



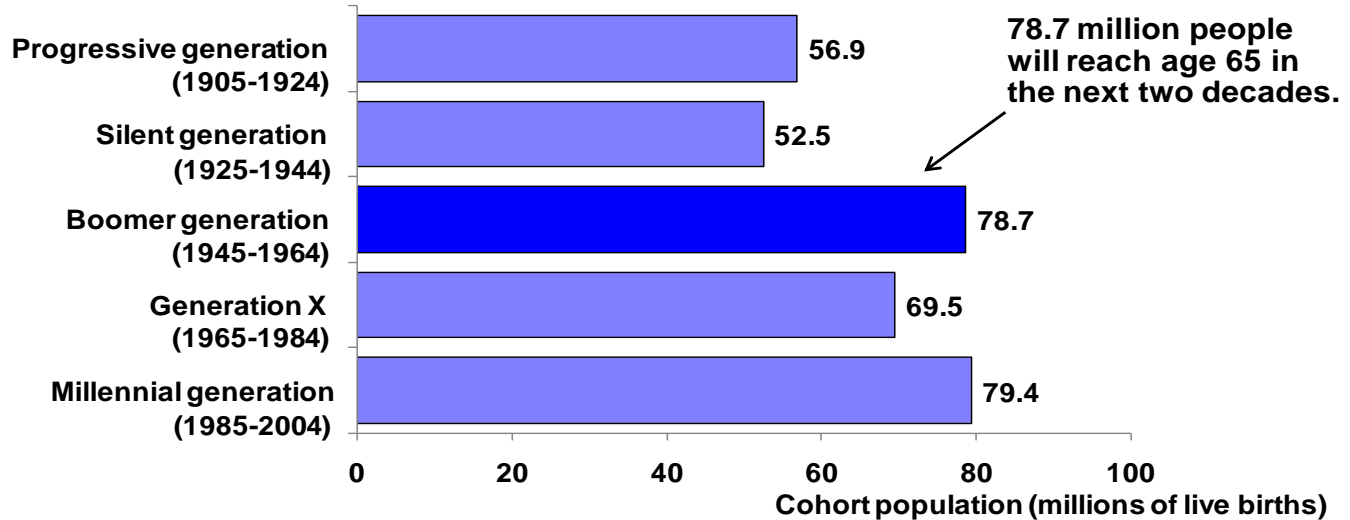
# **Can Dynamic Risk Investing Solve the Defined-Benefit Conundrum**

Tuesday, May 3, 2010

6:30 AM – 7:45 AM

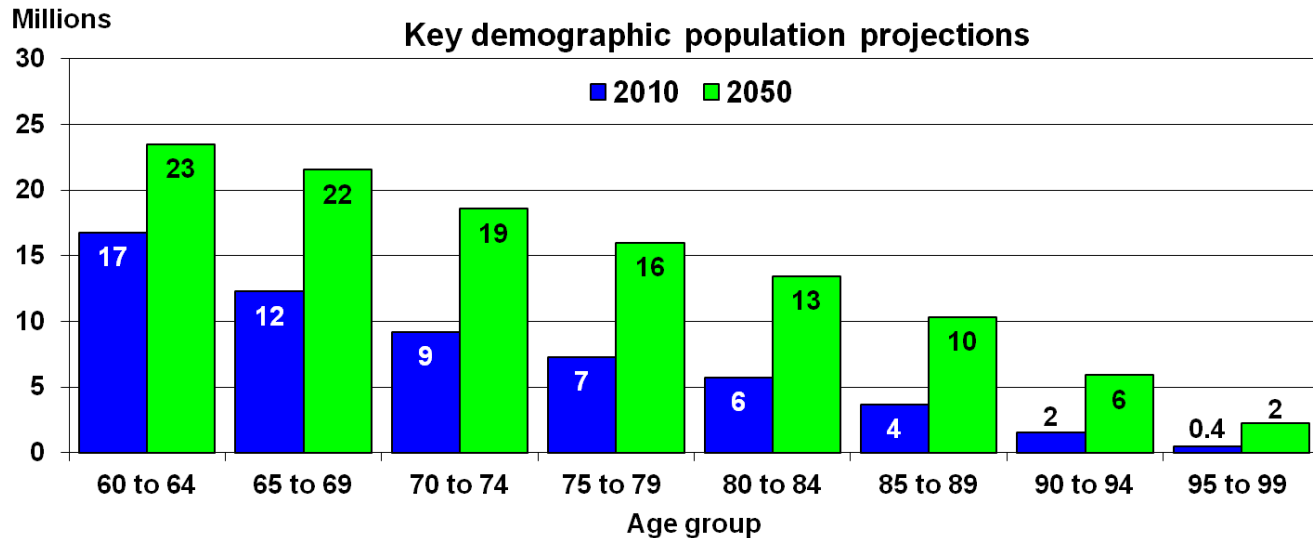


# Baby boomers approaching retirement



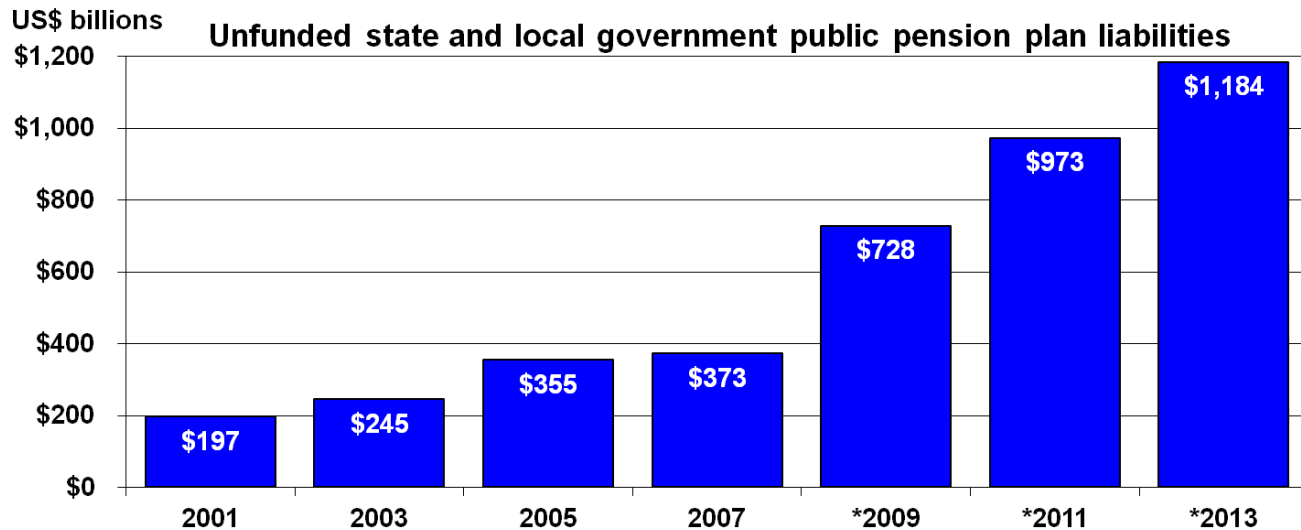
Source: McKinsey Global Institute, June 2008.

# Life insurance and annuity end-market demographics set to expand



Source: Statistical Abstract of the United States (2008).

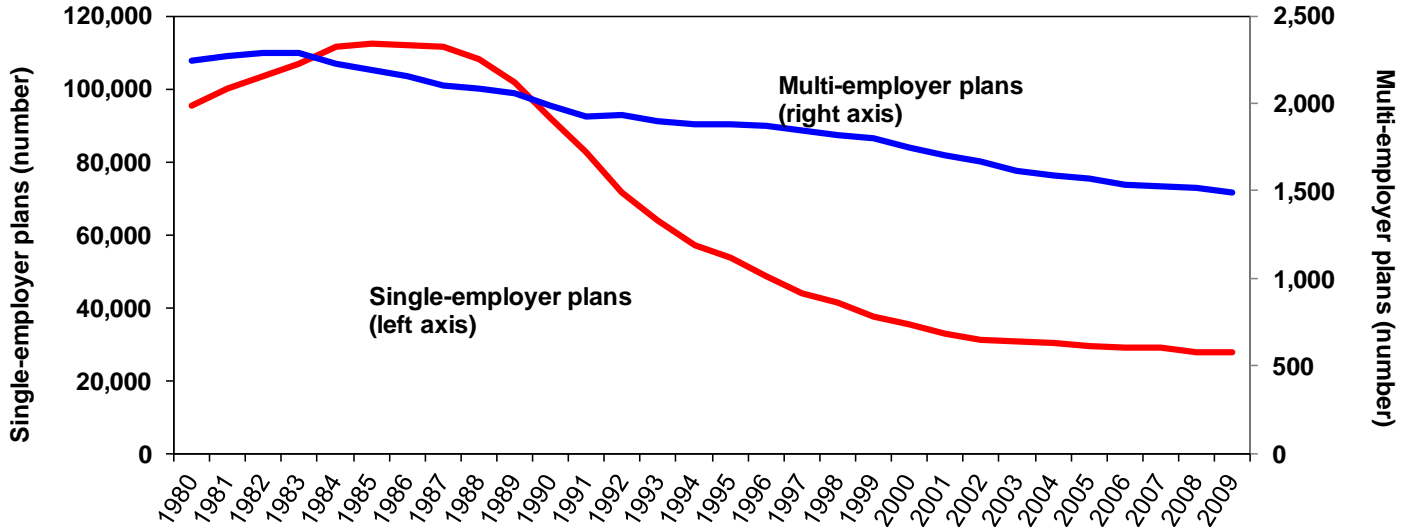
# Unfunded liabilities of state and local government public pension plans set to rise



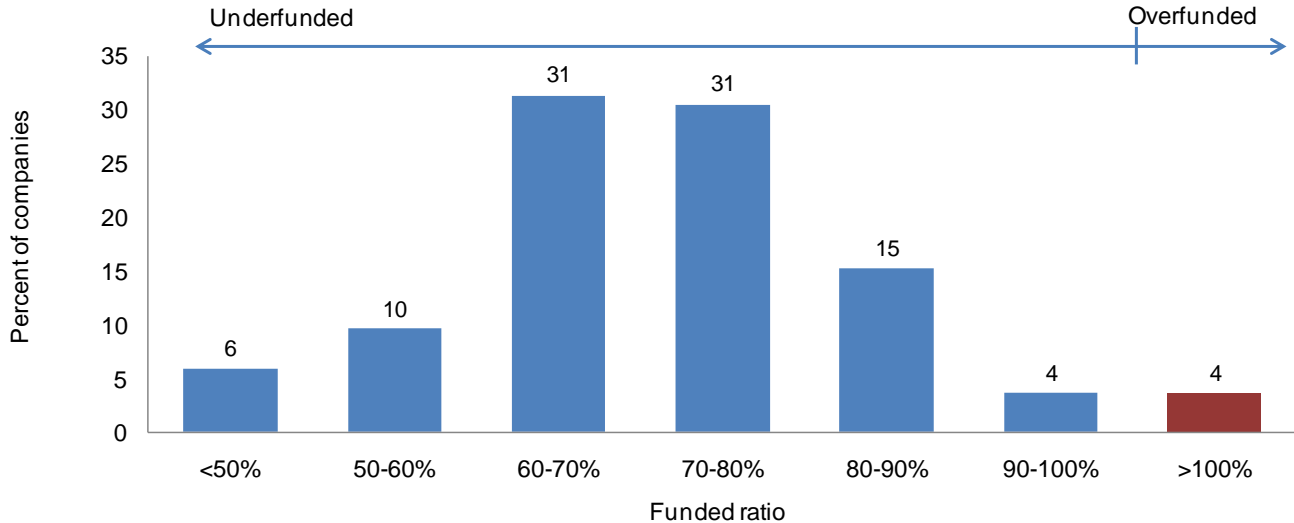
Source: Boston College Center for Retirement Research.

\*Projections

# Number of PBGC-insured defined-benefit pension plans, 1980-2009

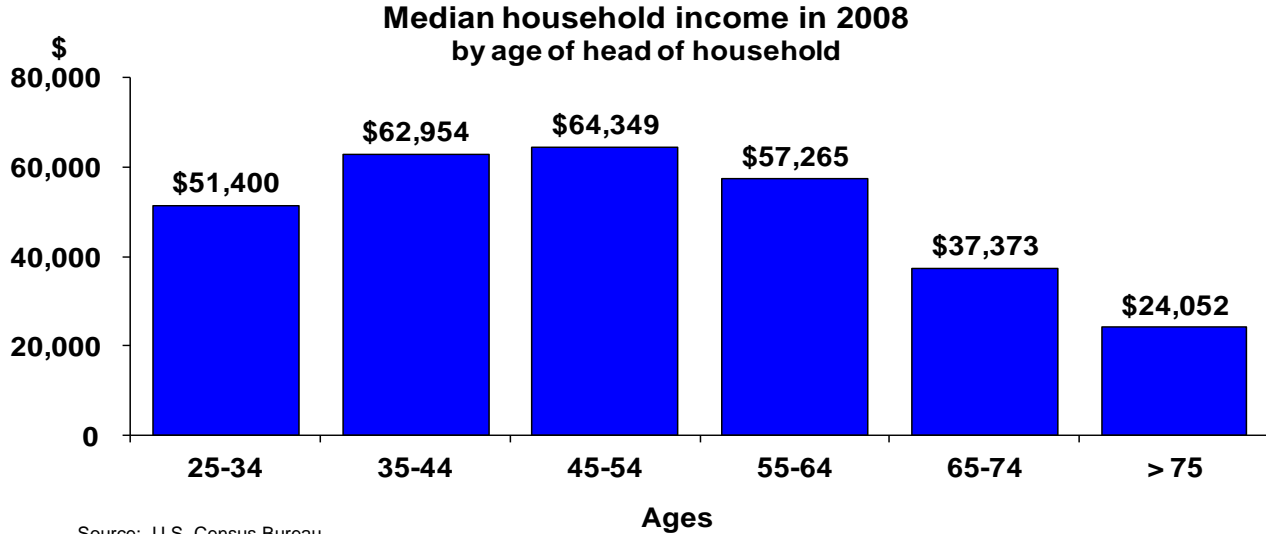


# Distribution of the funded status of S&P 500 companies' DB plans



Note: There are 354 companies in the S&P 500 with DB plans. The data are as of March 1, 2010.  
Source: Credit Suisse.

# Most elderly cannot maintain pre-retirement standard of living in retirement

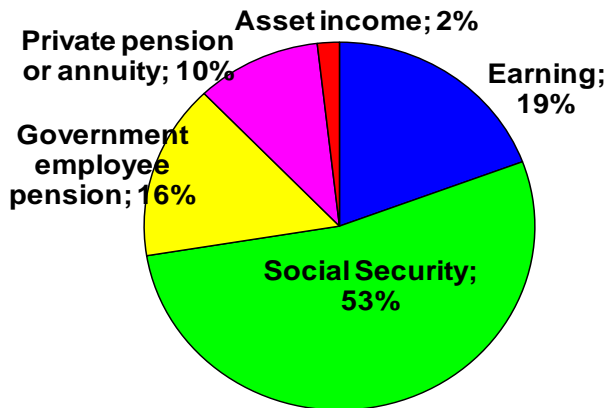


Source: U.S. Census Bureau.

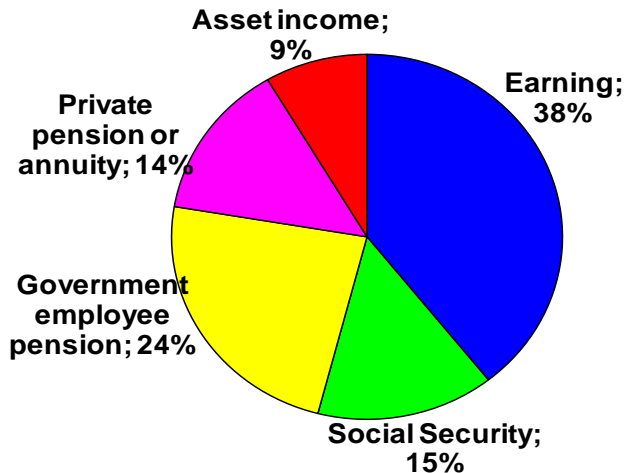
# Income resources of people 65 and older

*Social Security is the bedrock of retirement income for low-income earners*

Bottom quintile



Top quintile



Sources: Allianz Global Investors and Social Security Administration, Income of the Population 55 or Older in 2006, February 2009.

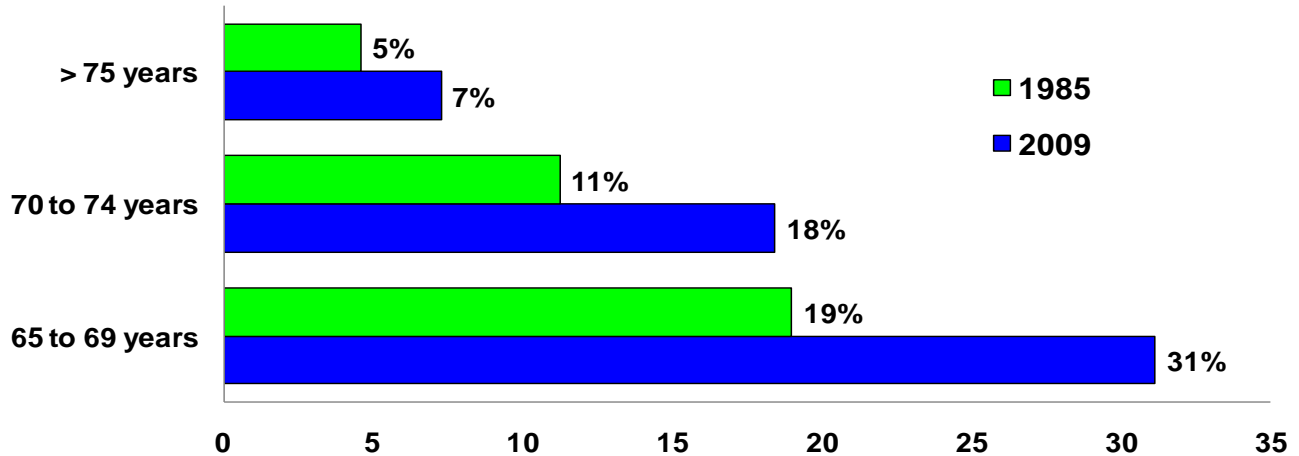


# Older workers staying longer in the work force



*Largely due to massive losses in retirement wealth*

Labor force participation rate (%) for older Americans

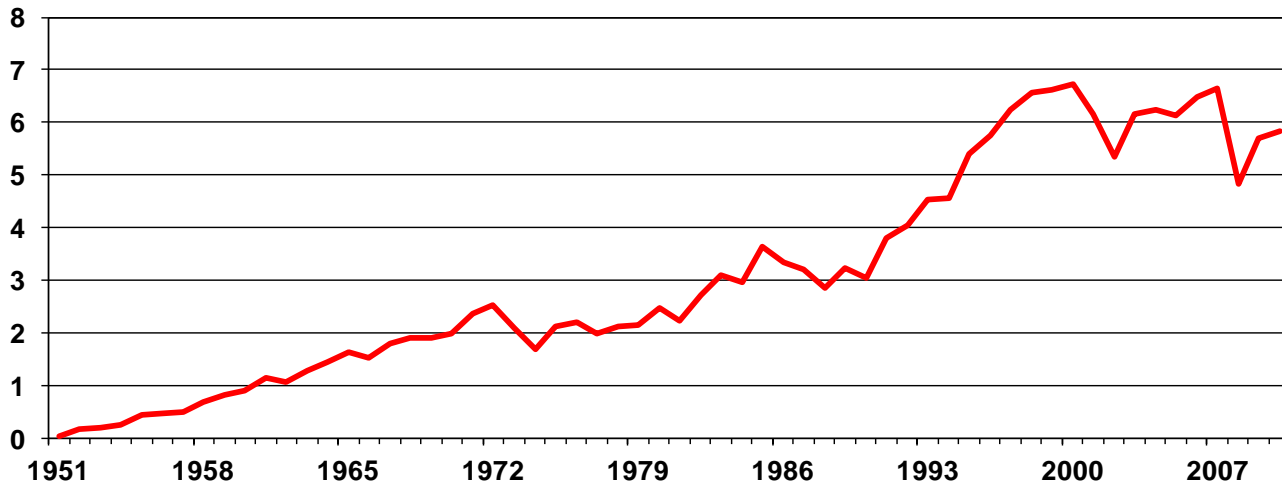


Source: The U.S. Bureau of Labor Statistics.

# Private pension plans account for an increasing share of households' net worth

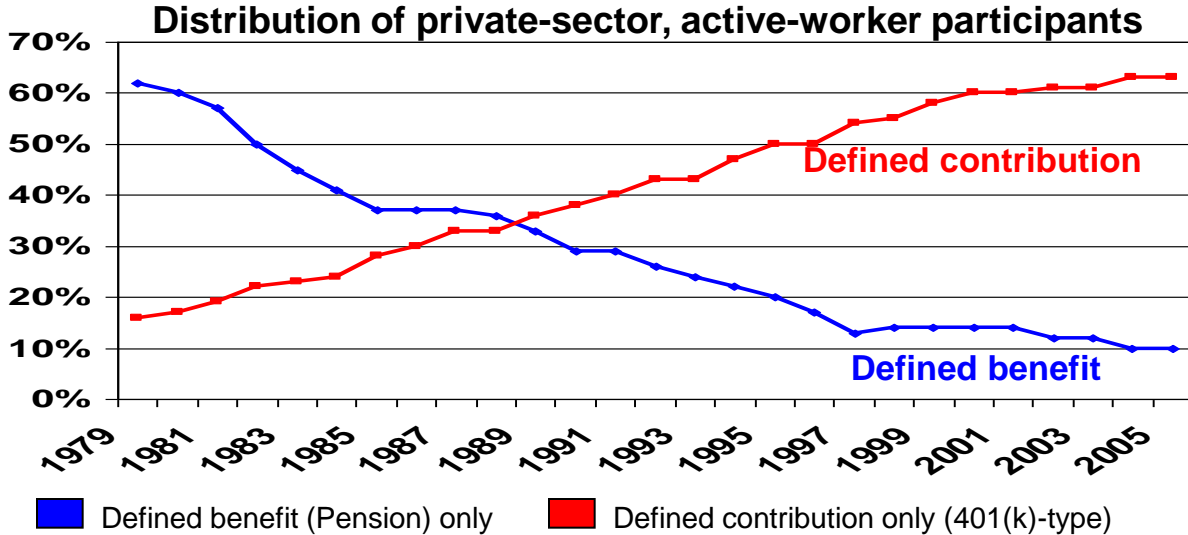
1951 to 2010

Private pension plan as % of households' net worth



Source: Federal Reserve, Flow of Funds.

# Retirement plan trends: The effect on defined benefit plans

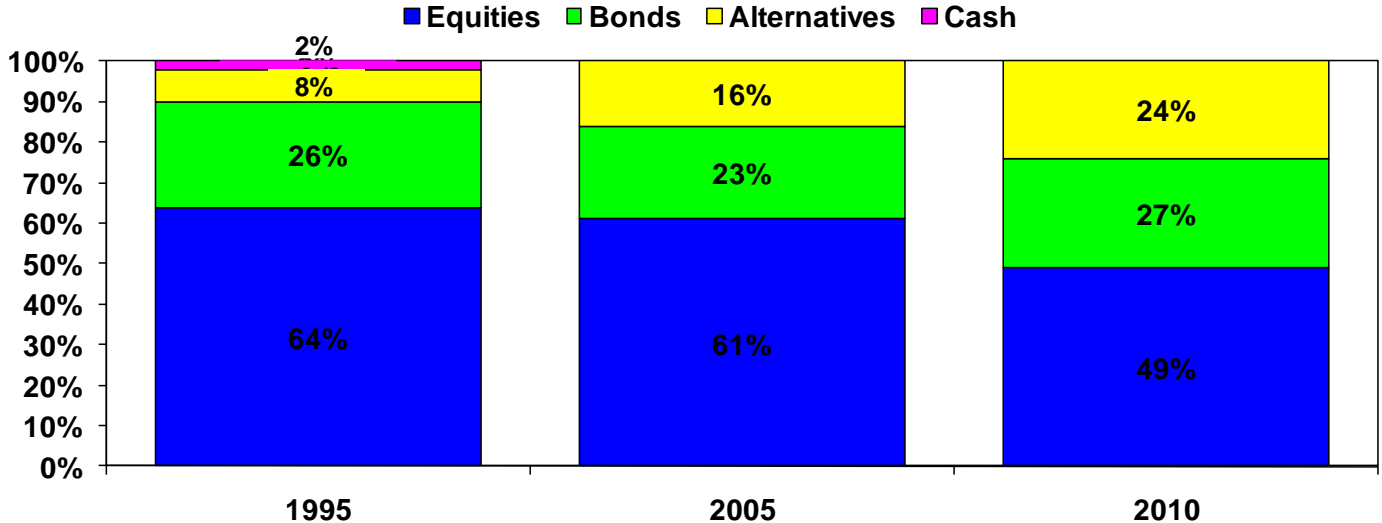


Source: EBRI tabulations of US Dept of Labor "Retirement Trends in the United States Over the Past Quarter-Century" 2007.

# U.S. pension asset allocation 1995 - 2010

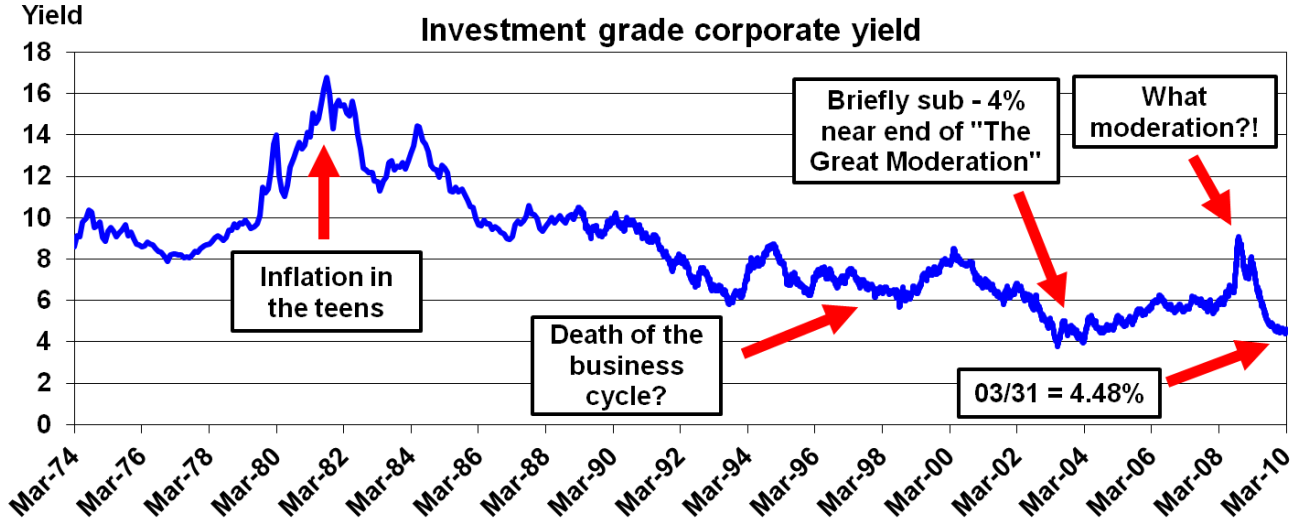


*Rapid increase of alternative investments post crisis*



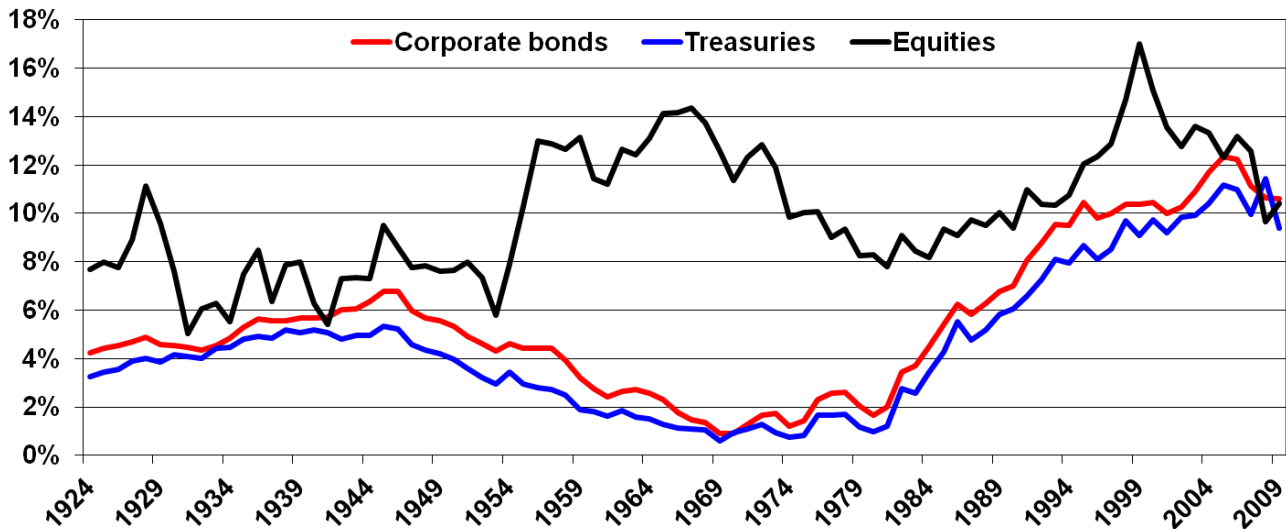
Source: Towers Watson 2011 Global Pension Asset Study.

# Corporate bond yields very low



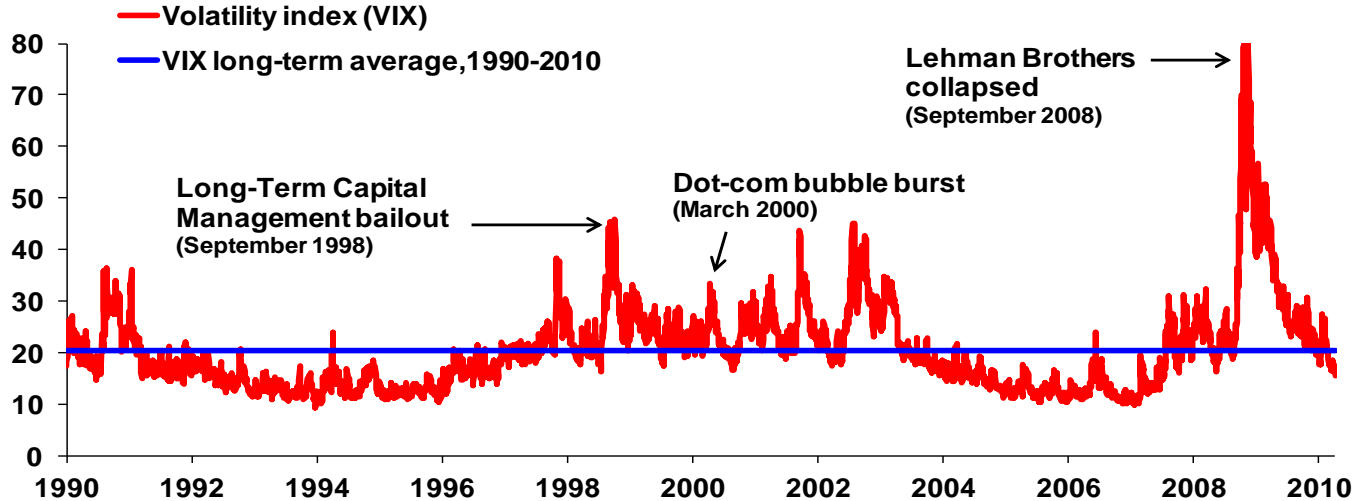
Source: Barclays Capital.

# 25-year rolling returns



Source: Deutsche Bank.

# Unprecedented rise in market volatility during the 2008 market crash

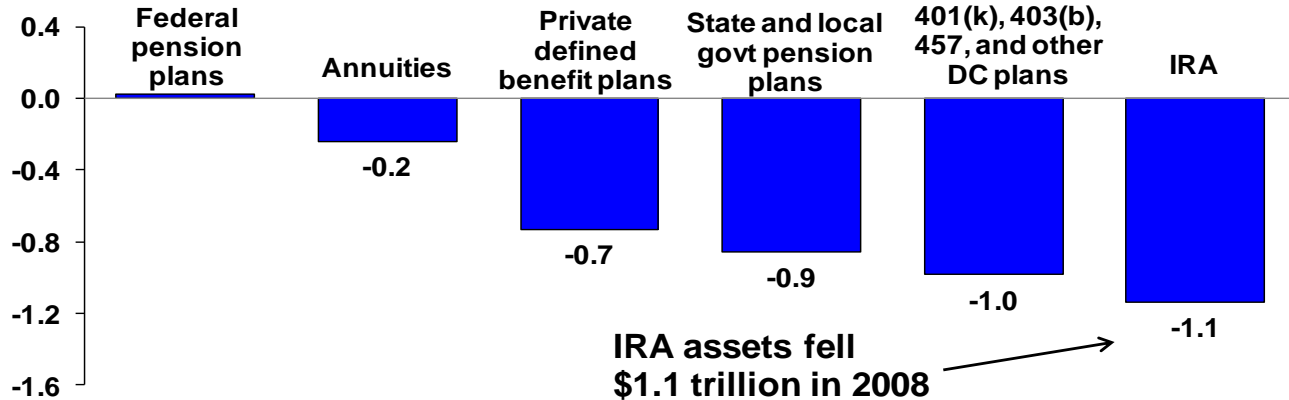


Note: VIX is the Chicago Board Options Exchange's volatility index.  
Source: DataStream.

# Massive losses in retirement savings in the 2008 market crash

## Change in retirement assets in 2008

US\$ trillions



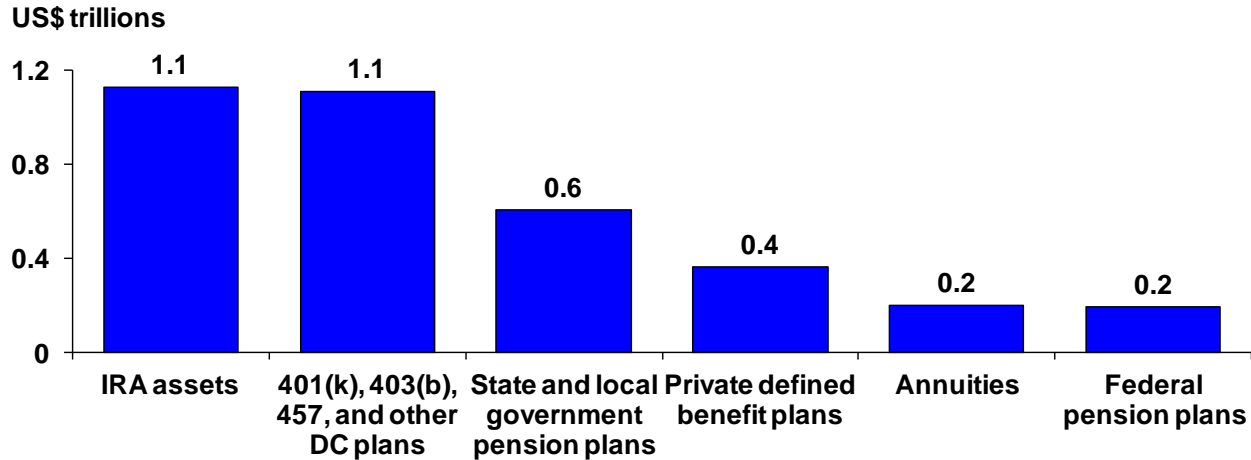
Sources: U.S. Census Bureau and Investment Company Institute.





# Retirement assets rebounded after 2009

Change in retirement assets in 2009 and 2010



Sources: U.S. Census Bureau and Investment Company Institute.



## Dynamic Risk Investing

**Kenneth Yip, PhD**  
**Investor Science Group, LLC.**

**Milken Conference**  
**May 1, 2011**

Please note that important information regarding the information and views expressed in this material at the end of this presentation under "Important Legal Information" and is available upon request

**Copyright © 2006-2011, Investor Science Group, LLC. All rights reserved.**

This document, which is protected by copyright and other intellectual property rights, is confidential and has been prepared solely for the information of the person to whom it has been delivered on behalf of Investor Science Group, LLC. It may not be reproduced, distributed, or used for any other purpose. Your acceptance of this document constitutes your acknowledgement of and agreement to abide by these terms and conditions.

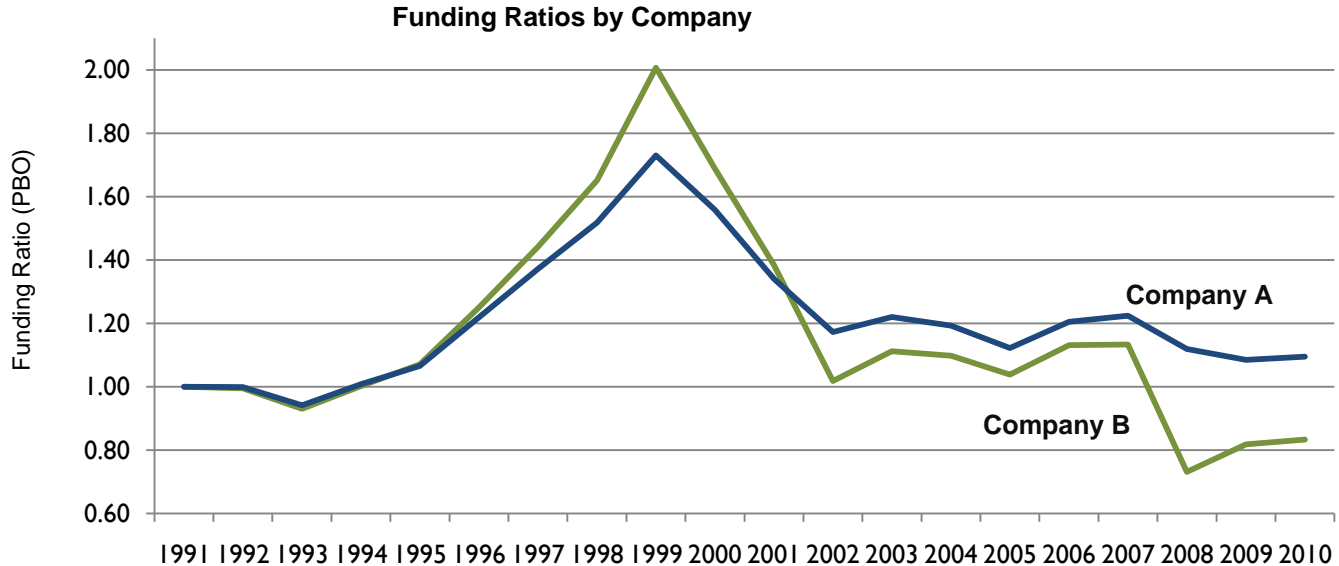
# Today's discussion



MILKEN INSTITUTE

- I. The failure of conventional thinking**
- II. Dynamic risk investing: A new paradigm**
- III. Case study & implementation**

# A tale of two companies



# The questions many avoid...



## Why did we fail?

- ❖ Why do risk management and diversification break down?
- ❖ How do you account for liquidity?
- ❖ Do you have a sustainable contribution strategy?
- ❖ Why are plan objectives so limited in scope?

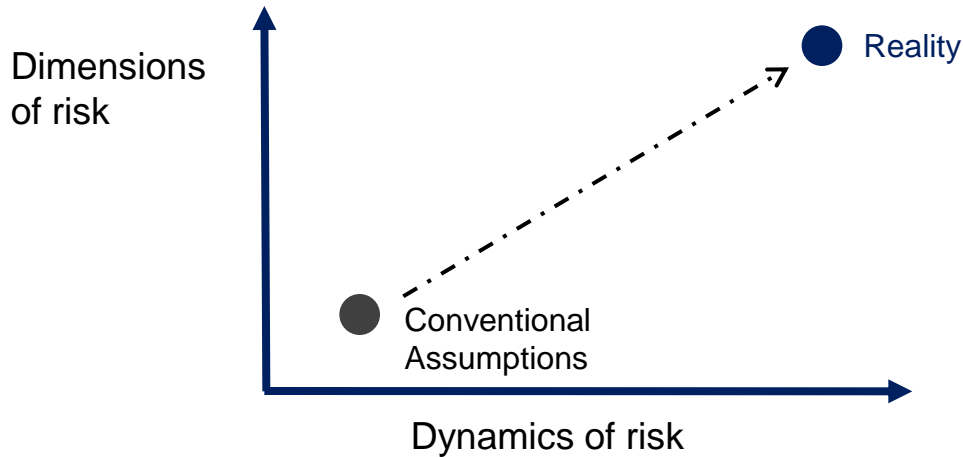
# The conventional view of risk is too simplistic

Legacy assumptions are far from the reality of the world we live in

*Legacy assumptions are far from the reality of the world we live in*

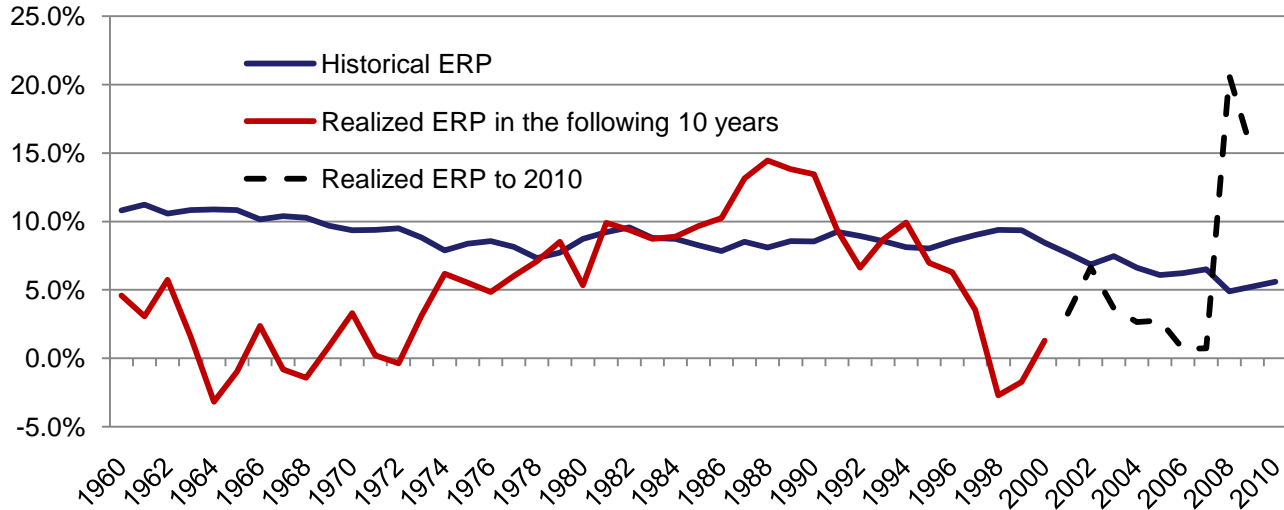


MILKEN INSTITUTE

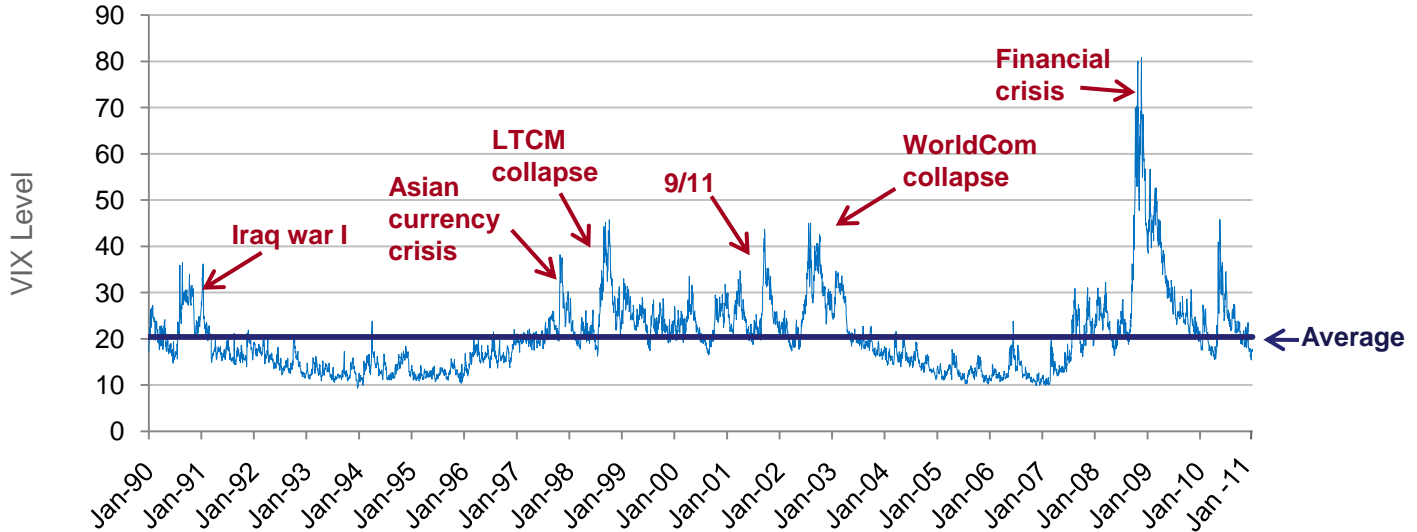


# Equity risk premium varies over time

## Historical versus realized equity risk premium over 3-month T-Bill 1960 to 2010



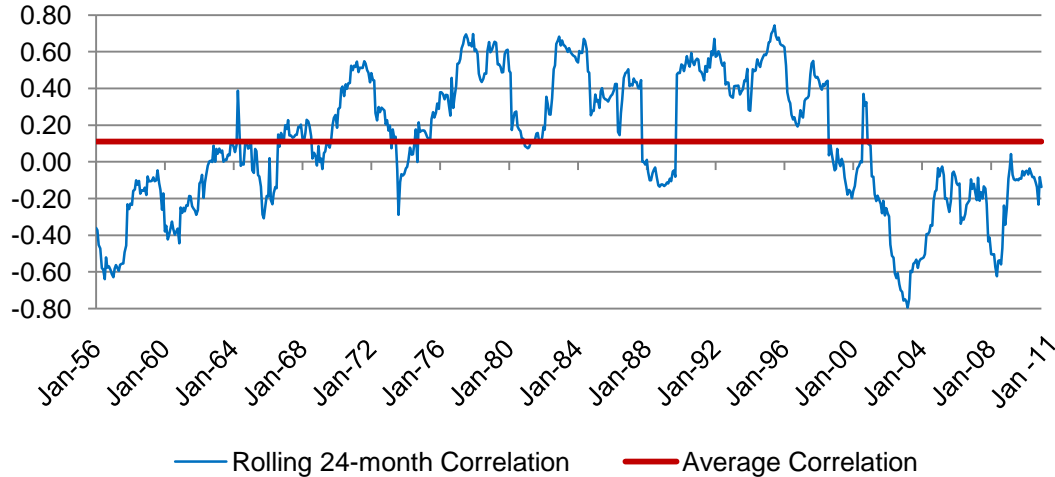
# Volatility is volatile...





# Correlation is also volatile

## Rolling 24-month correlation of S&P500 and long Government bond

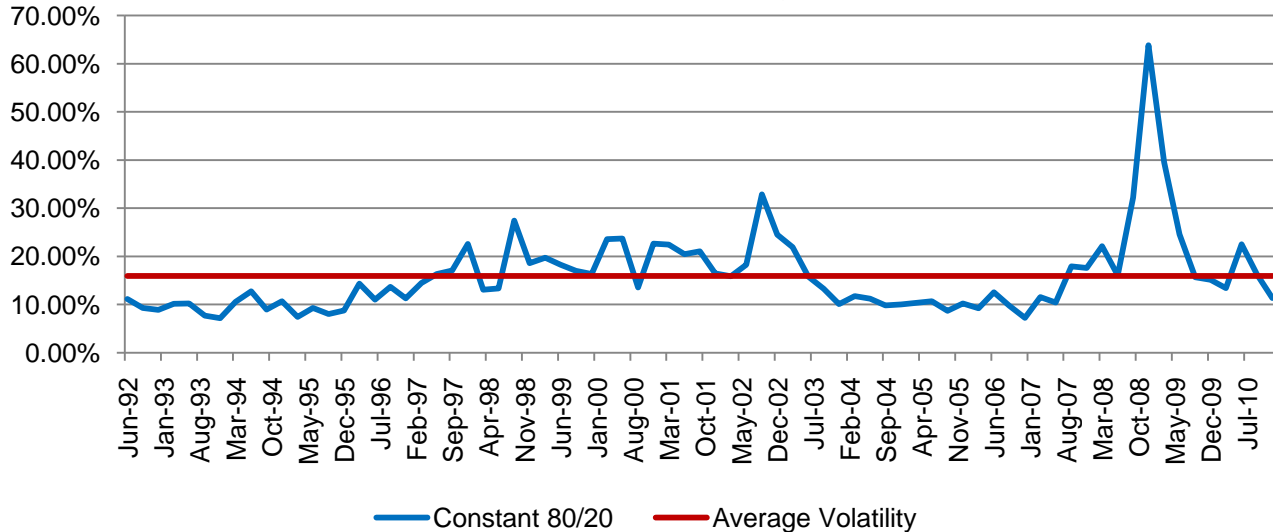


# Static allocations are a poor guide to risk

*Static allocations may have far more risk than the historical assumed average... Or less.*



## Realized portfolio volatility, 1992-2010



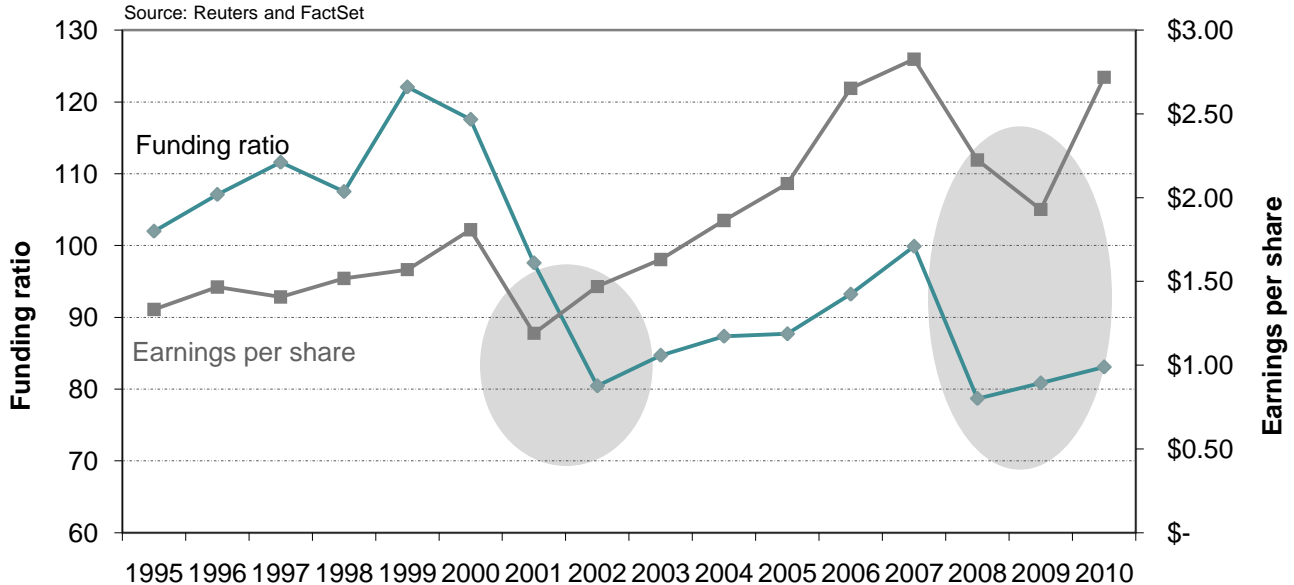
# Liquidity is most expensive when needed most



- Liquidity events affect both sources of liquidity: accessing credit and liquidating assets
- It is rarely integrated into portfolio construction

- Credit market freeze
- Hedge fund gates
- Private equity capital calls
- Real estate market shutdown

# A reactive contribution strategy is a very poor strategy



Do you have a sustainable contribution strategy?

Median funding ratio and earnings per share of 200 largest publicly traded companies' pensions Since 1995

# Investment objectives need to evolve

**ISOLATED** ----- > **INTEGRATED**



Asset only



Asset +  
Liability



Asset +  
Liability +  
Financial flexibility +  
Fiscal health of  
sponsor organization

# A new paradigm: holistic framework centered on risk



	Old framework	New paradigm
<b>Perspective</b>	Asset Liability Problem	Holistic Solution
<b>Focus</b>	Return	Risk
<b>Time</b>	Single period	Multi period
<b>Risk definition</b>	Standard deviation	State variables
<b>Principle</b>	Asset class	Risk, hedging, insurance, precautionary saving
<b>Stationarity</b>	Assumed	Not assumed
<b>Contributions</b>	Reactive	Strategic

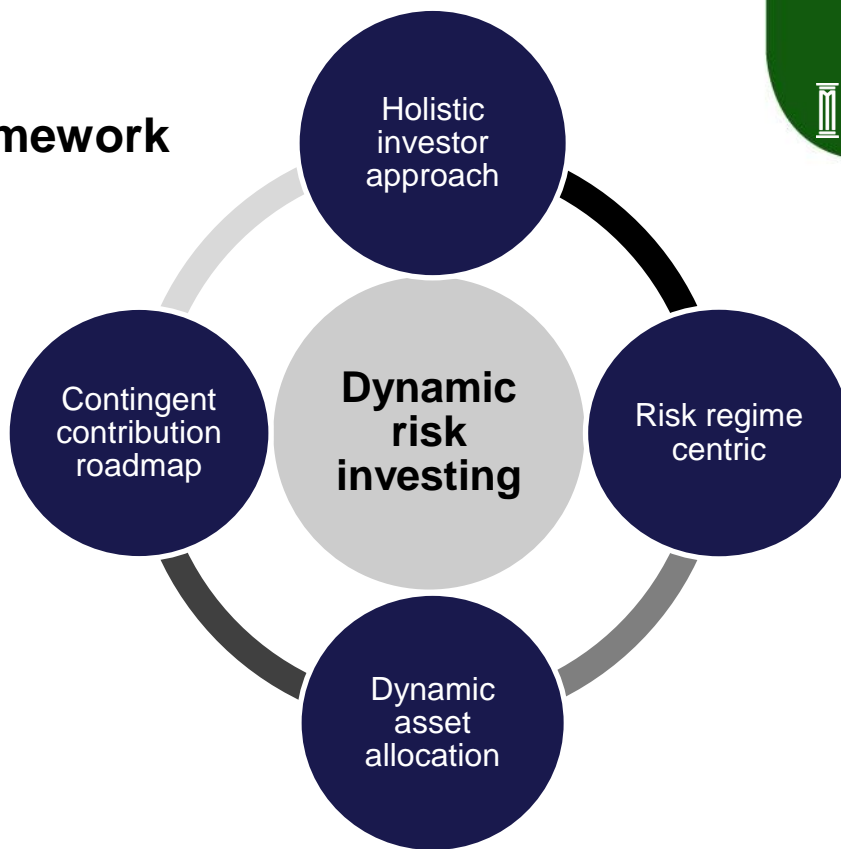
# Today's discussion



MILKEN INSTITUTE

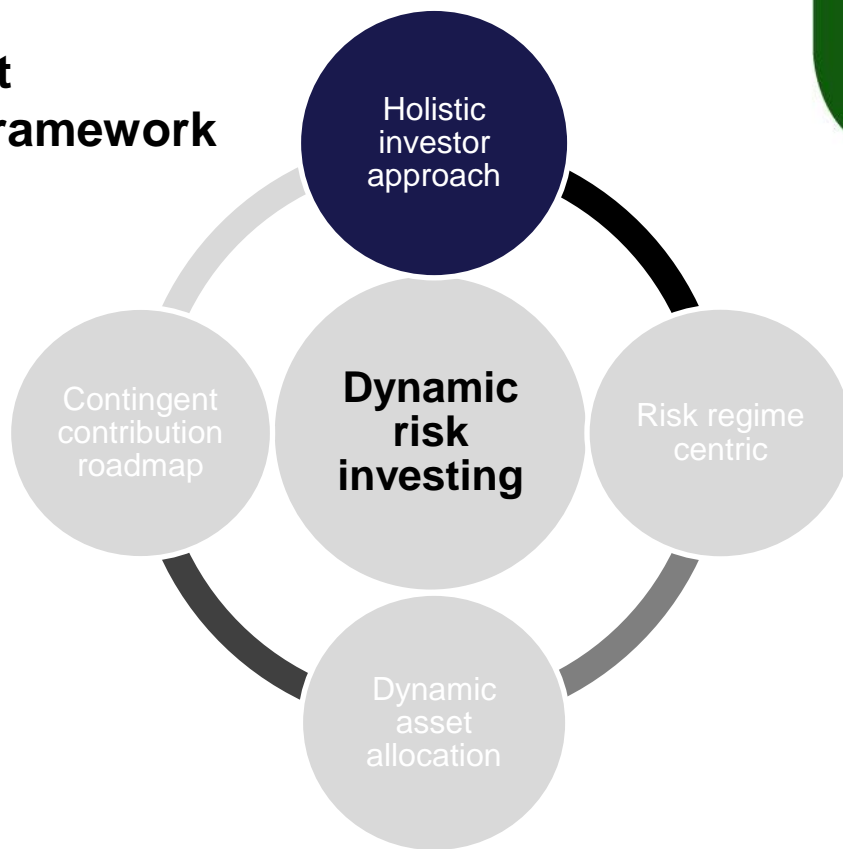
- I. The failure of conventional thinking
- II. Dynamic risk investing: A new paradigm
- III. Case study & implementation

# A new asset allocation framework



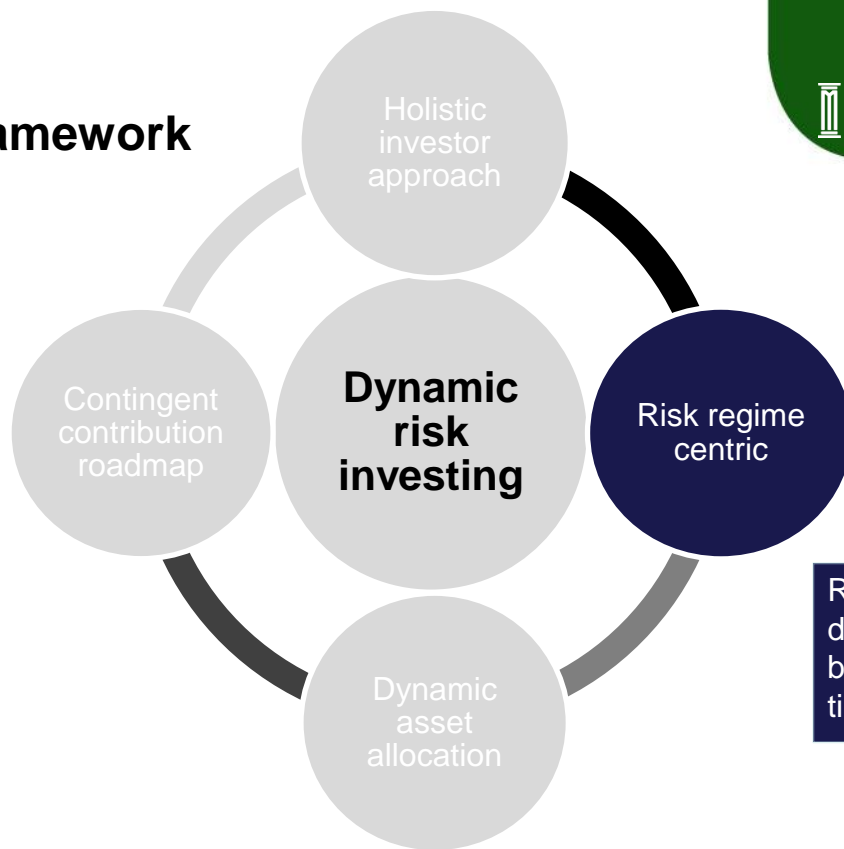


# A new asset allocation framework



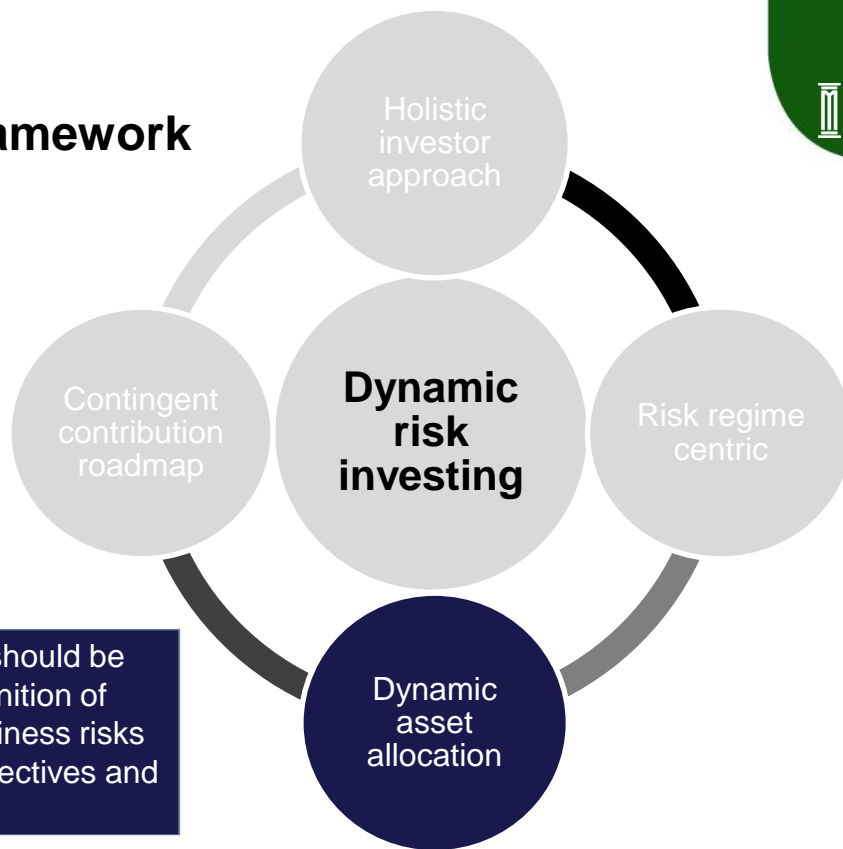
Take a holistic view: think of the pension/portfolio as an organizational asset, not a remote subsidiary

# A new asset allocation framework



Risk is highly state dependent and can be transferred across time and asset class

# A new asset allocation framework

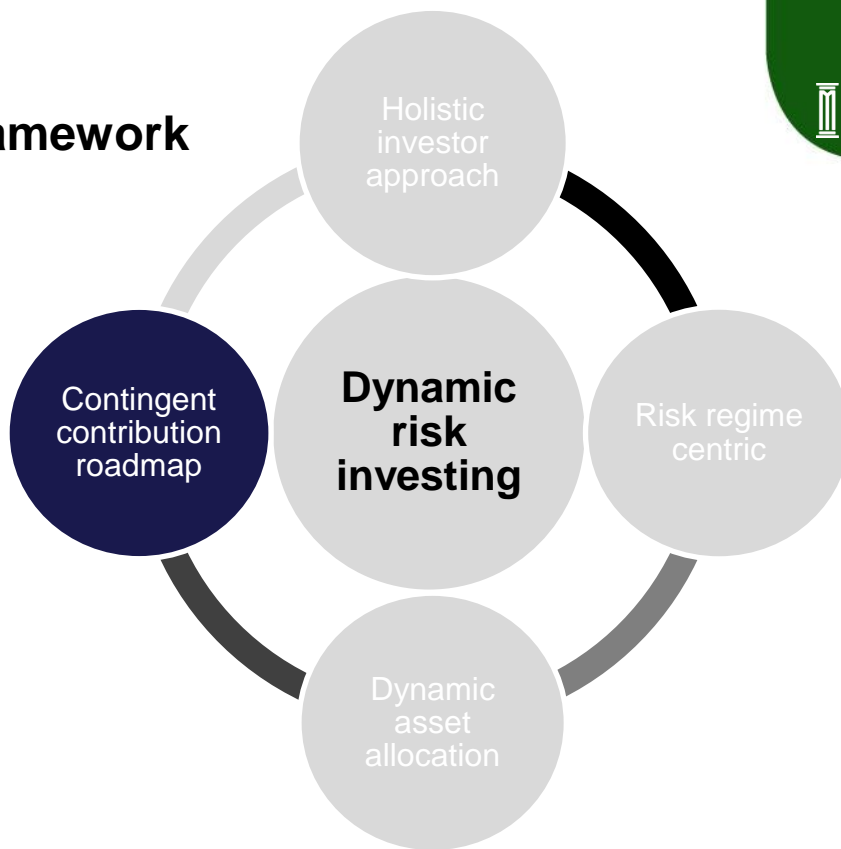


Asset allocation should be dynamic in recognition of market risks, business risks and changing objectives and conditions

# A new asset allocation framework



Contributions can be a strategic decision rather than an unexpected, painful necessity



# The process at work



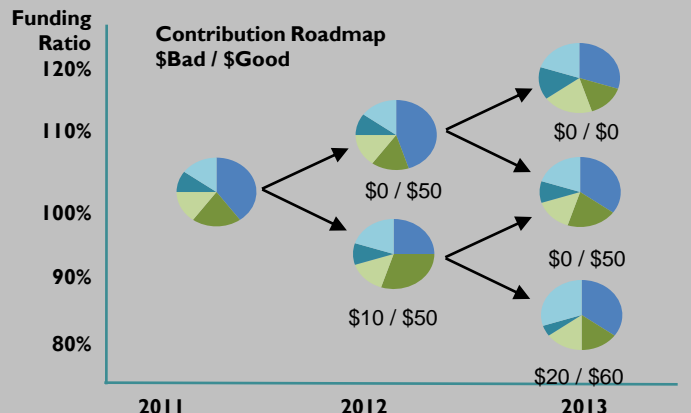
Preferences & objectives
Business conditions
Risk /Interest rate Assumptions
Asset / liability assumptions

**Rational Engine**

- Risk regime framework
- Dynamic multi-period process
- Forecast models
- Alternatives capabilities
  - Non-Normal/Short data histories
  - Illiquid investments

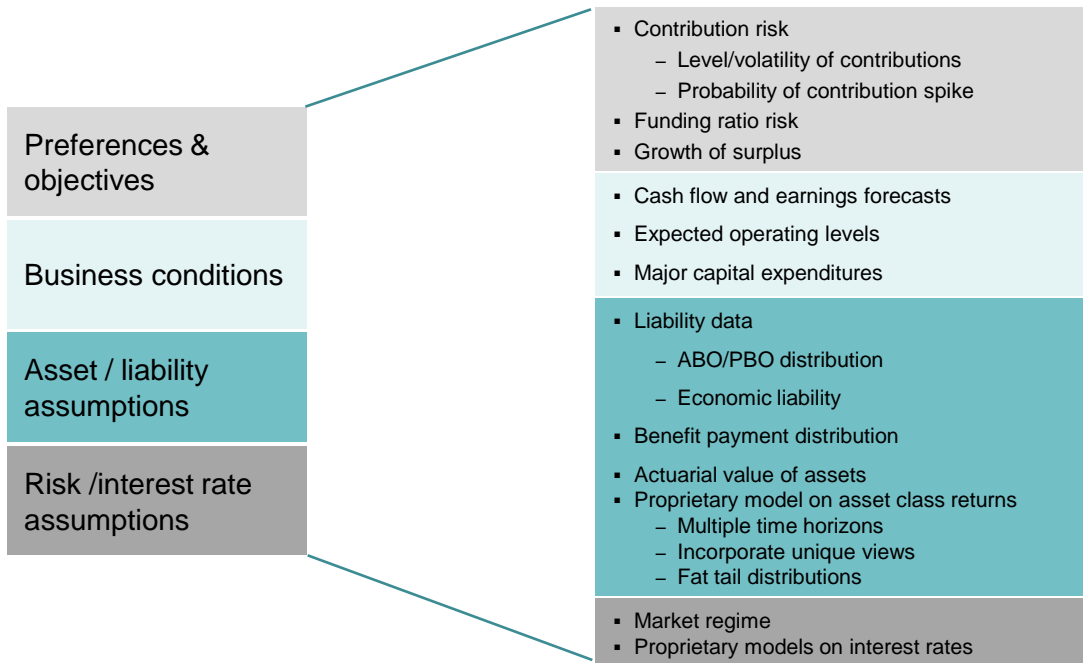
## Simplified illustration

### Dynamic asset allocation



- Equity related
- Fixed income related
- Commodities
- Illiquid assets
- Long duration

# Framing the problem: the portfolio as an organizational asset



# Today's discussion



MILKEN INSTITUTE

- I. The failure of conventional thinking
- II. Dynamic risk investing: A new paradigm
- III. Case study & implementation

## Case study: assumptions for plan sponsor of large industrial company



### Preferences

Minimize underfunded probability  
Minimize contribution surprise  
Minimize contribution  
Maximize probability of surplus

### Asset classes

Equity-related  
Fixed income-related  
Commodities  
Illiquid assets  
Long duration

### Plan horizon

10 years

### Investment assumptions

Survey of investment bank projections

### Discount rate

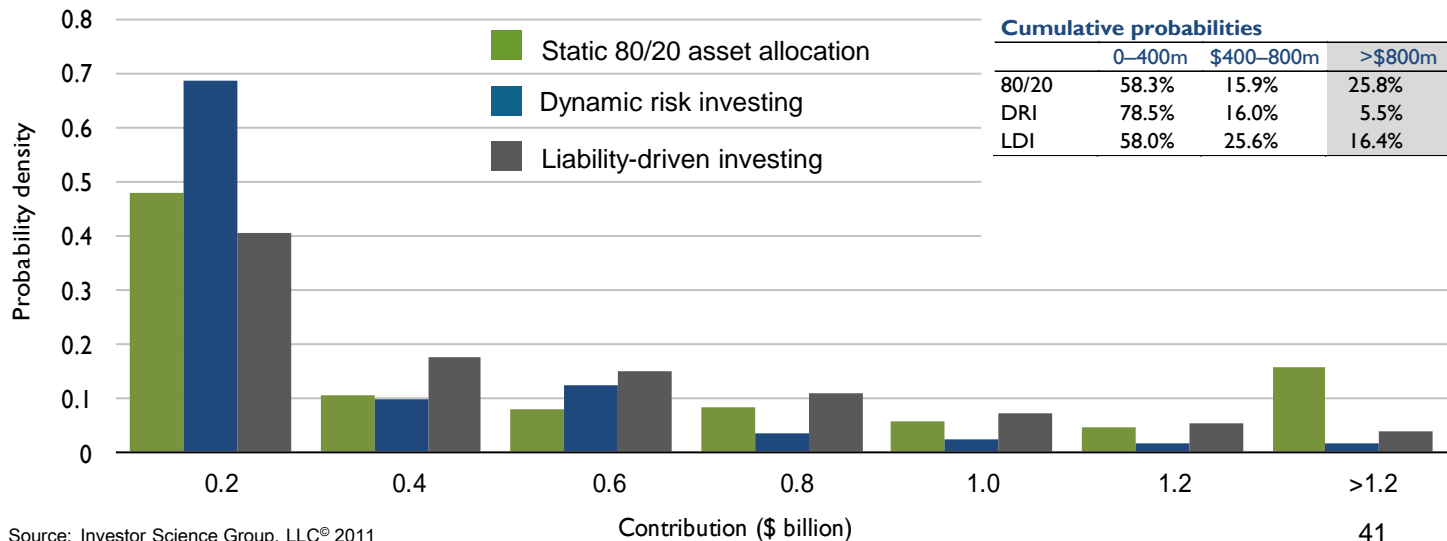
Moody Corporate AA



# Case study: impact on cumulative contribution/contribution surprise

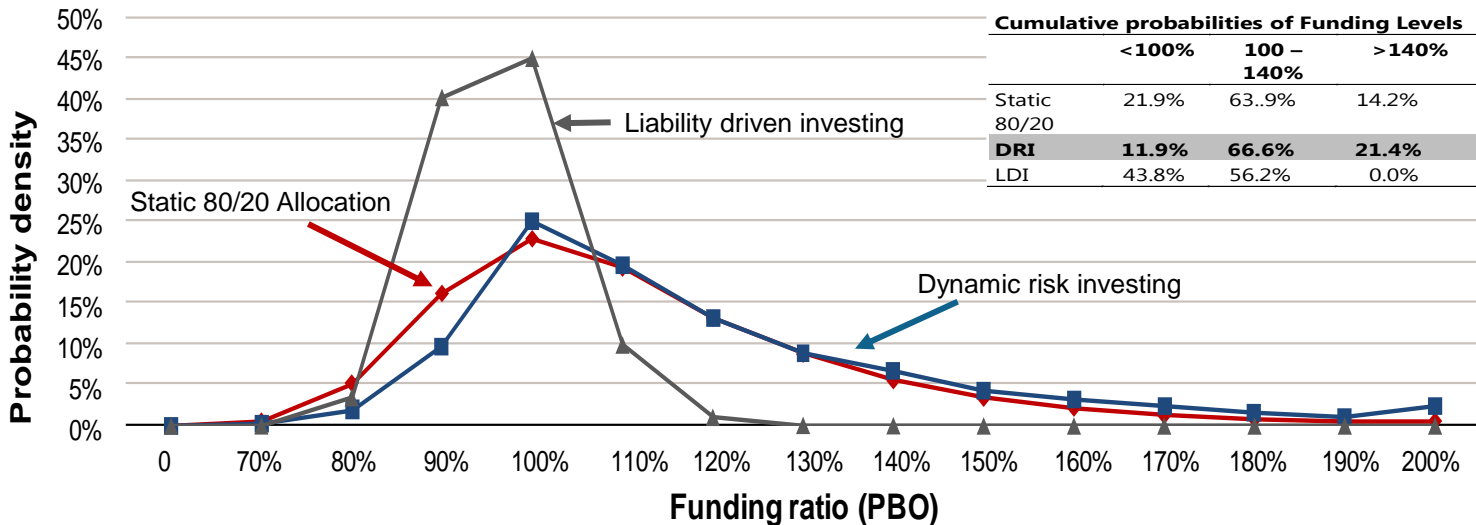


## PV Cumulative contribution



# Case study: impact on achieving fully funded status

## Funding ration distribution



## Case study: same model was applied historically to test effectiveness

Preferences	Minimize underfunded probability Minimize contribution surprise Minimize contribution Maximize probability of surplus
-------------	--

Asset classes	Stocks Bonds
---------------	-----------------

Plan horizon	10 years
--------------	----------

Discount rate	Moody Corporate AA
---------------	--------------------

Methodology tested against:

- 1) a constant mix 80/20 benchmark
- 2) a model using long-term historical estimates for forecasting stock and bond returns

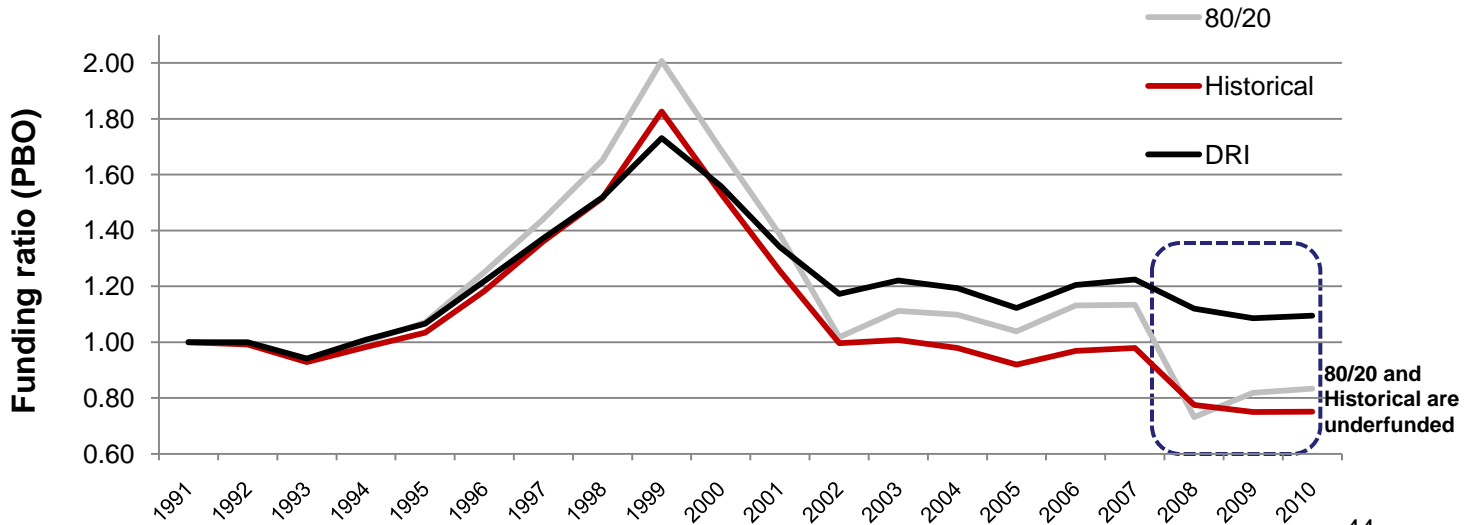
# Case study: historical impact of changes in methodology



MILKEN INSTITUTE

*The new methodology better controls fluctuations in the funding ratio*

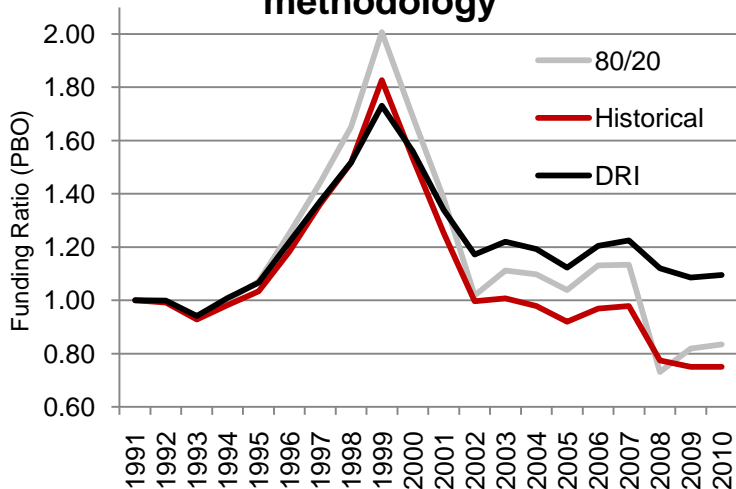
## Historical funding ratios by methodology



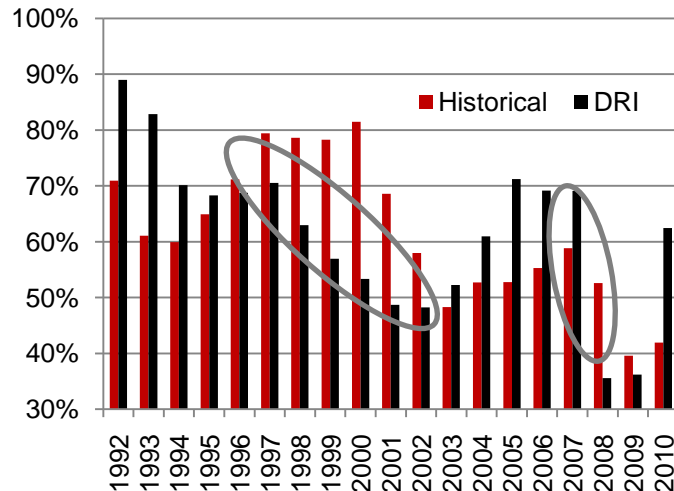
# Case study: historical impact of changes in methodology (cont'd)

The new methodology balances between the risk forecast and the funding ratio.

## Historical funding ratios by methodology



## Historical equity allocations



- A tale of two companies:
  - » Conventional approach to asset-liability management failed, plan dissolved
  - » Dynamic risk investing worked
- A mind shift is necessary to understand and exploit risk dynamically
- Financial technology and decision framework innovation allow us to harness the economic opportunities today

# Speaker biography



**Kenneth Yip, PhD**

**Founder, Investor Science Group, LLC**

phone: 646 287 9478 email: [kyip@investorsciencegroup.com](mailto:kyip@investorsciencegroup.com)



MILKEN INSTITUTE

Ken Yip is the founder and Chief Executive of Investor Science Group, a financial software and consulting firm specializing in asset/liability management and investment solutions, designed primarily for large Pension Funds. Before returning to Investor Science Group, Ken was Managing Director and head of the US Investment Solutions Group at Credit Suisse Asset Management. Prior to founding the Investor Science Group in 2006, he co-founded and was CIO of Thunder Bay Capital Management, New York, a multi-strategy quantitative hedge fund (AUM USD 110m). Before that, he was a Managing Director at Deutsche Asset Management and head of their Global Research Center, where he was responsible for the development of next generation investment products and solution processes to meet sophisticated asset/liability needs of major pension plan sponsors, corporations, endowment and foundation, and wealthy families in the US, Europe, Australia and Asia.

Ken has been featured in Plan Sponsor magazine, The Wall Street Journal, and Australian Financial Review. He has been an invited speaker at The Berkeley Program in Finance, The GARP Conference, Institutional Investor Conference, GAIM Conference, CFA Societies, and Society of Actuaries Meetings.

Prior to joining the financial services industry, Ken was a Principal Research Scientist in the Artificial Intelligence Laboratory and a visiting professor at MIT and before that was an Assistant Professor at Yale's Department of Computer Science, where he won the prestigious National Science Foundation Young Investigator Award, and the Yale College Teaching Award for excellence in teaching undergraduate natural sciences. Ken holds a BS, MS, and PhD in Computer Science from MIT.

# Important legal information

- There is no and will be no agreement, arrangement, or understanding that the information provided in connection herein will be used as a primary basis for any investment decisions, including, without limitation, the purchase of any Investor Science Group products or engagement of Investor Science Group consulting services. No person shall rely on this information as a primary basis for any investment decision with respect to any employee benefit plan, including, without limitation, the purchase of any Investor Science Group products or engagement of Investor Science Group consulting services on behalf of such plan; and there is no, and will be no, agreement, arrangement, or understanding to the contrary.
- This material has been prepared by Investor Science Group, LLC on the basis of publicly available information, internally developed data and other third party sources believed to be reliable. However, no assurances are provided regarding the reliability of such information. All opinions and views constitute judgments as of the date of writing, and are subject to change at any time without notice. The investment views and market opinions/analyses expressed may not reflect those of Investor Science Group, LLC as a whole and different views may be expressed based on different investment styles, objectives, views or philosophies.
- **No graph or formula can, by itself, guarantee, promise or predict investment results.** No graph or formula can determine what securities should be bought or sold or when to buy or sell them, nor can it assist someone in making a decision regarding security purchases or timing decisions. **The data and information contained in this presentation is for informational and illustrative purposes only.** This material should not be viewed as a current or past recommendation or a solicitation of an offer to buy or sell any securities or investment products or to adopt any investment strategy.
- Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results.**
- The use of leverage involves substantial risk. The more leverage that is employed by a market participant, the more likely a substantial change will occur, either up or down, in the value of such market participant's portfolio. The use of leverage to acquire positions will subject a market participant to major losses in the event that market disruptions destroy the hedged nature of such positions.