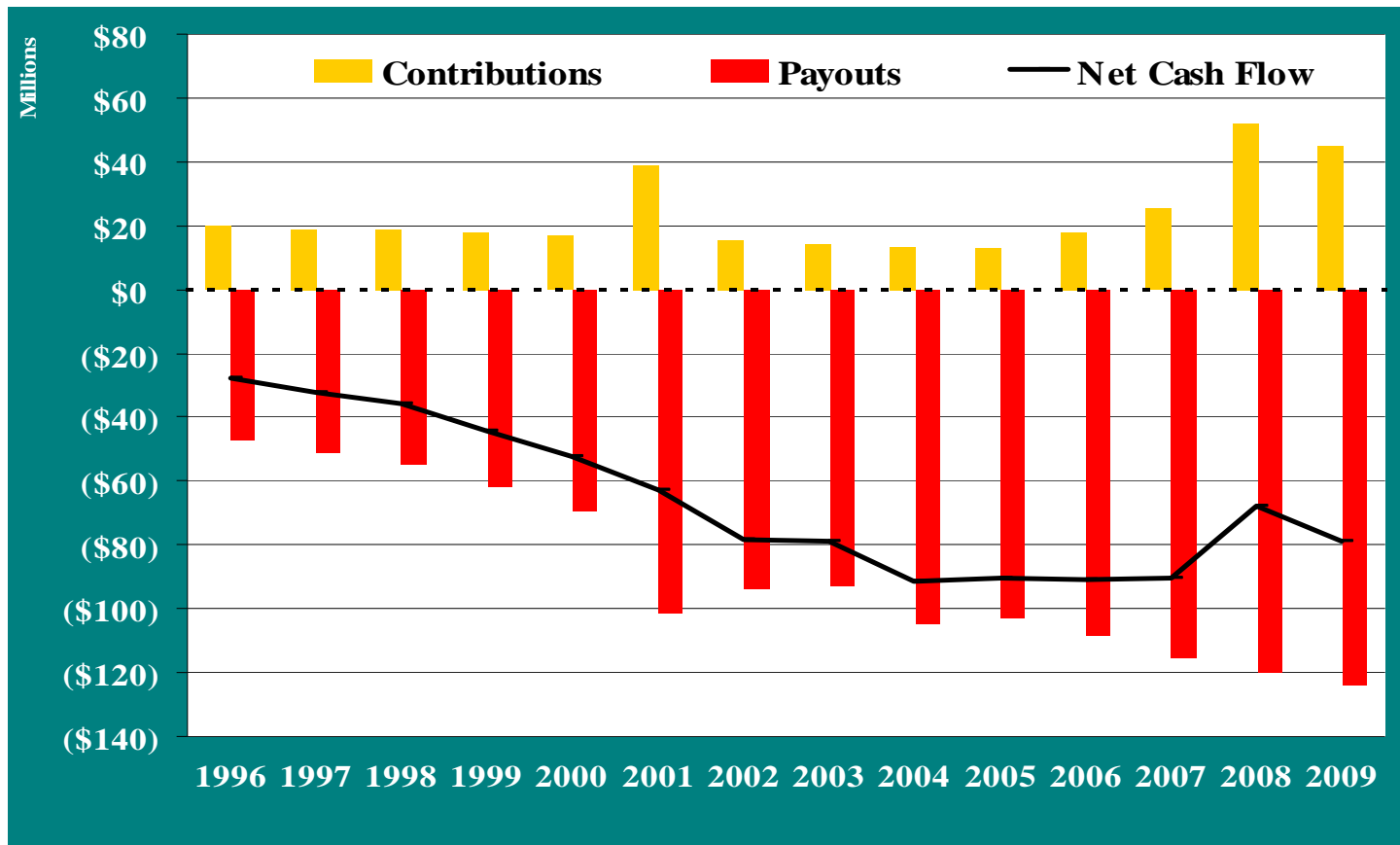
- Highest level of assets than ever before
- Highest allocation to risky assets than ever before
- Highest level of retiree liability than ever before
- Most aggressive actuarial assumptions than ever before
- Highest benefit levels than ever before
- More competition for the pension contribution
- All the above combined to *super leverage* the impacts of the 2008 market downturn

The Misunderstood Risks

Aging of the Baby Boomers, Leads to..



Negative Cash Flows (contributions less payouts)



Negative Cash Flows

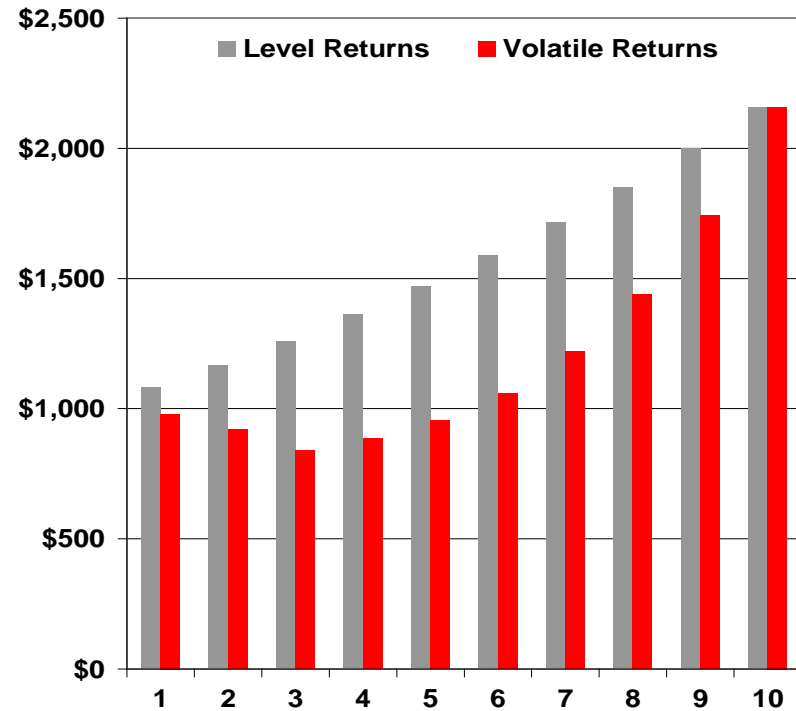
- Greatest misunderstood risk facing DB plans today
- As plans mature while active workforce declines, the risk spirals
- The greater the negative cash flow, the larger the deviation between time weighted and dollar weighted returns
 - Plan sponsors think they are achieving “target” returns which are universally reported by the investment consultants
 - Actuarial experience measurements are always based on dollar weighted returns

Without **Negative** Cash Flows Market Volatility Can be Managed

Starting Assets	\$ 1,000	
Net Cash Flow	0.0%	
Net Cash Flow Growth	0.0%	
Market Cycle	du	

Year	New Cash Flow	Level Returns	Volatile Returns	ASSETS	
				level	volatile
1	\$ -	8.0%	-2.0%	\$1,080	\$980
2	\$ -	8.0%	-6.0%	\$1,166	\$921
3	\$ -	8.0%	-9.0%	\$1,260	\$838
4	\$ -	8.0%	5.5%	\$1,360	\$885
5	\$ -	8.0%	8.0%	\$1,469	\$955
6	\$ -	8.0%	11.0%	\$1,587	\$1,060
7	\$ -	8.0%	15.0%	\$1,714	\$1,219
8	\$ -	8.0%	18.0%	\$1,851	\$1,439
9	\$ -	8.0%	21.0%	\$1,999	\$1,741
10	\$ -	8.0%	24.0%	\$2,159	\$2,159

reported return=	8.0%	8.0%
actual return =	8.0%	8.0%
Asset Loss/(Gain)	\$0	
% of Level Assets	100%	



Add In Negative Cash Flows

Starting Assets	\$ 1,000
Net Cash Flow	-6.0%
Net Cash Flow Growth	0.0%
Market Cycle	du

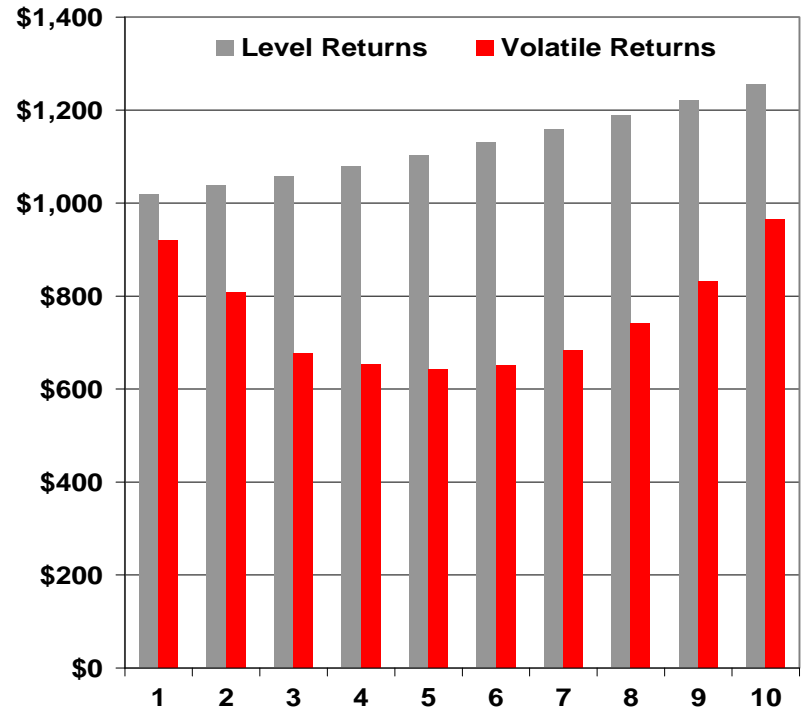
Year	New Cash Flow	Level Returns	Volatile Returns	ASSETS	
				level	volatile
1	\$ (60.0)	8.0%	-2.0%	\$1,018	\$921
2	\$ (60.0)	8.0%	-6.0%	\$1,037	\$807
3	\$ (60.0)	8.0%	-9.0%	\$1,057	\$677
4	\$ (60.0)	8.0%	5.5%	\$1,080	\$653
5	\$ (60.0)	8.0%	8.0%	\$1,104	\$643
6	\$ (60.0)	8.0%	11.0%	\$1,129	\$650
7	\$ (60.0)	8.0%	15.0%	\$1,157	\$684
8	\$ (60.0)	8.0%	18.0%	\$1,188	\$742
9	\$ (60.0)	8.0%	21.0%	\$1,220	\$831
10	\$ (60.0)	8.0%	24.0%	\$1,256	\$964

reported return= 8.0% 8.0%

actual return = 8.0% **5.9%**

Asset Loss/(Gain) **\$292**

% of Level Assets **77%**



With **Negative** Cash Flows *Market Volatility Difficult to Manage*

Starting Assets	\$ 1,000	
Net Cash Flow	-6.0%	
Net Cash Flow Growth	10.0%	
Market Cycle	du	

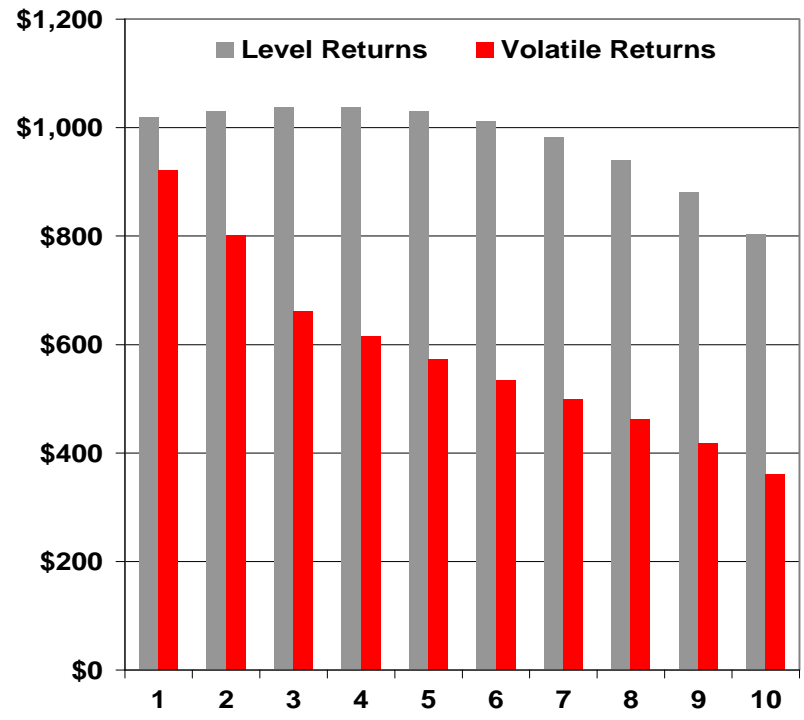
Year	New Cash Flow	Level Returns	Volatile Returns	ASSETS	
				level	volatile
1	\$ (60.0)	8.0%	-2.0%	\$1,018	\$921
2	\$ (66.0)	8.0%	-6.0%	\$1,030	\$801
3	\$ (72.6)	8.0%	-9.0%	\$1,037	\$660
4	\$ (79.9)	8.0%	5.5%	\$1,037	\$614
5	\$ (87.8)	8.0%	8.0%	\$1,029	\$572
6	\$ (96.6)	8.0%	11.0%	\$1,011	\$533
7	\$ (106.3)	8.0%	15.0%	\$982	\$499
8	\$ (116.9)	8.0%	18.0%	\$939	\$462
9	\$ (128.6)	8.0%	21.0%	\$880	\$418
10	\$ (141.5)	8.0%	24.0%	\$803	\$361

reported return= 8.0% 8.0%

actual return = 8.0% **4.2%**

Asset Loss/(Gain) **\$443**

% of Level Assets **45%**



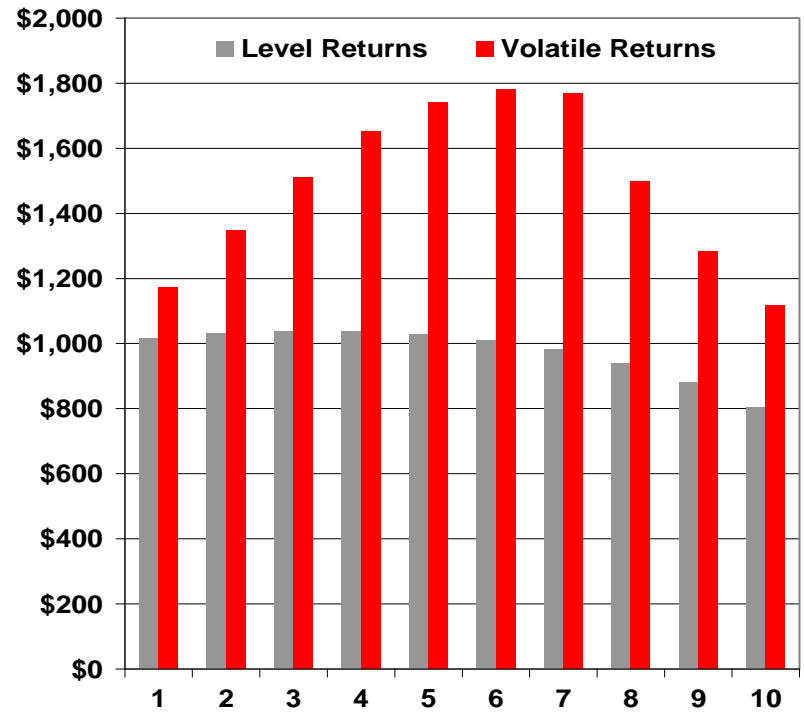
With **Negative** Cash Flows *Up Down Markets Don't Fully Restore*

Starting Assets	\$ 1,000				
Net Cash Flow	-6.0%				
Net Cash Flow Growth	10.0%				
Market Cycle	UD				

Year	New Cash Flow	Level Returns	Volatile Returns	ASSETS	
				level	volatile
1	\$ (60.0)	8.0%	24.0%	\$1,018	\$1,173
2	\$ (66.0)	8.0%	21.0%	\$1,030	\$1,347
3	\$ (72.0)	8.0%	18.0%	\$1,051	\$1,511
4	\$ (79.9)	8.0%	15.0%	\$1,037	\$1,651
5	\$ (87.8)	8.0%	11.0%	\$1,029	\$1,741
6	\$ (96.6)	8.0%	8.0%	\$1,011	\$1,779
7	\$ (106.3)	8.0%	5.5%	\$982	\$1,768
8	\$ (116.9)	8.0%	-9.0%	\$939	\$1,498
9	\$ (128.6)	8.0%	-6.0%	\$880	\$1,283
10	\$ (141.5)	8.0%	-2.0%	\$803	\$1,117

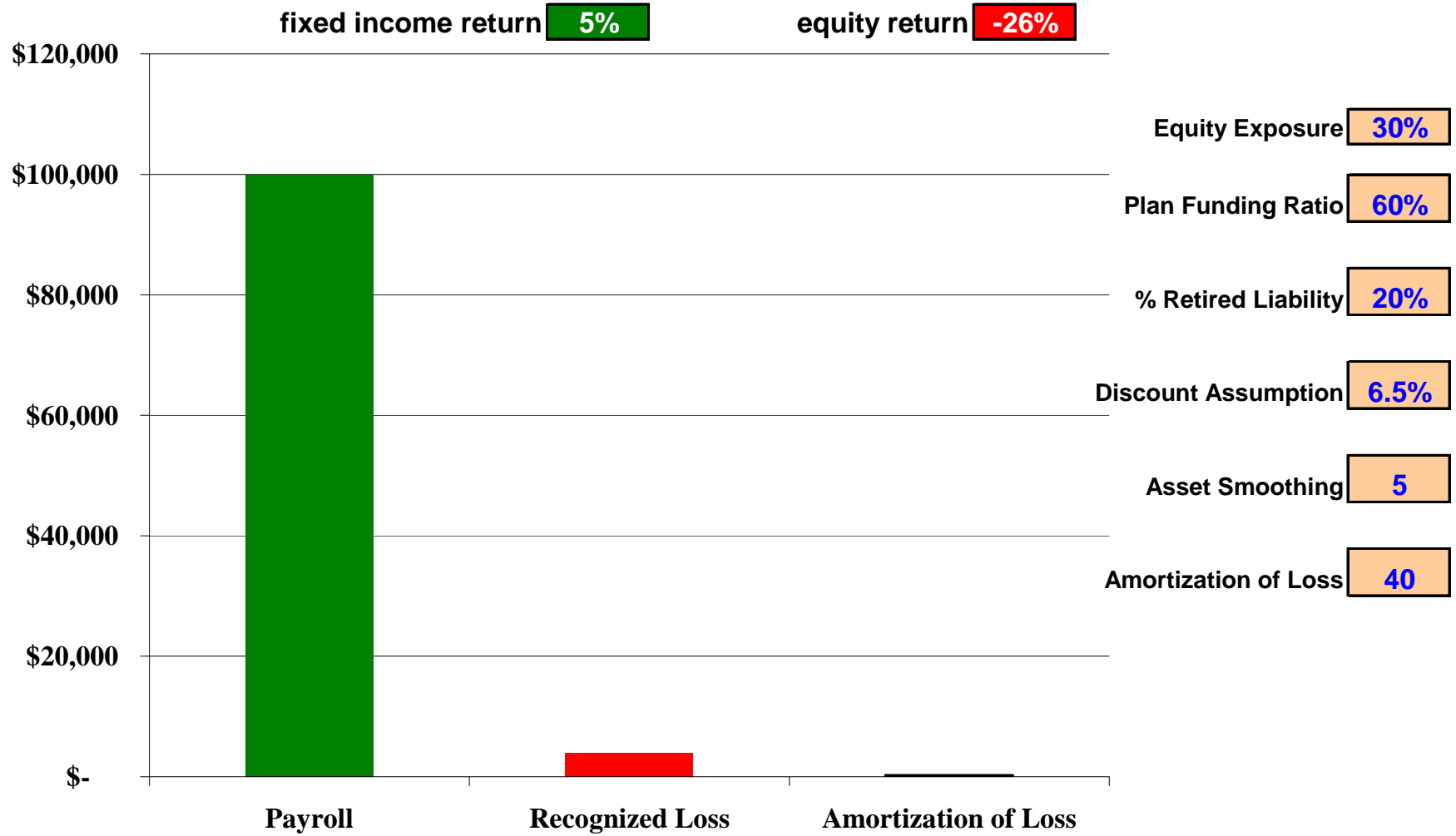
reported return=	8.0%	8.0%
actual return =	8.0%	10.0%

Asset Loss/(Gain)	(\$314)
% of Level Assets	139%



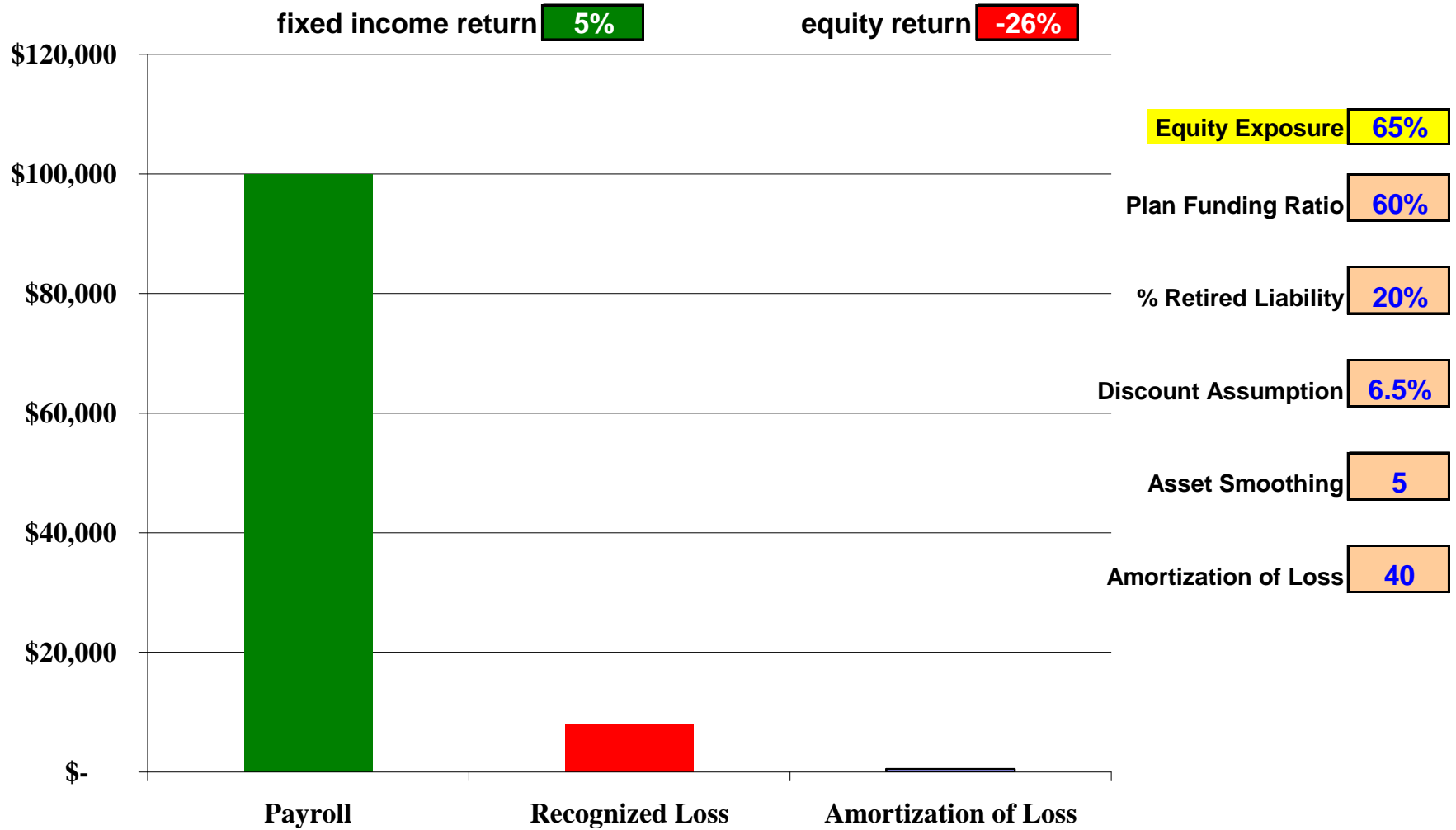
Super Leverage

Impact of the 2008 Market Downturn Given the Situation in the 1970's



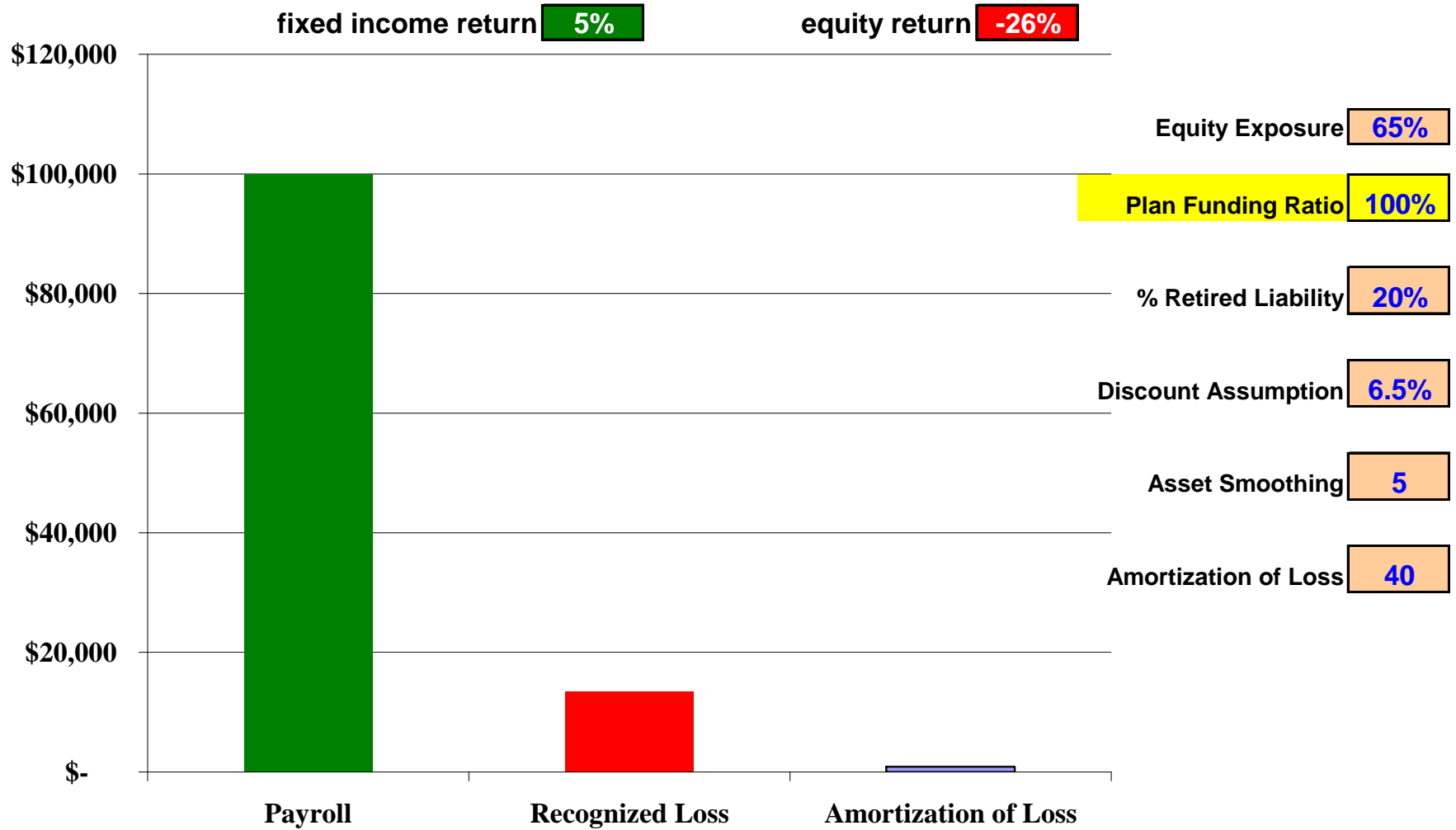
Recognized Loss as a % of Payroll **3.9%**
 Amortization of Loss as a % of Payroll **0.3%**

Impact of Increasing Equity Exposure



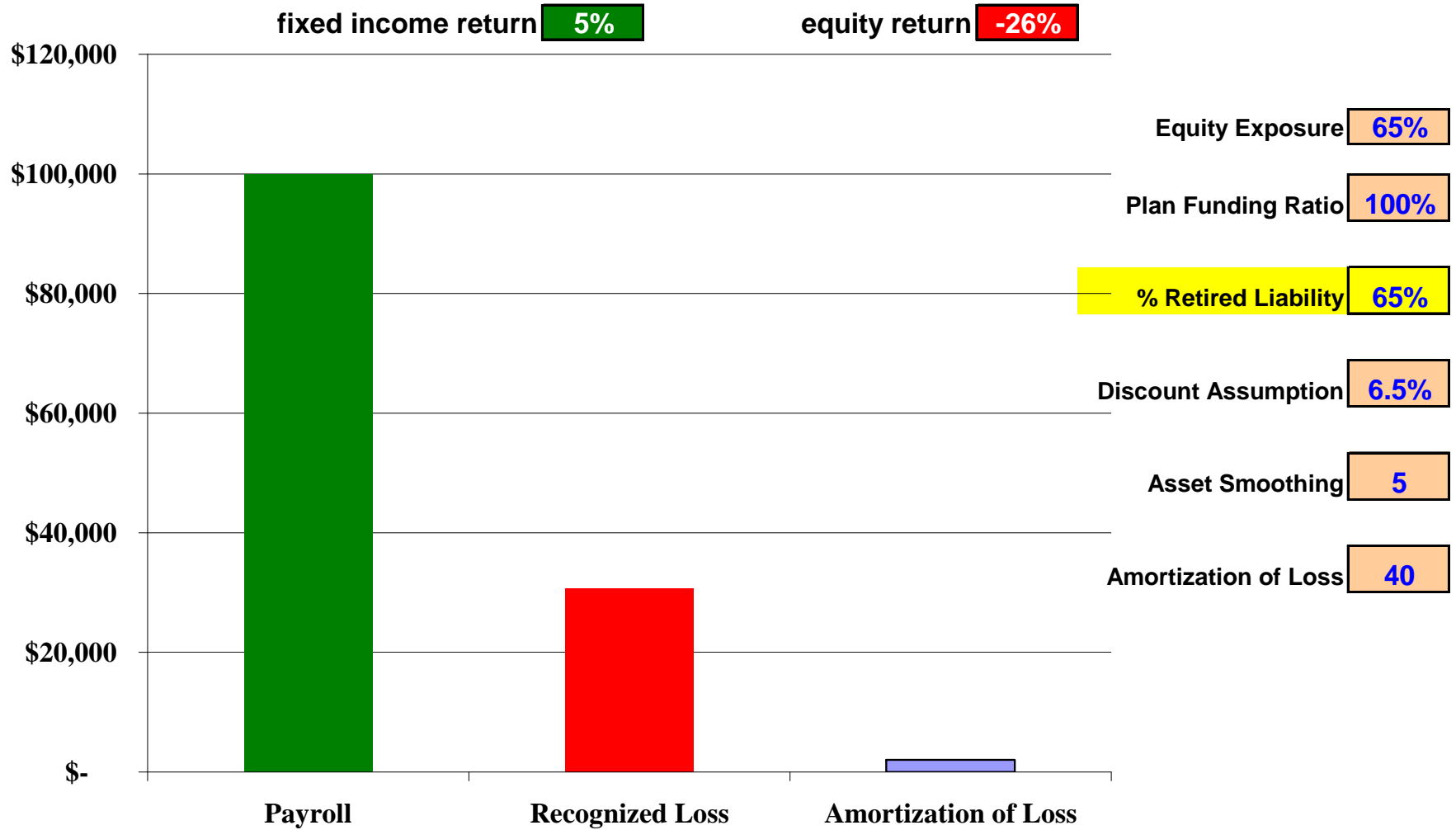
Recognized Loss as a % of Payroll 8.1%
Amortization of Loss as a % of Payroll 0.5%

Impact of Increased Funded Status



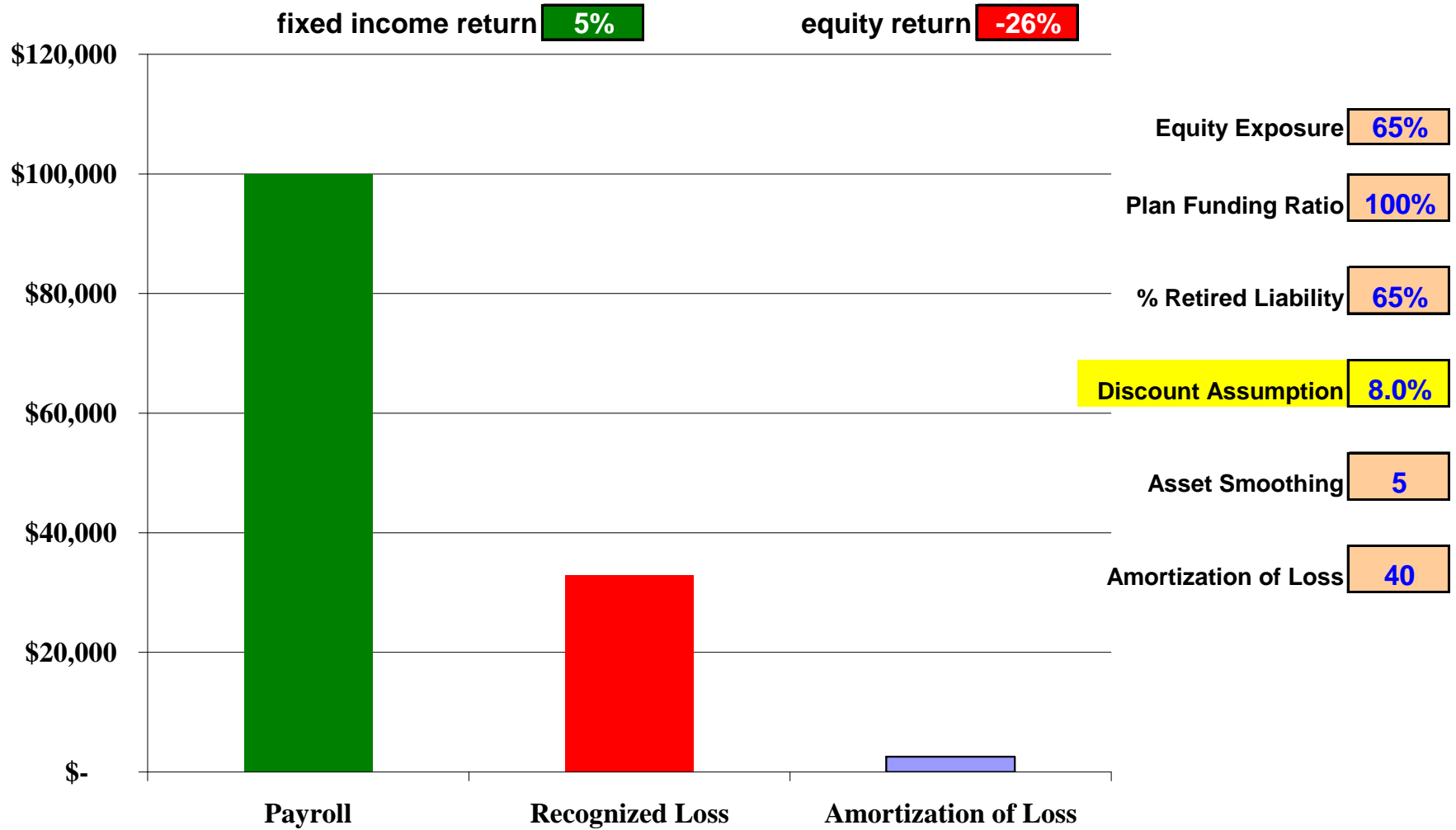
Recognized Loss as a % of Payroll **13.4%**
 Amortization of Loss as a % of Payroll **0.9%**

Impact of Increased Plan Maturity



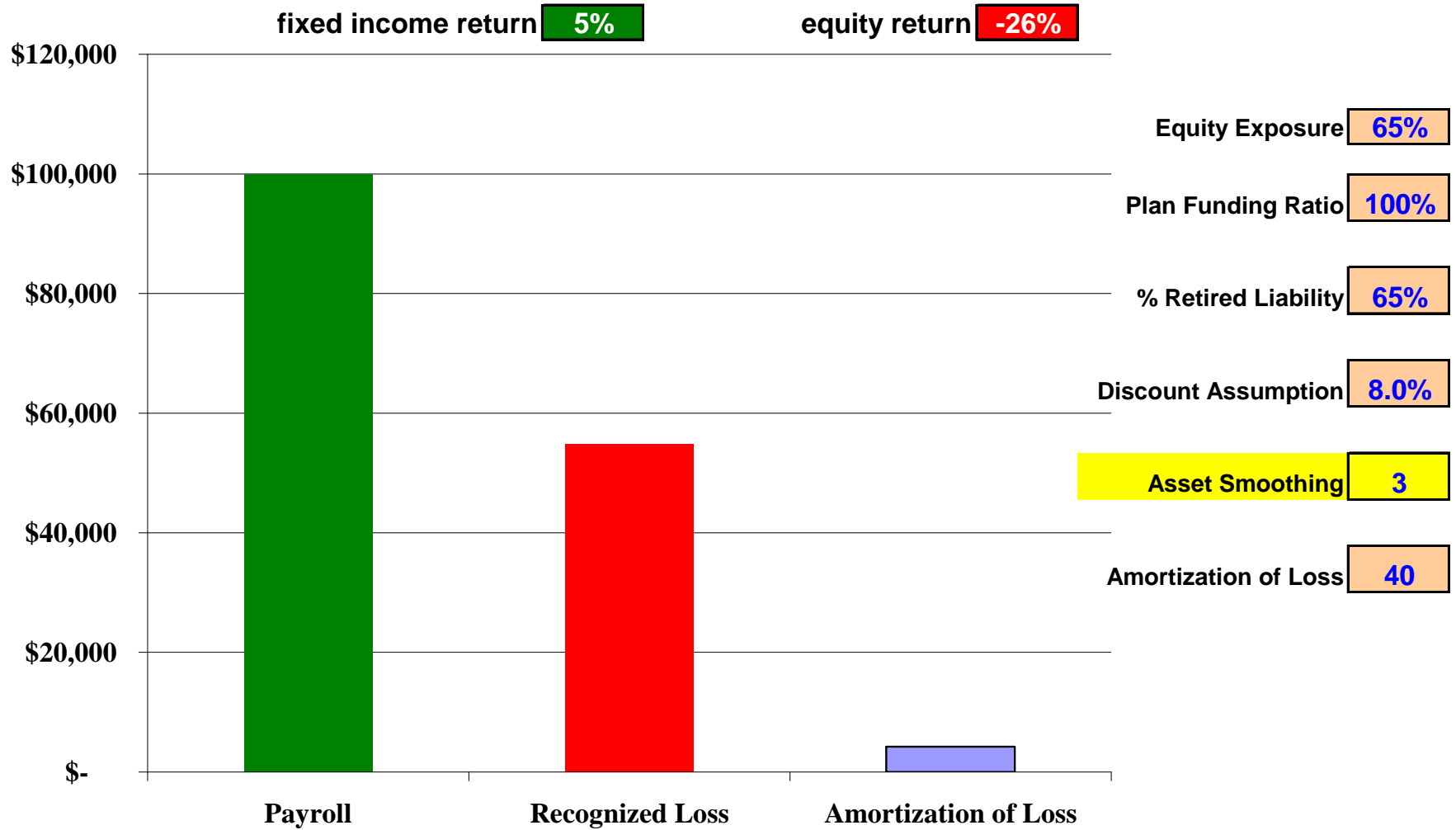
Recognized Loss as a % of Payroll **30.7%**
 Amortization of Loss as a % of Payroll **2.0%**

Impact of Increased Earnings Expectations



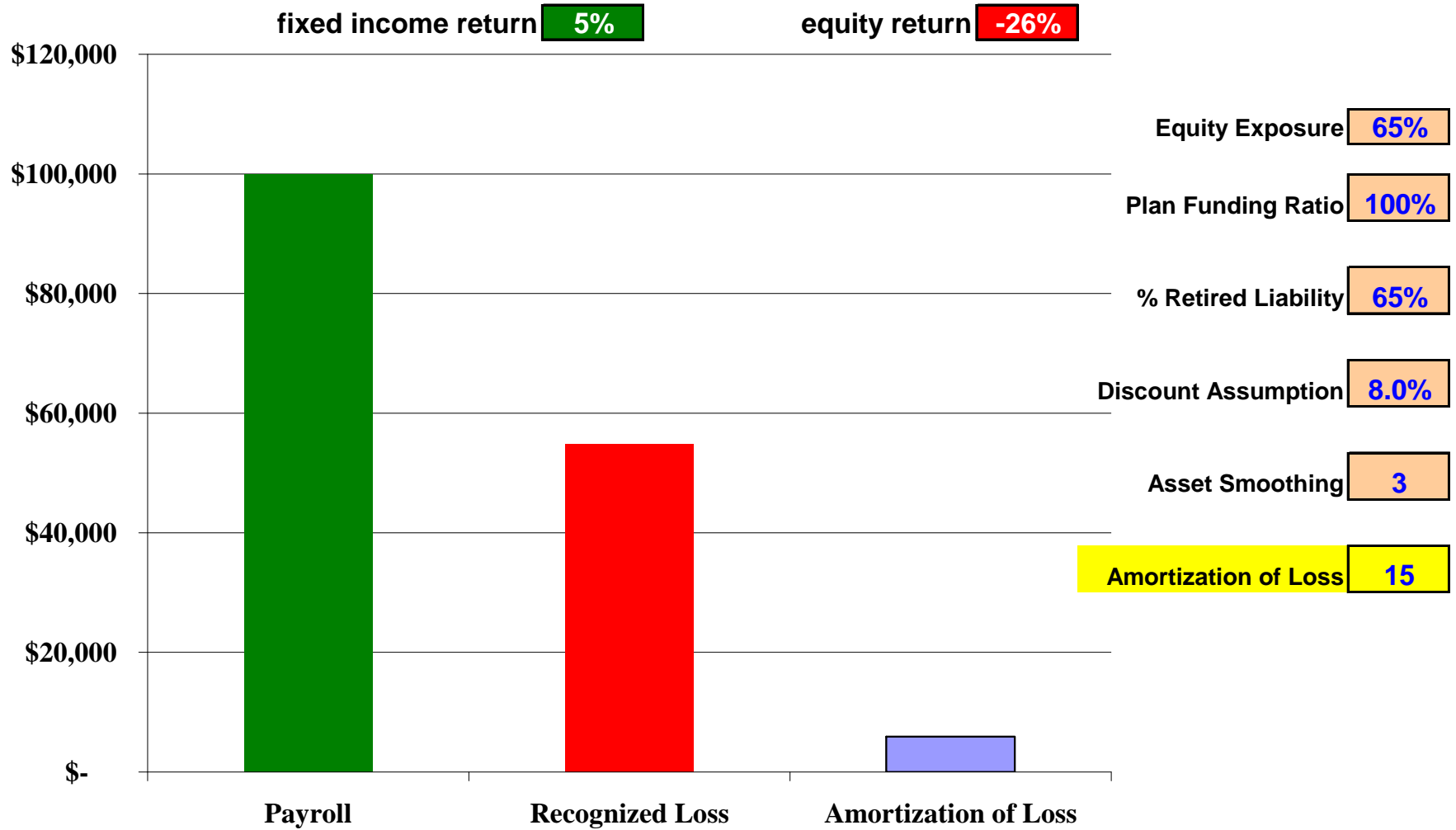
Recognized Loss as a % of Payroll **32.9%**
 Amortization of Loss as a % of Payroll **2.6%**

Impact of Shorter Smoothing Period



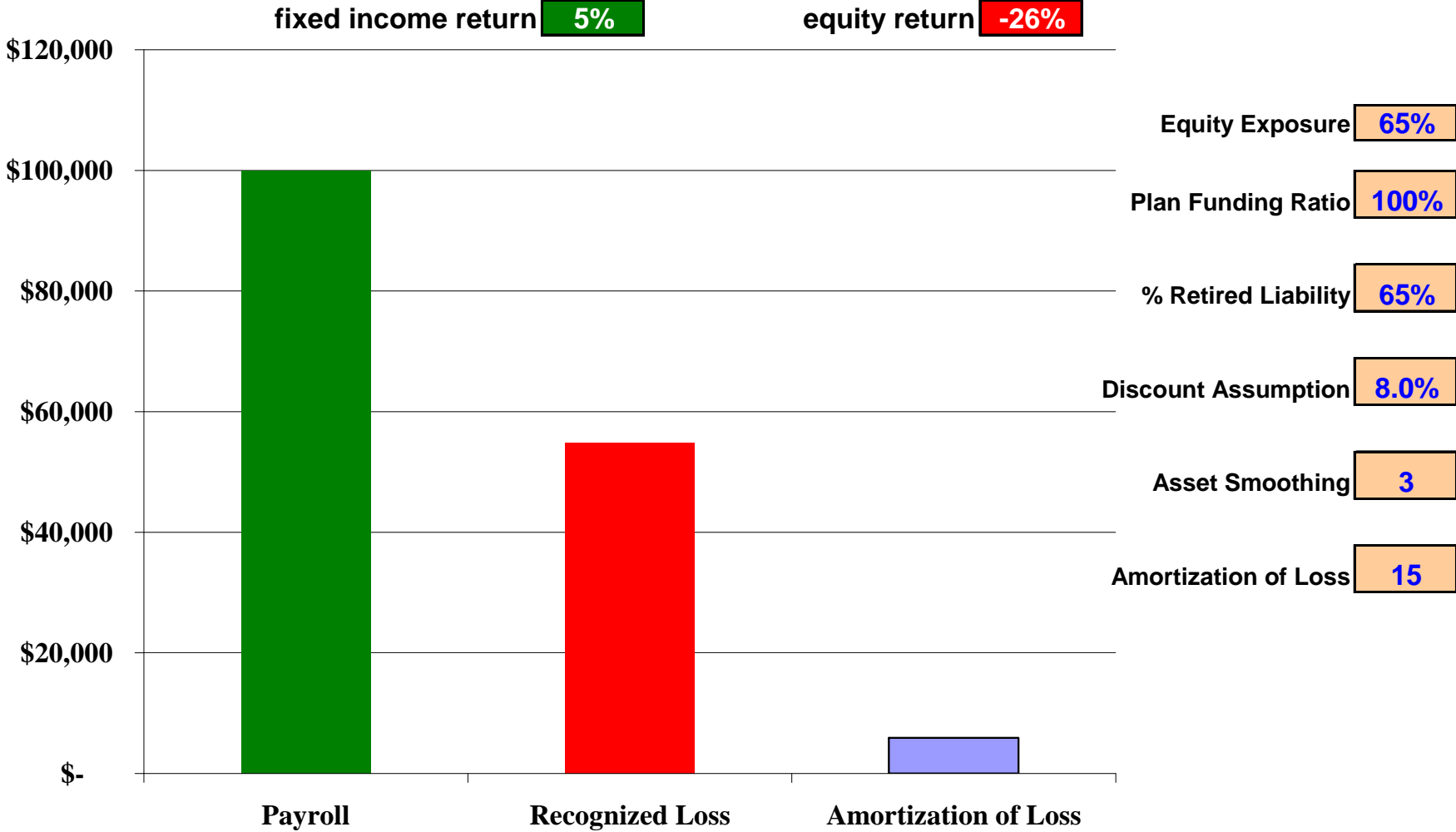
Recognized Loss as a % of Payroll 54.8%
Amortization of Loss as a % of Payroll 4.3%

Impact of Shorter Amortization Period



Recognized Loss as a % of Payroll **54.8%**
 Amortization of Loss as a % of Payroll **5.9%**

Impact of the 2008 Market Downturn Given the Situation in the 2000's



Recognized Loss as a % of Payroll 54.8%
Amortization of Loss as a % of Payroll 5.9%

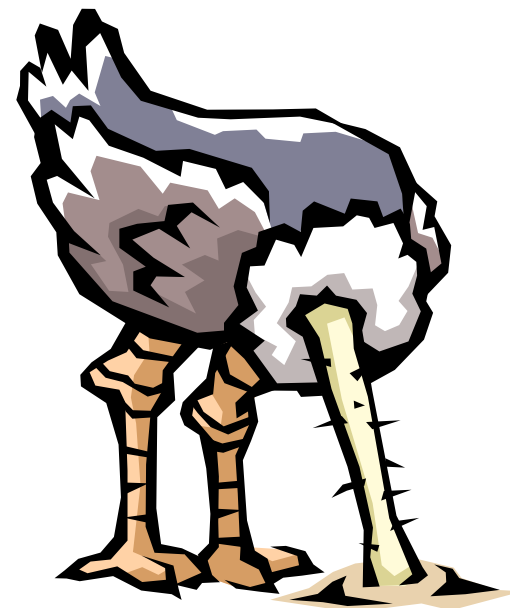
New Strategies After the Meltdown

- Market value of liabilities
- Focus on better risk measures
- Increase the transparency of risk
- Other potential strategies
- Revamp the traditional actuarial model of reporting and analysis

Market Value of Liabilities Debate, or *The battle of the Dogmatists and the Ostriches*



**I'm right, and that's
all there is to it!**



**I don't want to see
any other measure**

Focus on Better Risk Measures

- Greatest contributor to the current pension crisis was the inability to focus on a Plan's primary risk - *not being able to afford the plan*
 - 90+% time spent on qualification issues and investment manager performance and selection
- Identify risk limits and assess likelihood of hitting them
 - Maximum contribution levels
 - Maximum annual change in contribution rate
 - Minimum funded status

Potential Risk Indexes

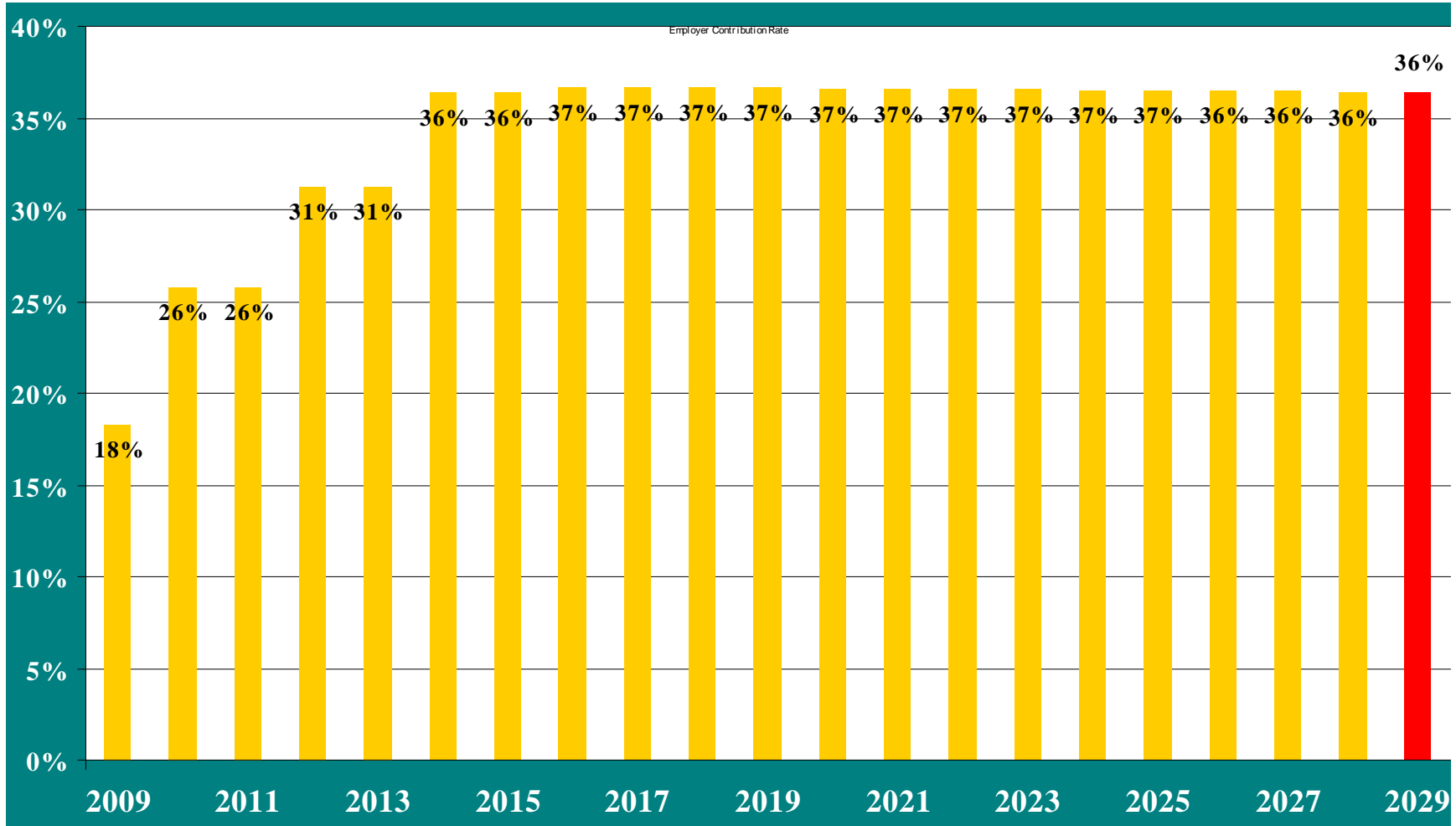
- Affordability risk = $(\text{One STD} \times \text{MVA}) / \text{Payroll}$
 - Measures the percentage of payroll at risk for a 1 in 6 investment loss
- Debt transfer = $\text{UAL} / \text{Payroll (or headcount)}$
 - Measures the amount future taxpayers are committed to pay for past service benefits
- Funding progression = $(\text{NC} + \text{interest on UAL}) / \text{Contributions}$
 - Measures whether UAL is expected to increase or decrease

Increase the Transparency of Risk

- The likelihood that contributions set at the expected earnings rate will be sufficient is usually less than 50%
- The greater the degree of negative cash flows, the higher the likelihood of insufficient contributions
- Plan sponsors and trustees should not automatically accept the contribution level derived from the expected earnings rate
 - First explore potential outcomes under numerous economic scenarios
 - Then set contributions based on your risk appetite

Increase the Transparency of Risk

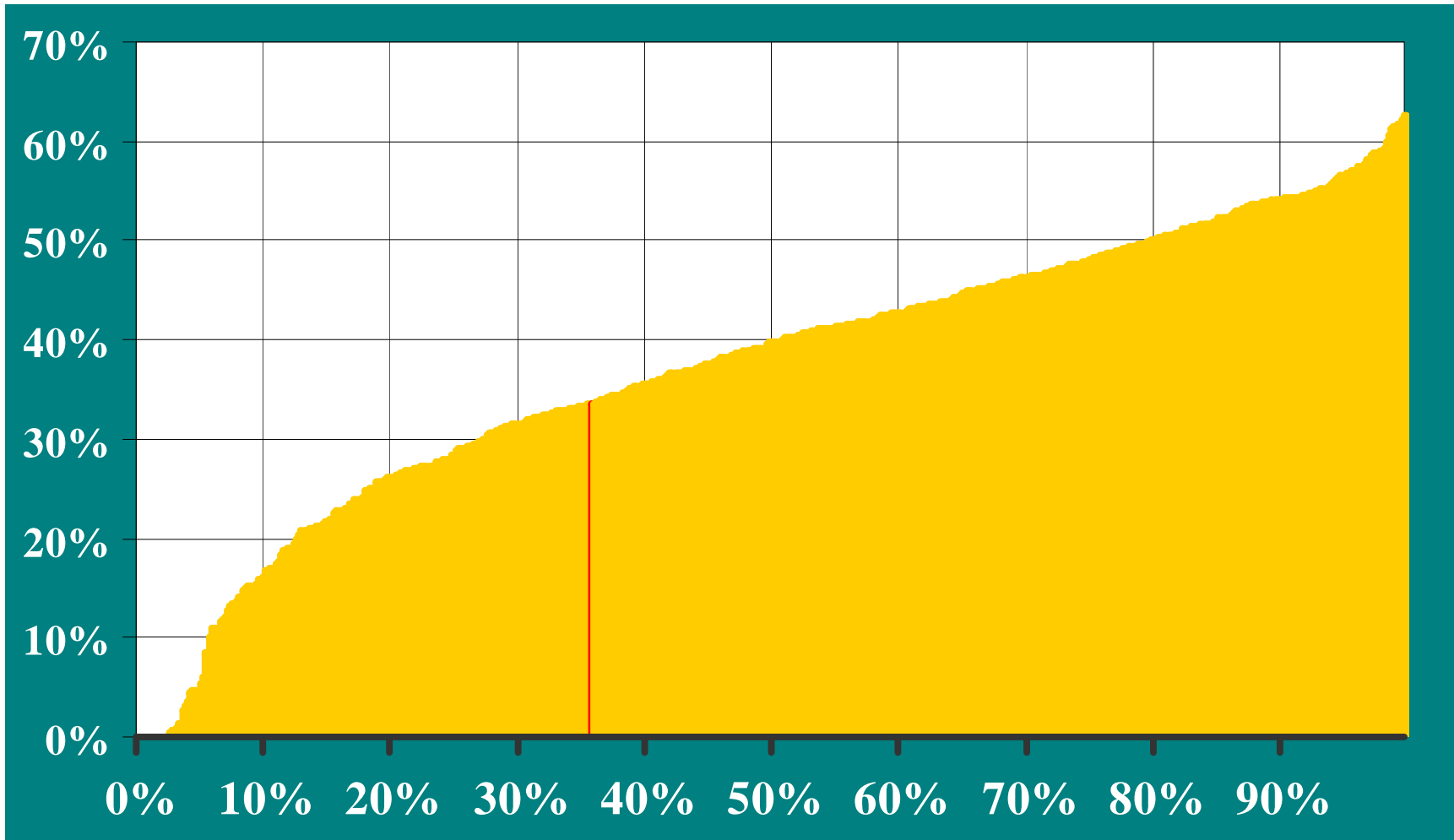
Deterministic Projection - Earnings Always as Assumed
 Contributions Projected to be 36% of Payroll in 2029



Increase the Transparency of Risk

Stochastic Projection of 2029 Contribution

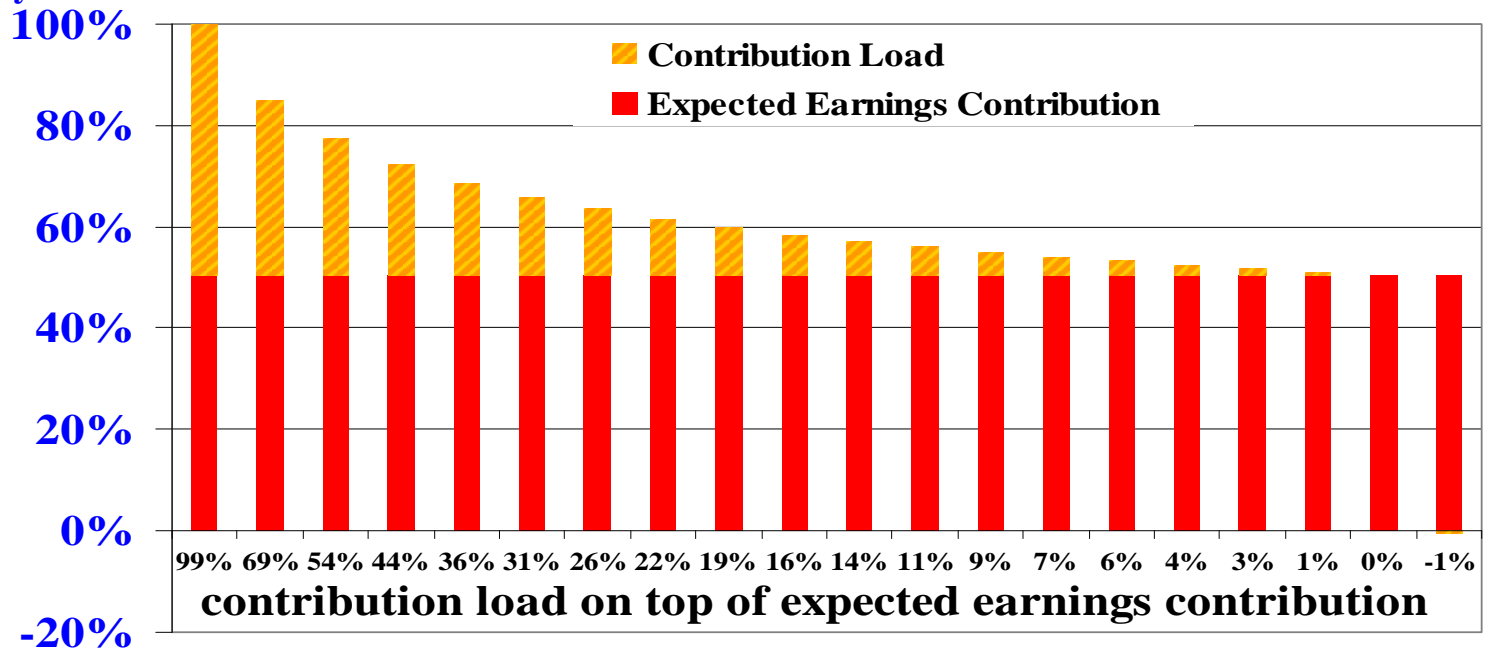
Likelihood that Contributions will Exceed 36% is 64%



Increase the Transparency of Risk

Show the Full Range of Possibilities

Probabilities that contributions will fully fund the Plan



Other Potential Strategies

- Limit the ratio of equity assets to payroll
- Immunize or annuitize retired liabilities
- Increase the funding target (e.g. 150%, with equity exposures at 60%)
- Set the earnings assumption below the expected earnings level
 - Increases likelihood of achieving expected costs
- Adjust contribution rates now to reduce the likelihood of exceeding a maximum threshold in the future

Traditional Actuarial Model

- Annual Valuation performed much like those in the 1960's
- Performed usually 6-9 months after the fact
- Produces a single number based on where you have been
- No actuarial risk analysis
- Disconnect with monthly investment reporting and asset allocation
- 100% funding is the holy grail

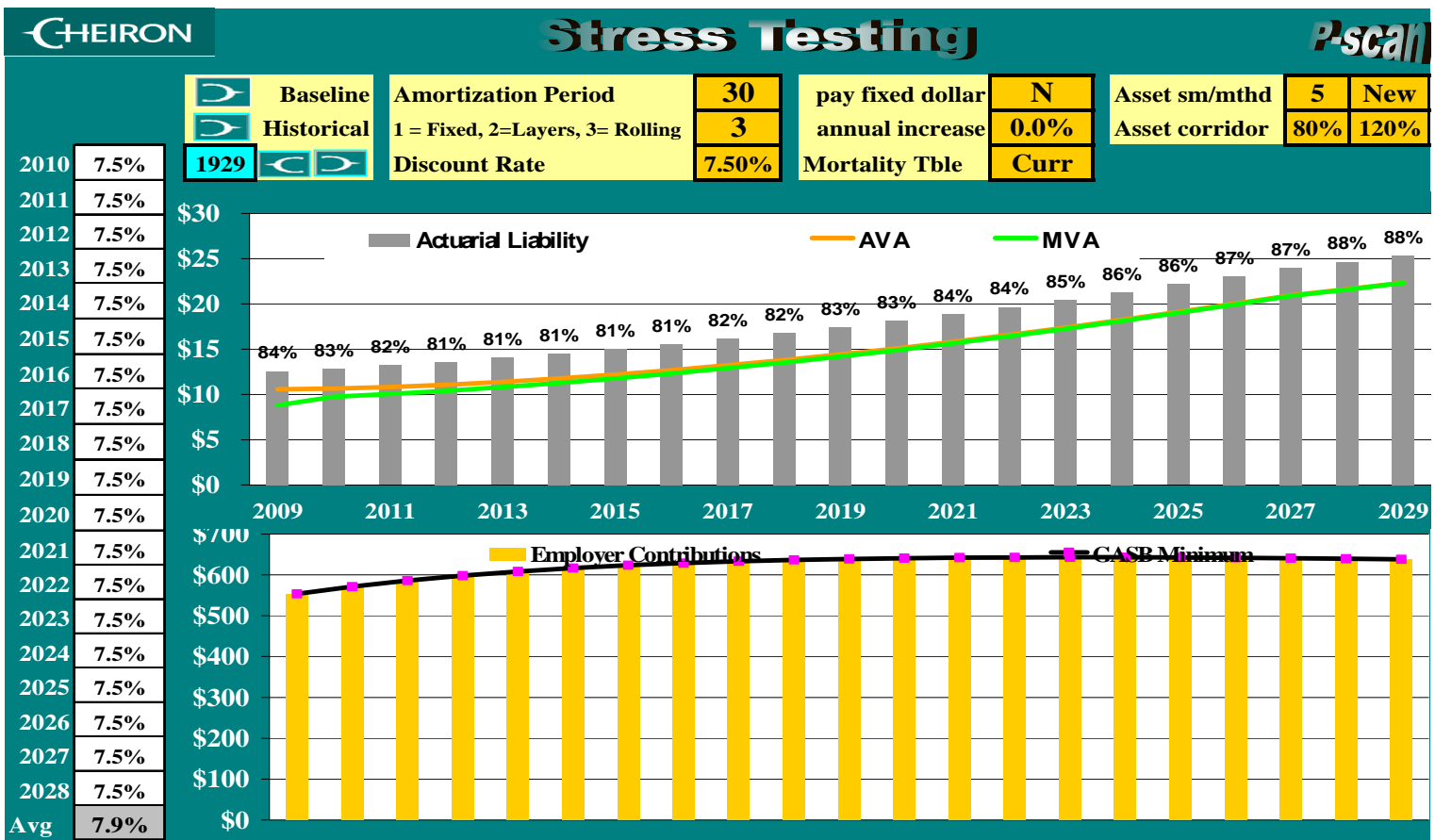
Valuation Date	June 30, 2005		June 30, 2004*		
Number of active members		72,281		71,950	
Annual salaries	\$	2,703,430	\$	2,641,533	
Number of annuitants and beneficiaries		37,402		35,803	
Annual allowances	\$	994,745	\$	914,879	
Assets:					
Market value	\$	13,456,026	\$	12,858,540	
Actuarial value	\$	14,598,843	\$	14,255,131	
Unfunded actuarial accrued liability	\$	4,536,027	\$	3,362,495	
Amortization period (years)		30		30	
		Univ.	Non-Univ.	Univ.	Non-Univ.
Pension Plan:					
Normal		14.39%	17.84%	14.19%	18.02%
Accrued liability		<u>9.43</u>	<u>8.94</u>	<u>8.18</u>	<u>7.31</u>
Total		<u>23.82%</u>	<u>26.78%</u>	<u>22.37%</u>	<u>25.33%</u>
Member		7.625%	9.105%	7.625%	9.105%
State (ARC)		<u>16.195</u>	<u>17.675</u>	<u>14.745</u>	<u>16.225</u>
Total		23.82%	26.78%	22.37%	25.33%
Life Insurance Fund:					
State		0.17%	0.17%	0.17%	0.17%
Medical Insurance Fund:					
Member		0.75%	0.75%	0.75%	0.75%
State Match		0.75	0.75	0.75	0.75
State Additional		<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
Total		<u>1.50%</u>	<u>1.50%</u>	<u>1.50%</u>	<u>1.50%</u>
Total Contributions		<u>25.49%</u>	<u>28.45%</u>	<u>24.04%</u>	<u>27.00%</u>
Contribution rates for fiscal year ending:		June 30, 2008		June 30, 2007	
Member Statutory		8.375%	9.855%	8.375%	9.855%
State Statutory		11.625	13.105	11.625	13.105
Required Increase		1.32	1.32	0.11	0.11
State Special		<u>4.17</u>	<u>4.17</u>	<u>3.93</u>	<u>3.93</u>
Total		<u>25.49%</u>	<u>28.45%</u>	<u>24.04%</u>	<u>27.00%</u>

Revamp the Traditional Model

- Technology allows for continuous examination of Plan's financial prospects
- Can be based on today's assets
- Look forward and produce a variety of possible results
- Integrate investment policy with Board's funding goals (*and track them!*)
- Analyze risk of not meeting goals
- 100% funding is an illusion

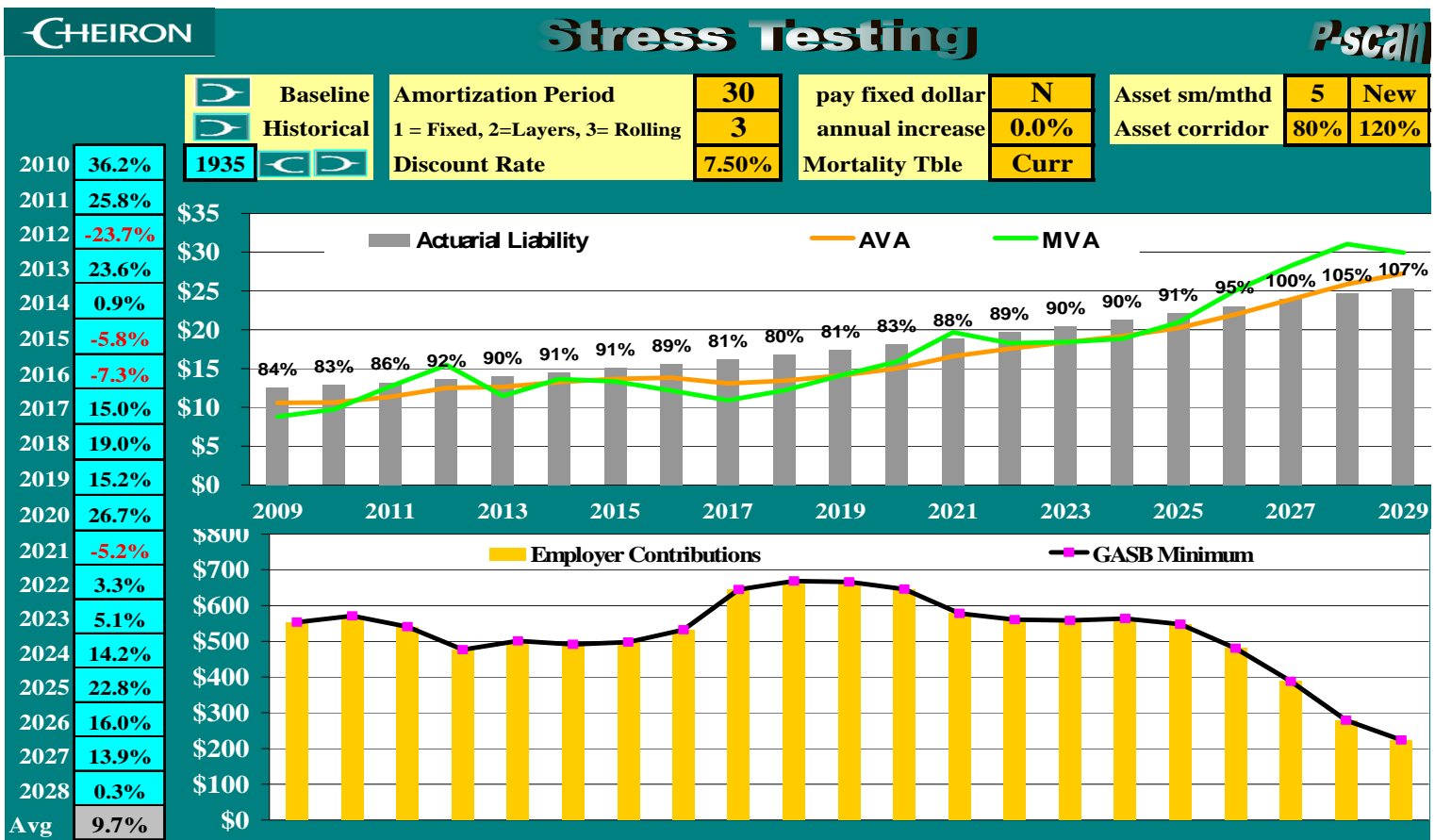
Actuarial Tools

Can Show You Best Estimates



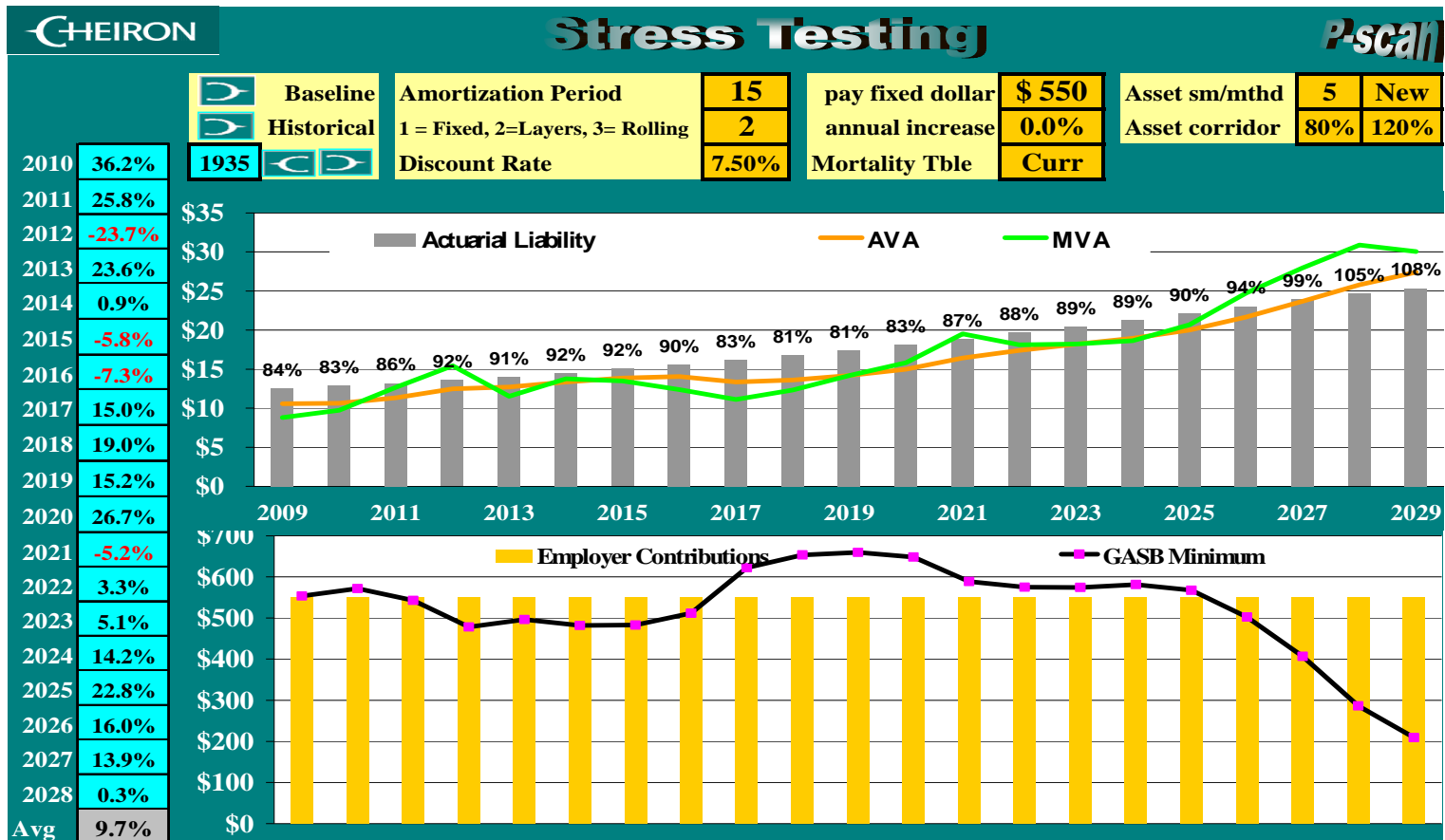
Actuarial Tools

Can Stress Test Future Returns



Actuarial Tools

Can Test Alternative Funding Choices



Actuarial Tools

Can Give You Probabilities of Success

