Asset Allocation: *Strategy or Policy?*

. . . a brief look at a Risk-Based Approach

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Putnam Investments

Asset Allocation Decisions

Proper Measurement of the Objective

(pension fund liability)

Proper Measurement of the Asset Classes

(large cap equity)

Asset Allocation:
portfolio construction & rebalancing

Do we have the right target for our equity allocation?

What about the range . . . is it too narrow or too tight?

Should policy mix include . . . . . . small cap? . . . international?

What should trigger rebalancing?

Should rebalancing frequency be sensitive to market volatility?

Is frequent rebalancing too costly?

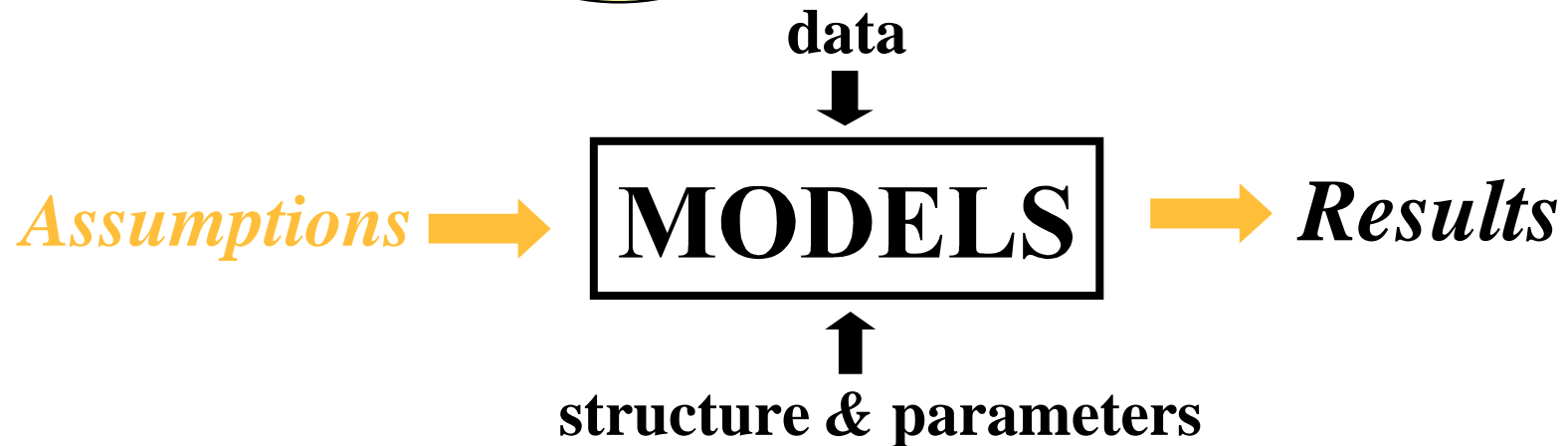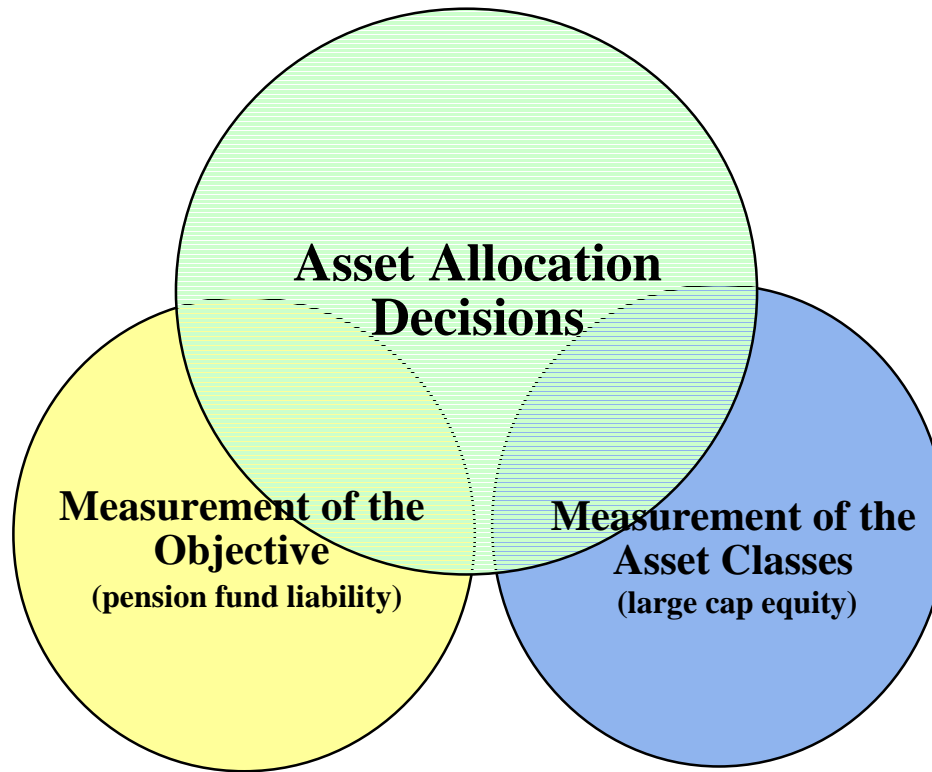# Audit the asset allocation decision process

- ➢ Who is key decision maker ?
  - Policy committee / Investment consultant
  - Investment staff / Investment manager(s)
- ➢ When made ?
  - Decision horizon (parameter estimate or forecast)?
  - Decision review frequency (trigger?)
- ➢ How is it made ?
  - Resources applied ?
    - skill set; quality of info (detail / timeliness); quality of interpretation
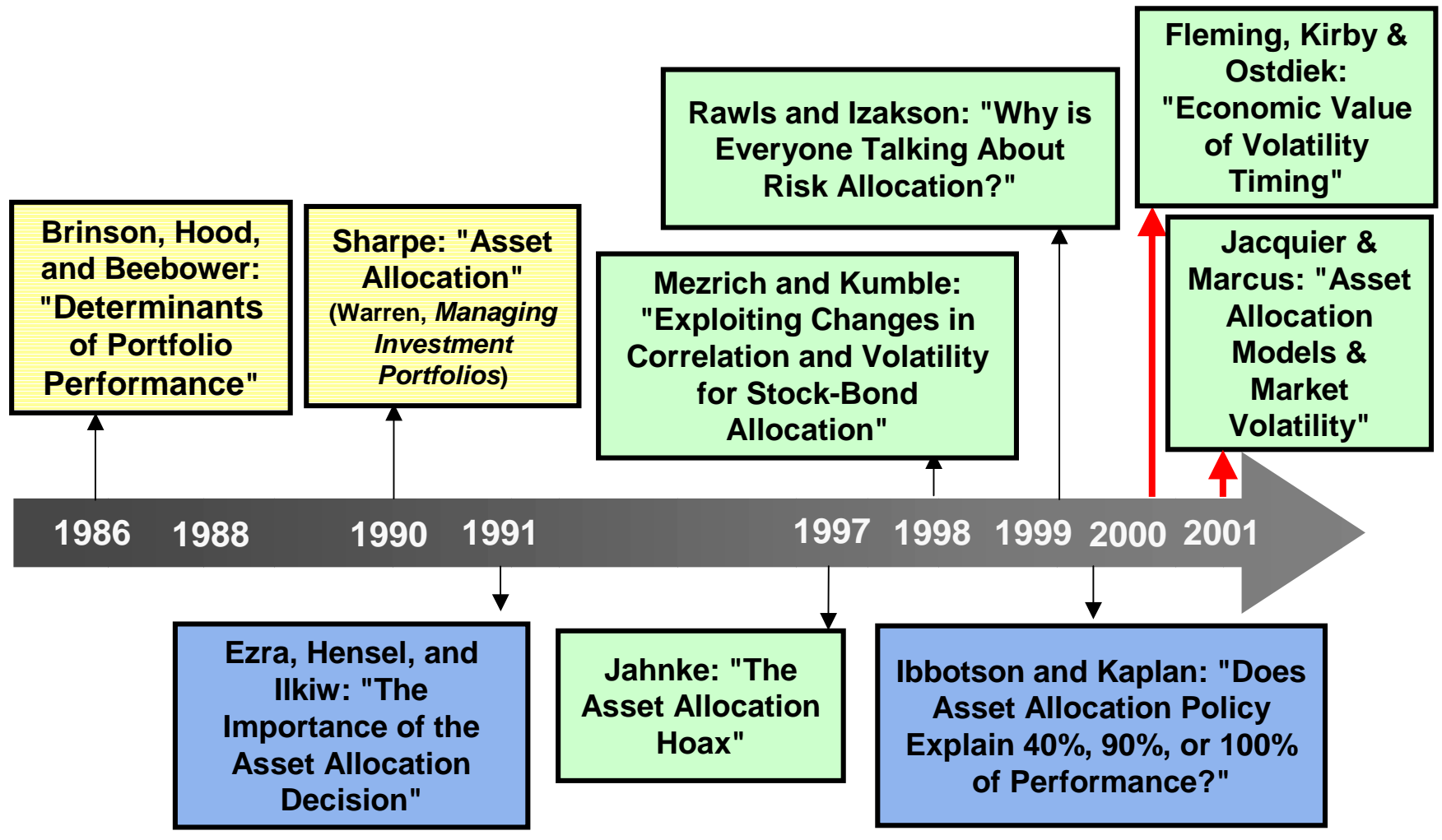 - *Evaluation*: "performance analysis" of the Asset Allocation Decision

Audit the asset allocation decision process

➢ Measure the value-added (-lost) from:

- Choice of Policy
    - choice of objective for portfolio construction
    - "benchmark"
- Choice of Strategy
    - Active Mix: degree; extent/shape of collar
    - Fixed Mix: speed (and cost) of rebalancing
- Choice of implementation (cash market/derivatives; cost/delay)

➢ How good is the liability model ?

- Decision (parameter estimate or forecast) horizon
- How much *realized* Surplus Volatility comes from **…**
    - mis-specification ? **…** errors in assumptions ?

Asset Allocation Decisions

Measurement of the Objective
(pension fund liability)

Measurement of the Asset Classes
(large cap equity)

data

Assumptions → MODELS → *Results*

structure & parameters

Is asset allocation a policy decision or a managed decision?

Brinson, Hood, and Beebower: "Determinants of Portfolio Performance"

Sharpe: "Asset Allocation" (Warren, *Managing Investment Portfolios*)

Rawls and Izakson: "Why is Everyone Talking About Risk Allocation?"

Mezrich and Kumble: "Exploiting Changes in Correlation and Volatility for Stock-Bond Allocation"

Fleming, Kirby & Ostdiek: "Economic Value of Volatility Timing"

Jacquier & Marcus: "Asset Allocation Models & Market Volatility"

Ezra, Hensel, and Ilkiw: "The Importance of the Asset Allocation Decision"

Jahnke: "The Asset Allocation Hoax"

Ibbotson and Kaplan: "Does Asset Allocation Policy Explain 40%, 90%, or 100% of Performance?"
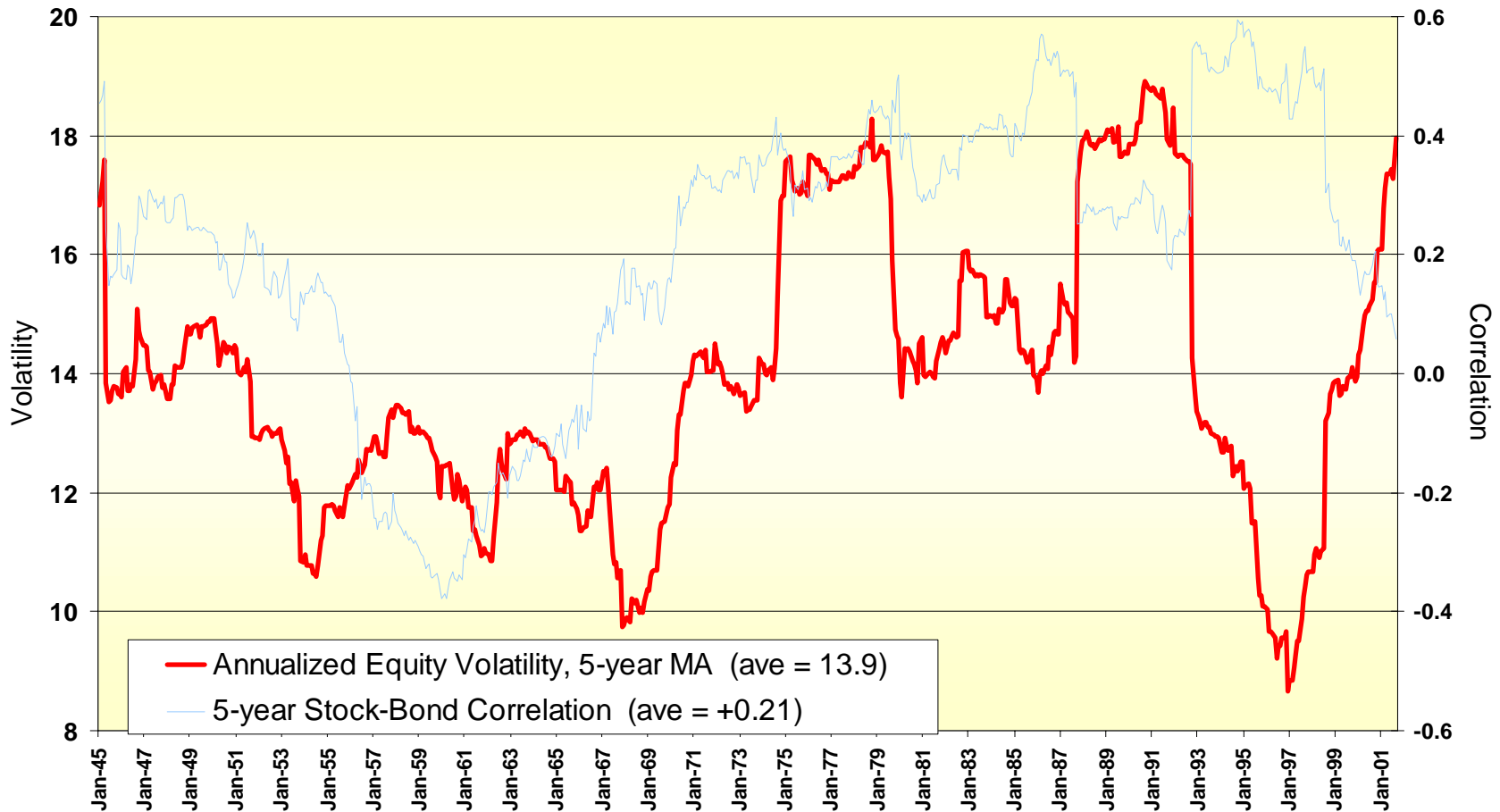
1986 1988 1990 1991 1997 1998 1999 2000 2001

What have we learned from the debate ?

➢ Pension plans have stuck to fixed-mix allocations since the ERISA.

➢ "It is … agreed that the asset allocation decision is by far the most important one made by an investor."

➢ "timing" & "selection" have as much impact as "allocation" when a naïve policy-benchmark is used.

➢ Fixed-mix allocations can produce extremes of excessively high or low risk in an investment fund.

➢ Trailing volatility is a useful predictor of forward volatility & correlations.
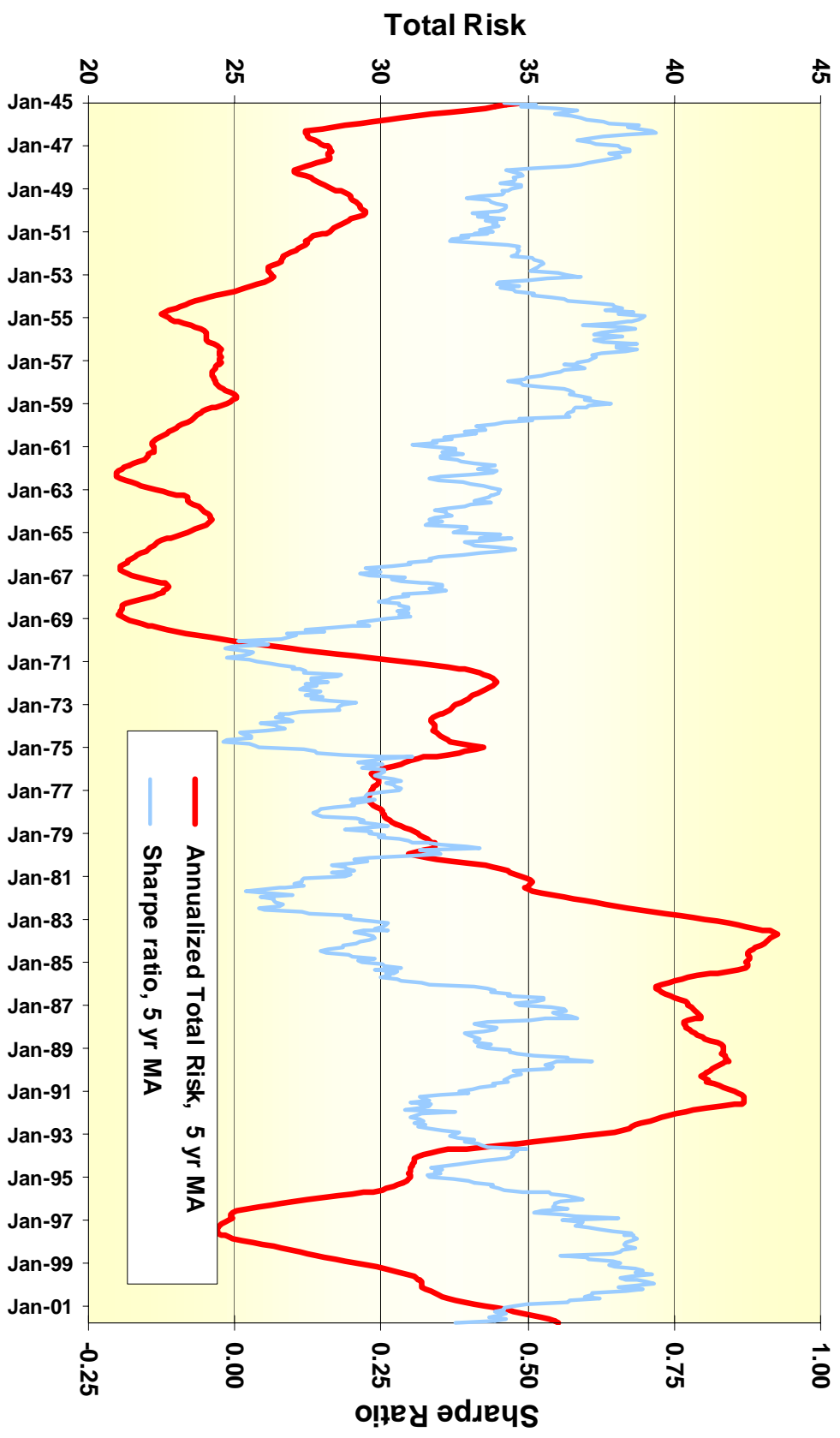
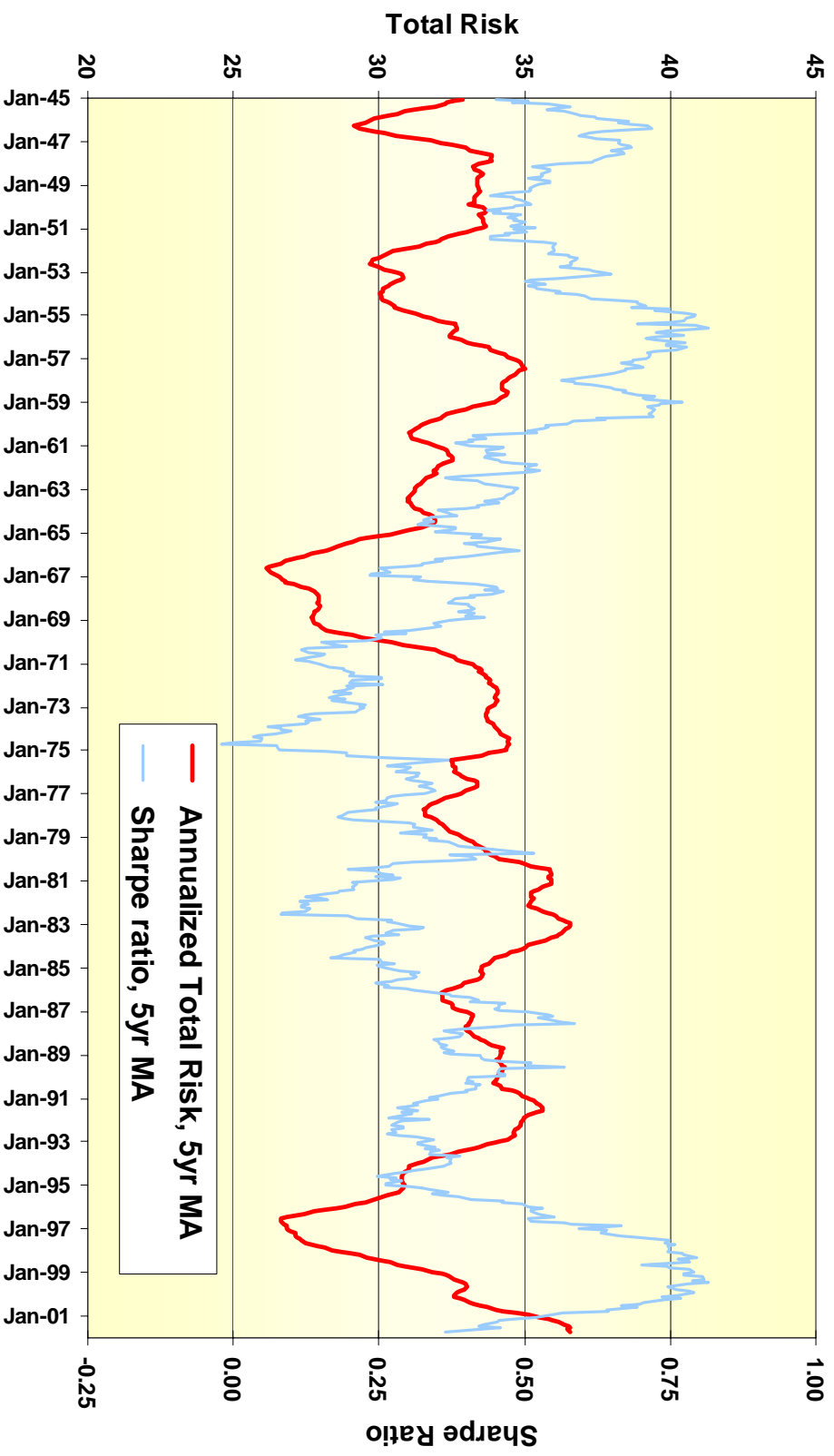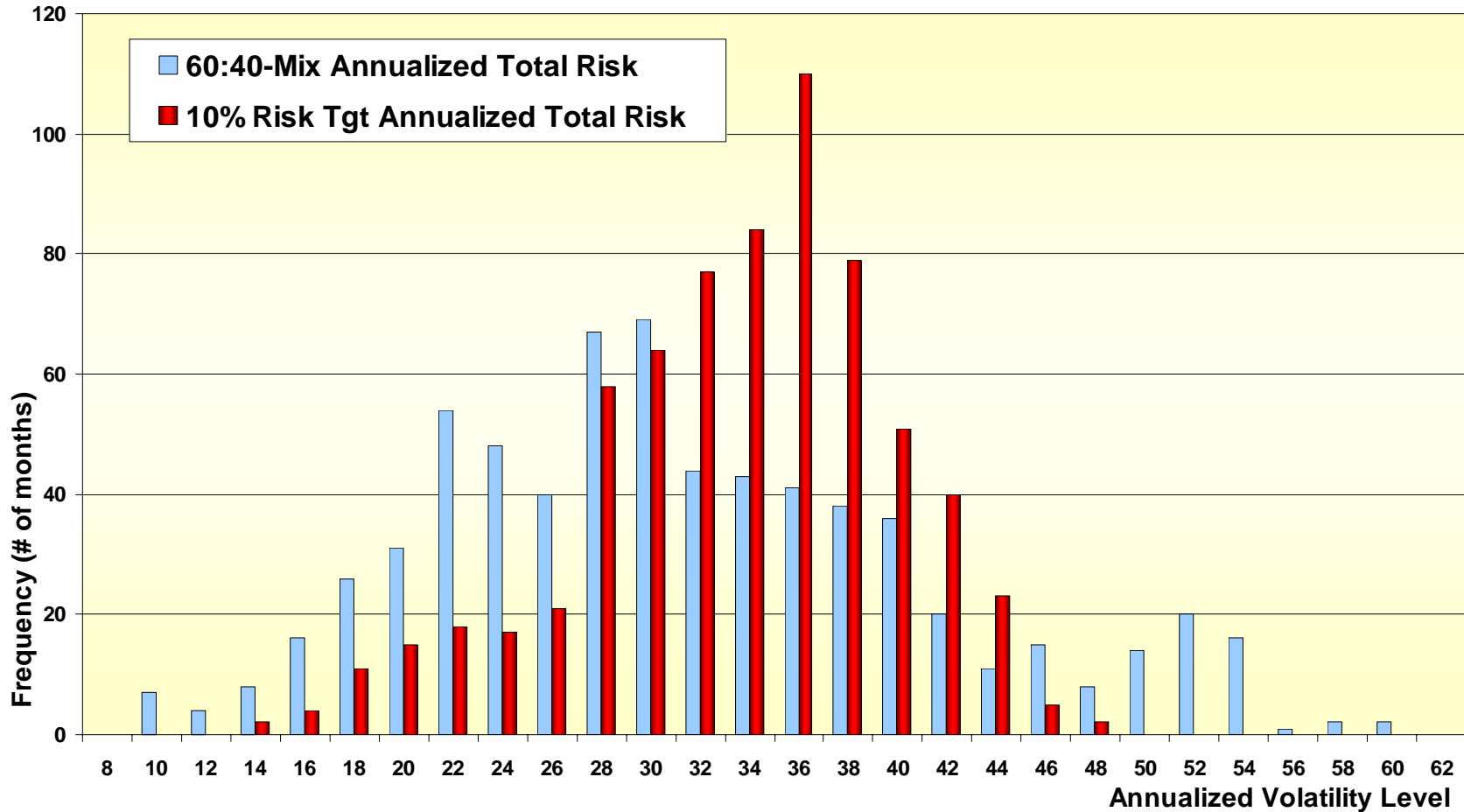# Fixed-mix Allocation Policies* Assuming a Stable Risk Environment

Legend:
- **Annualized Equity Volatility, 5-year MA (ave = 13.9)**
- 5-year Stock-Bond Correlation (ave = +0.21)

Fixed Allocations Track a Wide Range of Risk

Total Risk

Sharpe Ratio

Annualized Total Risk, 5 yr MA
Sharpe ratio, 5 yr MA

Targeted Policies Specify Level & Range of Risk

deMarco 1/24/02 11

Unleveraged Portfolios can Still Drop to Low Risk Levels

Targeted Risk Policies have Better Results

Legend:
- 10% risk target vs. 60:40-bounded Sharpe ratios
- 10% risk target: Annualized Total Risk, 5yr MA
- 60:40-bounded: Annualized Total Risk, 5 yr MA
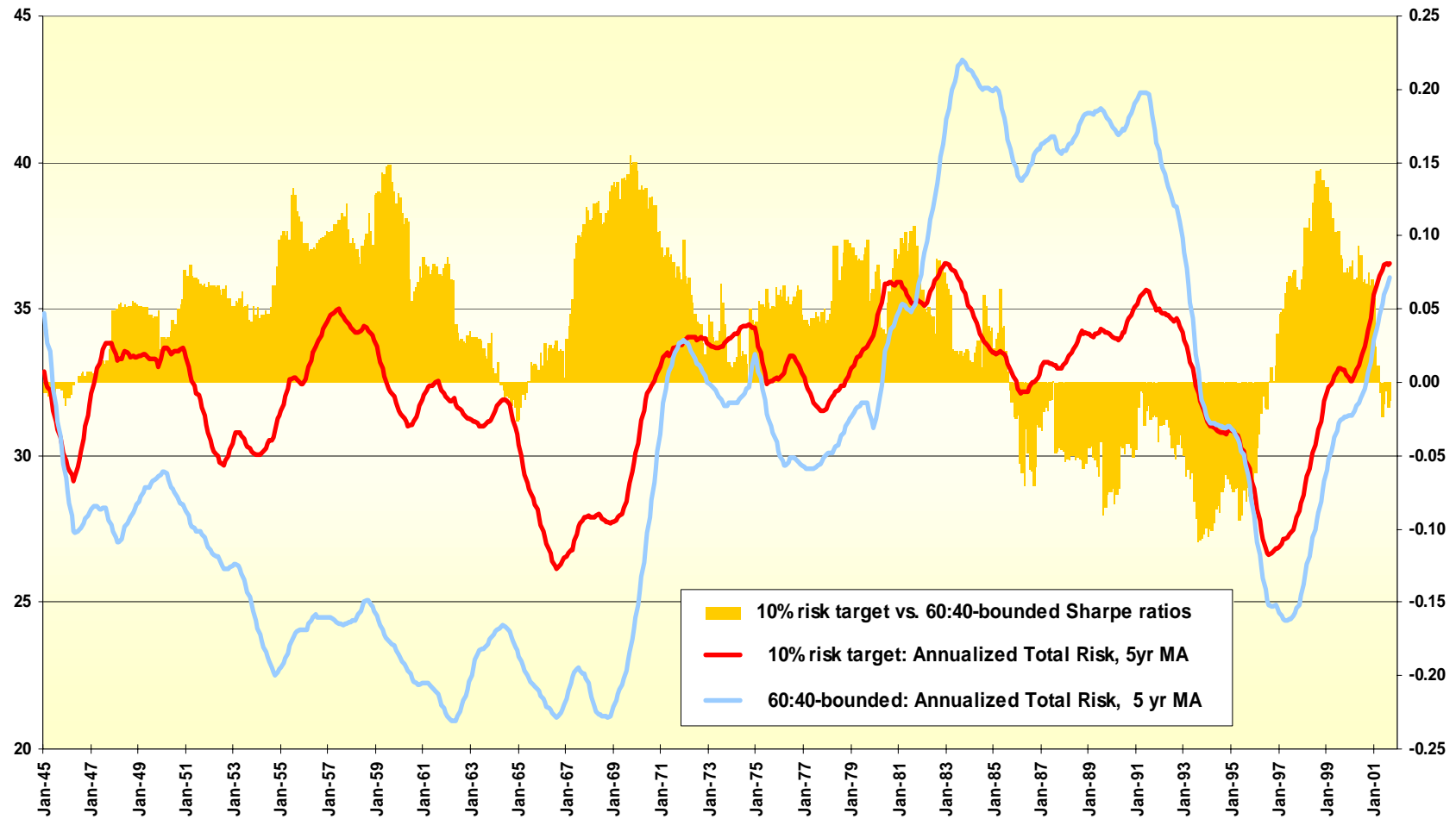
Risk "Transitions" Tend to be Abrupt
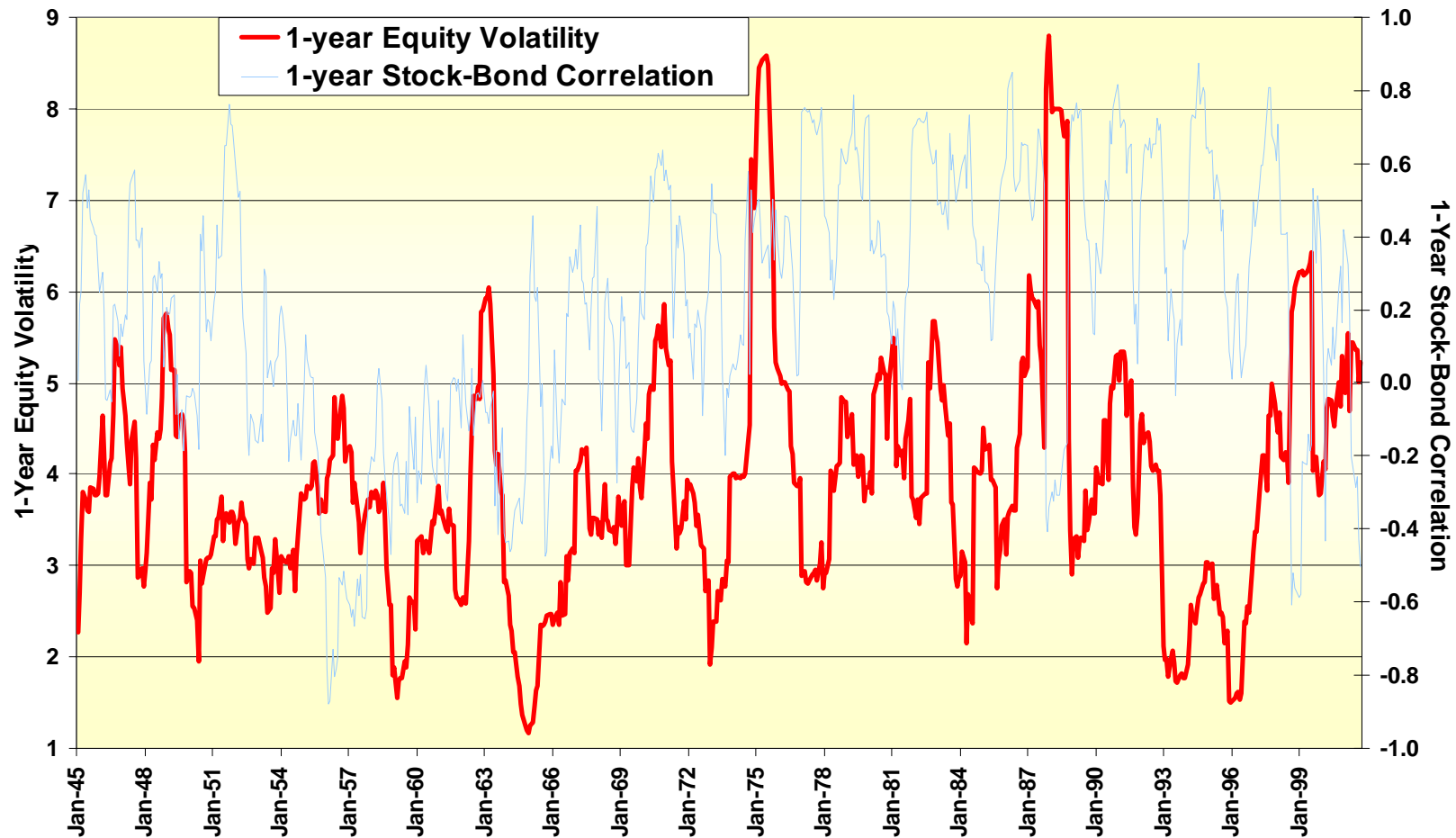
Short-horizon Rebalancing Rules are Required to Catch Volatility Storms

Legend:
- 10% risk target vs. 60:40-bounded Sharpe ratios
- 10% risk target Sharpe ratio, 5yr MA
- 60:40-bounded Sharpe ratio, 5 yr MA
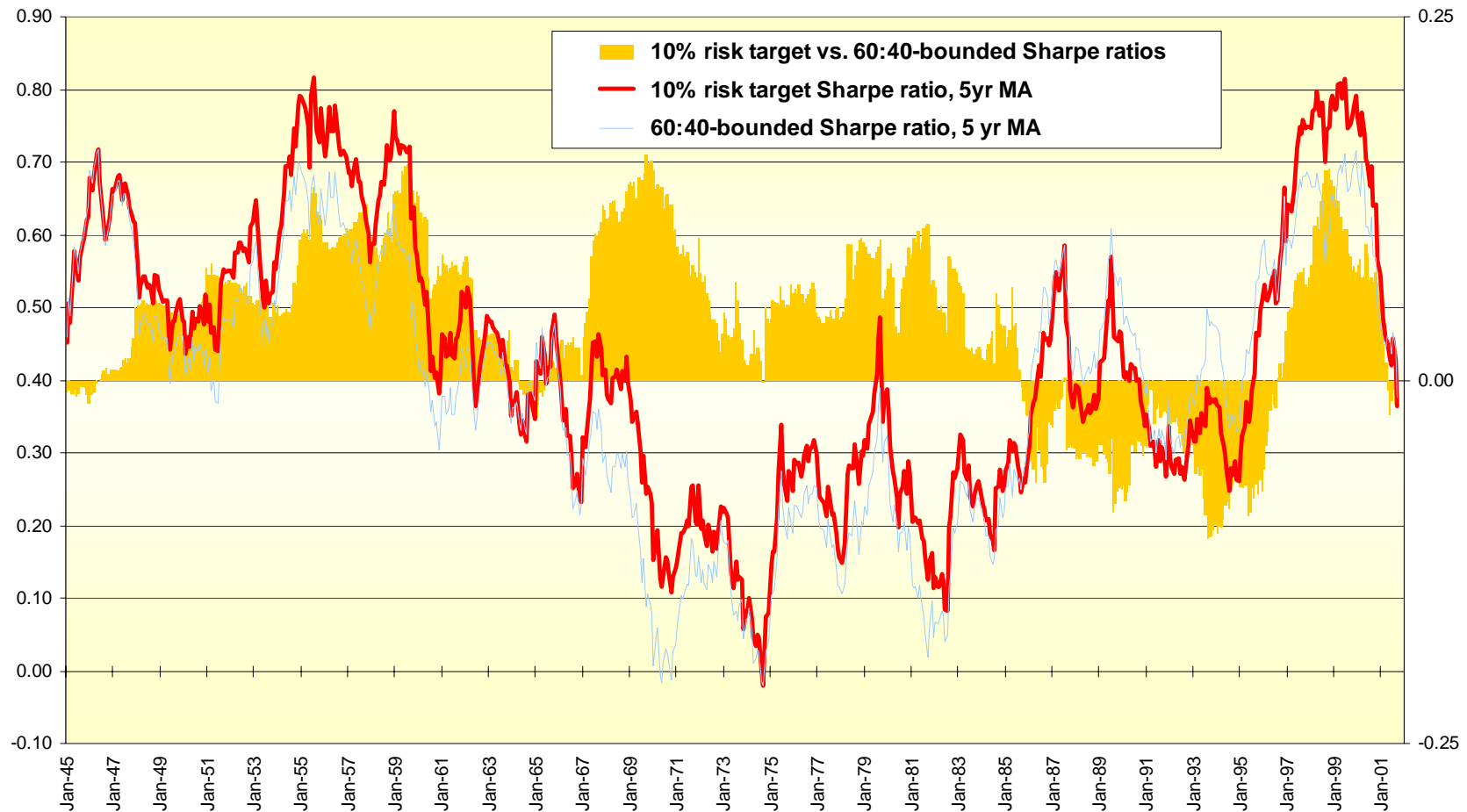
A Slow Rebalancing Rule May Weaken Performance

Legend:
- 10% risk target vs. 60:40-bounded   Equity Allocation
- 10% risk target vs. 60:40-bounded   Excess Returns, 5yr MA
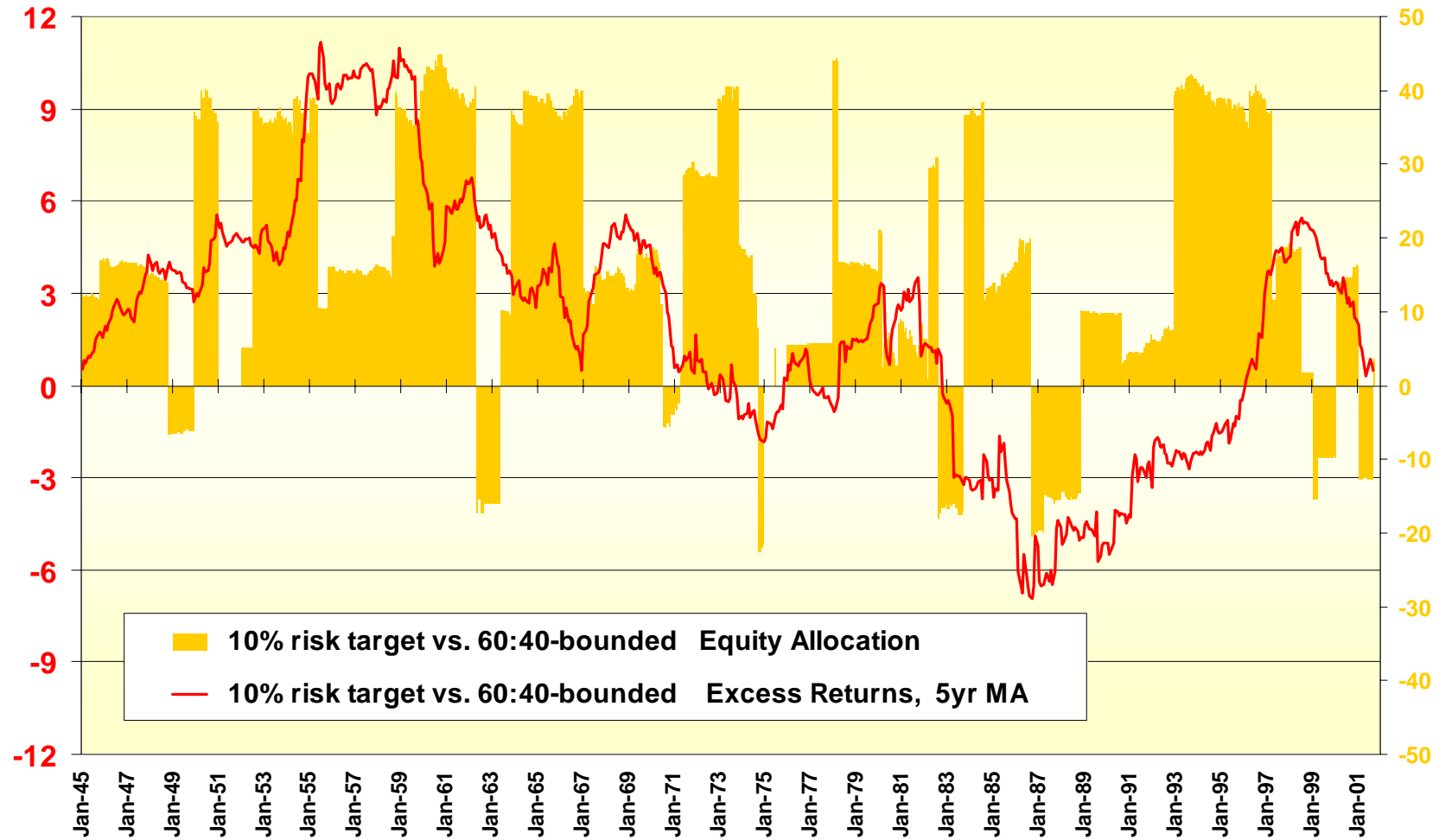
Risk Target vs. Asset-mix Target

50 year comparison

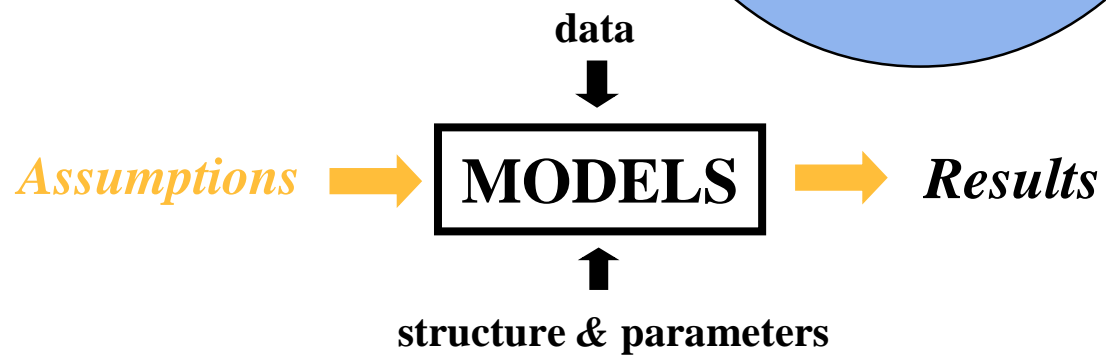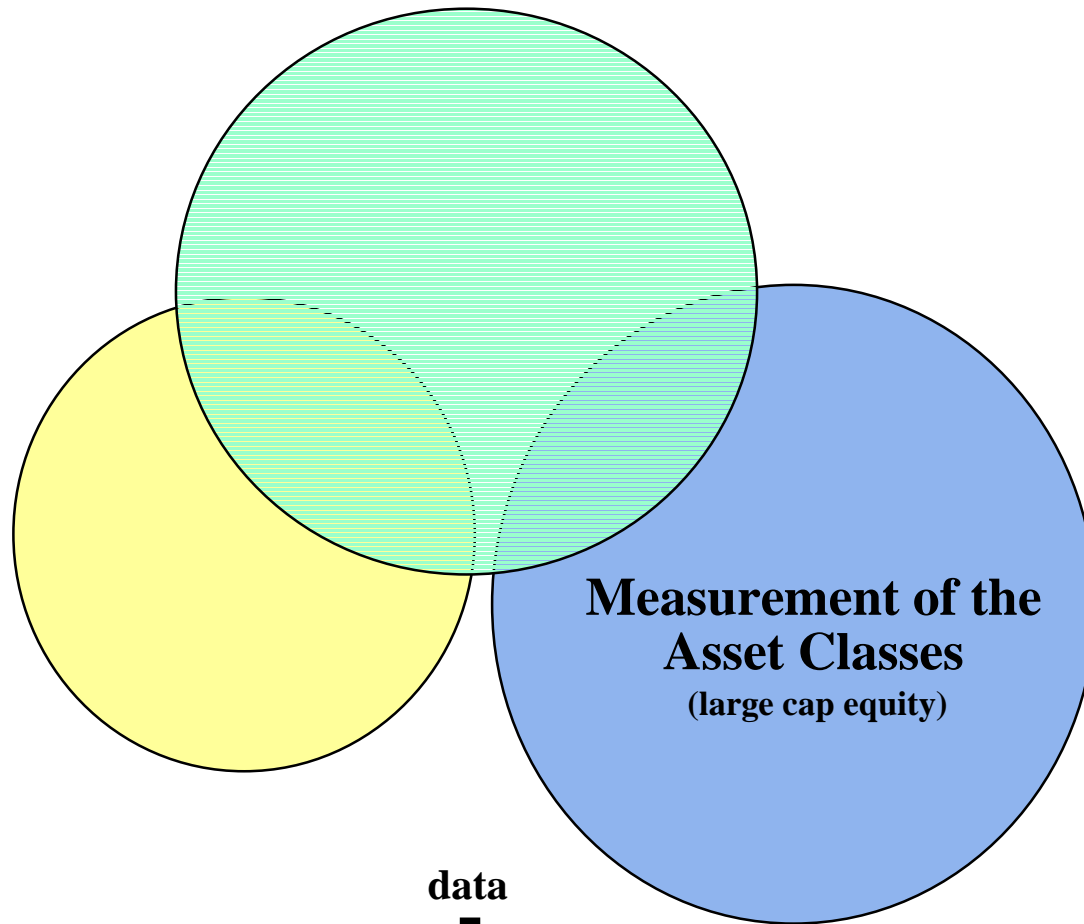|	Risk Target	Fixed-mix Target
Return	13.03%	11.17%
Total Risk	32.56%	30.49%
Sharpe ratio	0.41	0.37
Best One-year Return	61.89 (to Dec '54)	48.71 (to June '83)
Worst One-year Return	- 29.18 (to Sept "74)	- 26.97 (to Sept "74)
# of times Rebalanced	29	28
Max. Stock Allocation	100.0	65.0
Min. Stock Allocation	38.3	55.2

Low Cost Implementation

Futures Contracts	Average **Daily** Volume (US$ billions)	Impact Ceiling @ 5% (US$ millions)	Implied Size of Investment Fund [2] (US$ millions)
S&P 500	23.5	1,175	54,210
Nasdaq 100	4.5	225	51,903
Russell 2000	0.6	180 [1]	47,059
US Composite			**53,167**
EuroSTOXX 50	3.8	190	42,222
FTSE	3.1	155	34,444
CAC	3.4	170	37,778
DAX	6.6	330	73,333
MIB	2.9	145	32,222
IBEX	1.4	70	15,556
Nikkie 225	4.5	225	50,000
Hang Seng	1.5	75	16,667
ASX SPI	3.1	155	34,444
non-US Composite			**43,344**

(1) : adjusted for realized liquidity

(2) : to conduct a 5% reallocation

Measurement of the Asset Classes
(large cap equity)

data

$$\downarrow$$

Assumptions ➡ **MODELS** ➡ *Results*

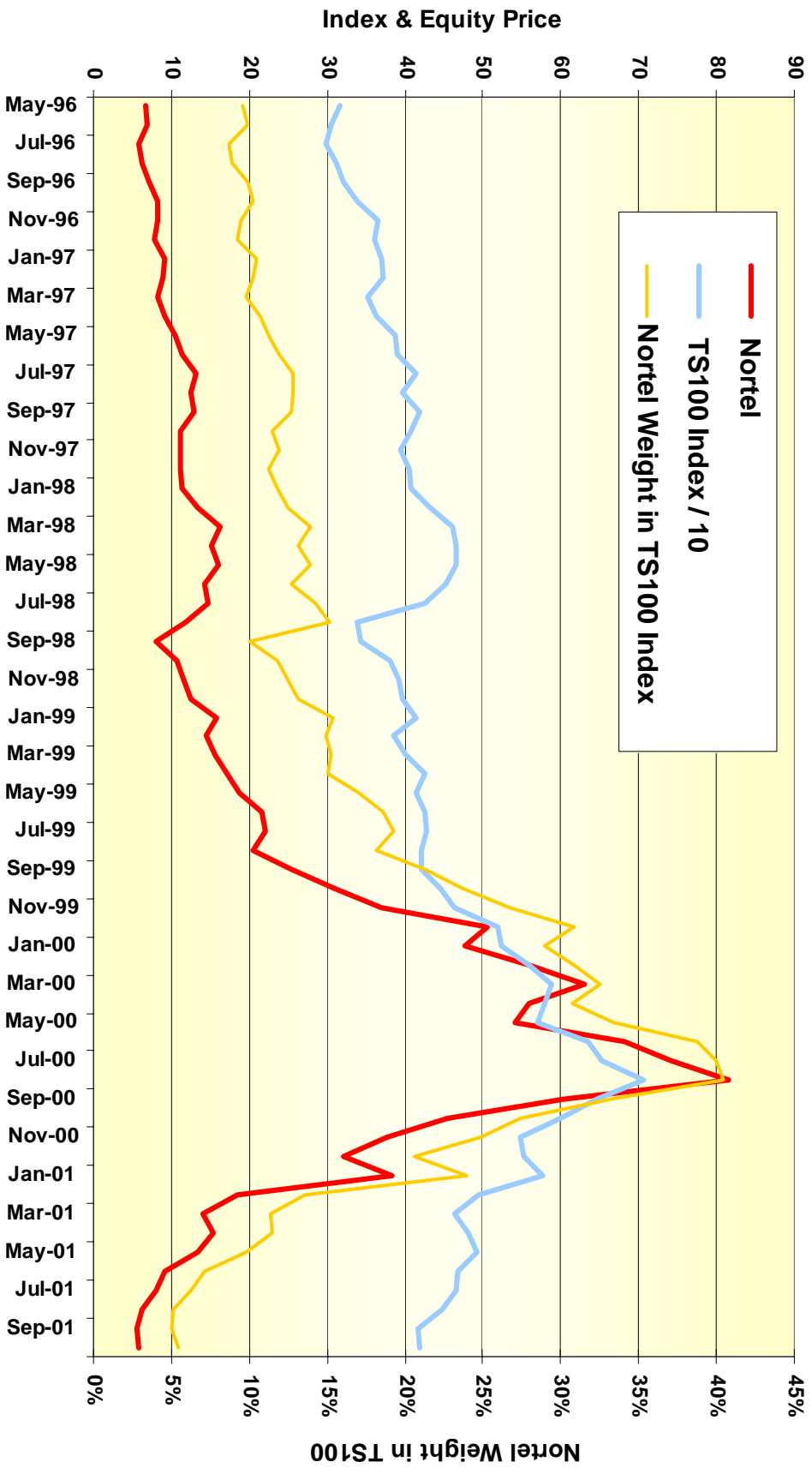$$\uparrow$$
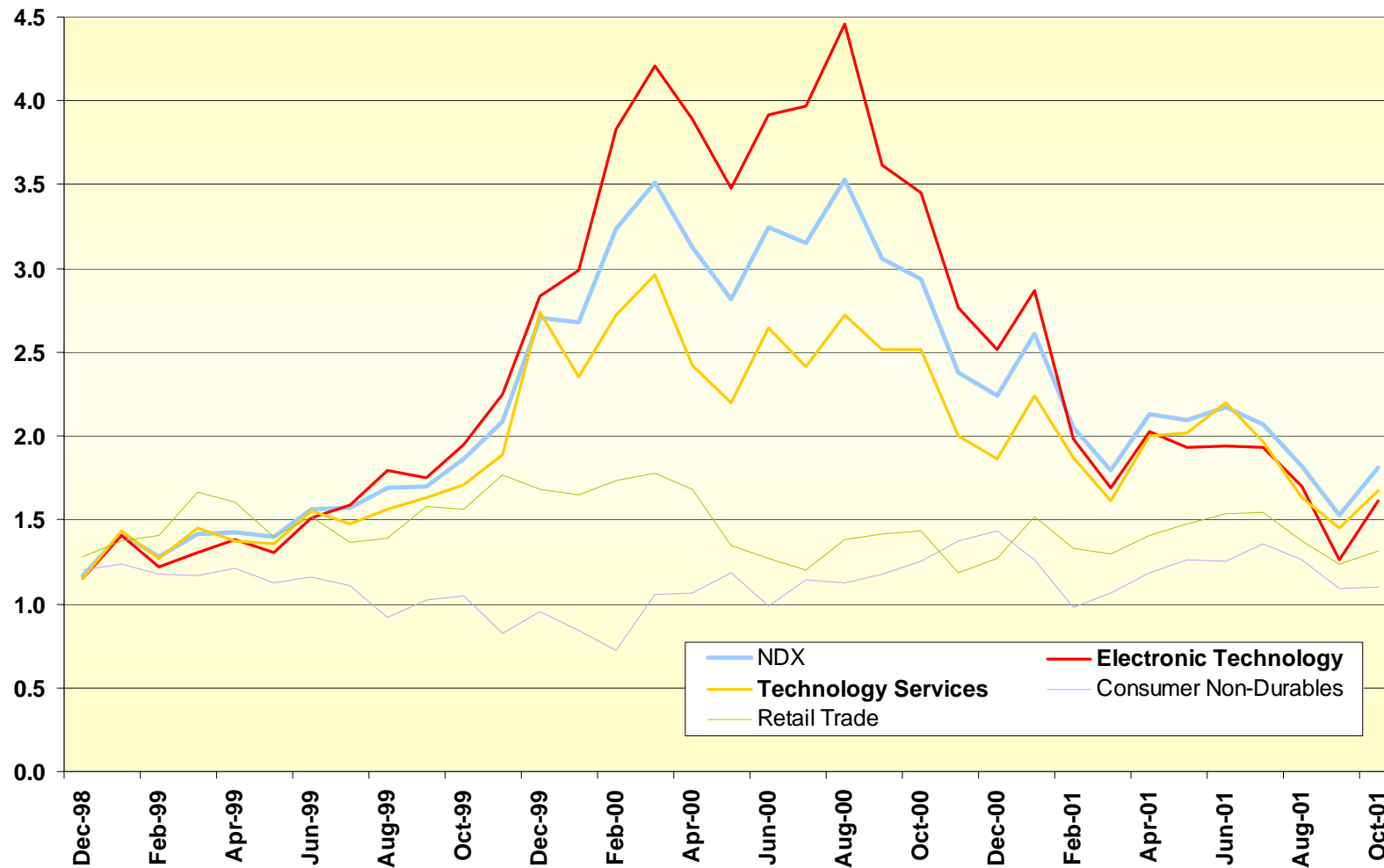
structure & parameters

Measuring the Asset Class

➢ Asset allocation is by proxies for the asset classes; i.e., country / market / sector indexes: S&P, Russell, MSCI, FT, Lehman, Salomon Brothers.

- The basis for market-cap weighted indexes is Efficient Market Theory which assumes economic equilibrium; i.e., *asset prices = fair value*.

- Actual asset prices can be distorted for extended periods by *sentiment* (or *momentum)* and by Central Bank actions.
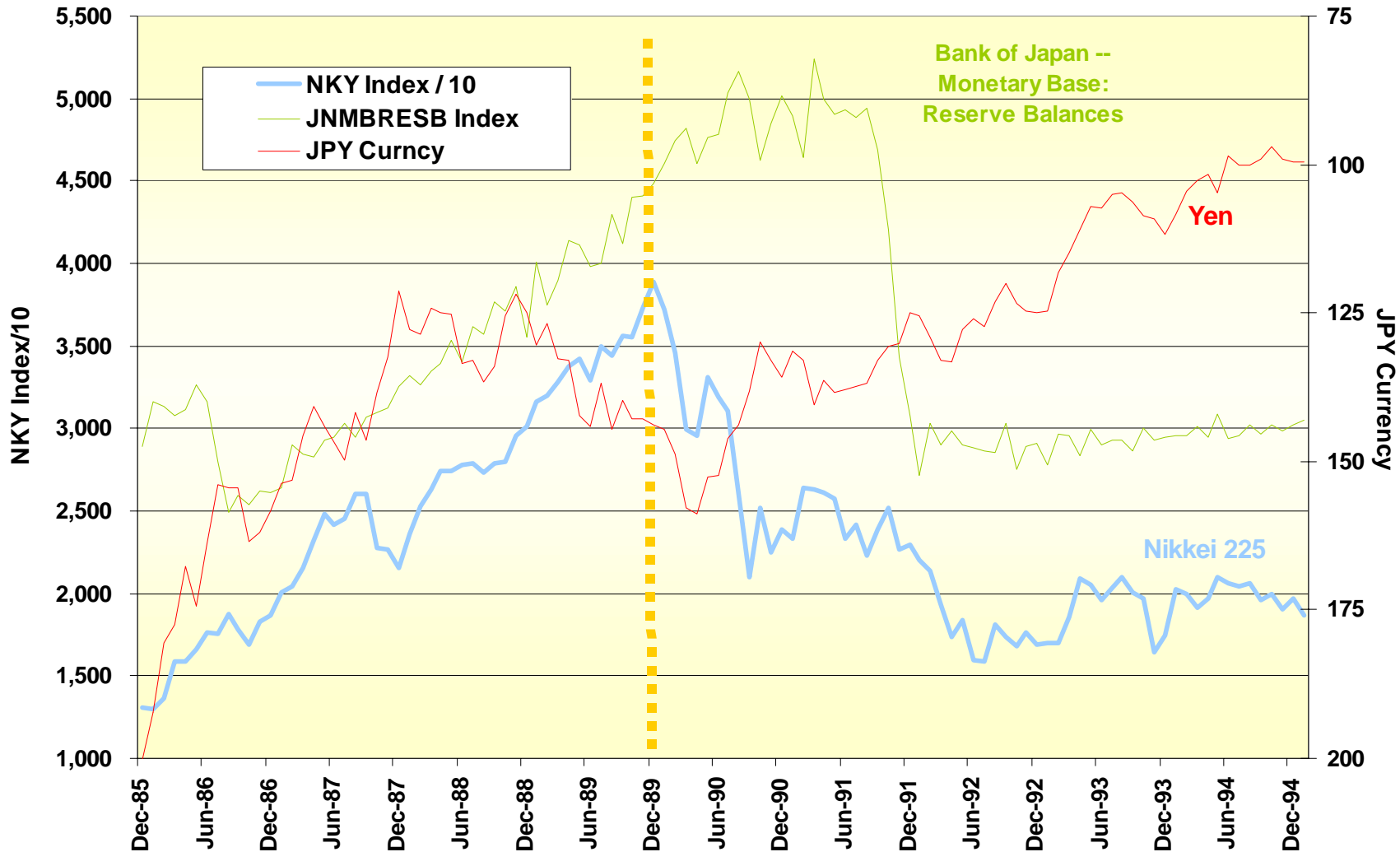
Asset Price Distortion from a "Hot Stock"

Index & Equity Price

Legend:
- **Nortel** (red)
- **TS100 Index / 10** (blue)
- **Nortel Weight in TS100 Index** (yellow)

X-axis (top): 0, 10, 20, 30, 40, 50, 60, 70, 80, 90

Y-axis (months): May-96, Jul-96, Sep-96, Nov-96, Jan-97, Mar-97, May-97, Jul-97, Sep-97, Nov-97, Jan-98, Mar-98, May-98, Jul-98, Sep-98, Nov-98, Jan-99, Mar-99, May-99, Jul-99, Sep-99, Nov-99, Jan-00, Mar-00, May-00, Jul-00, Sep-00, Nov-00, Jan-01, Mar-01, May-01, Jul-01, Sep-01

Nortel Weight in TS100
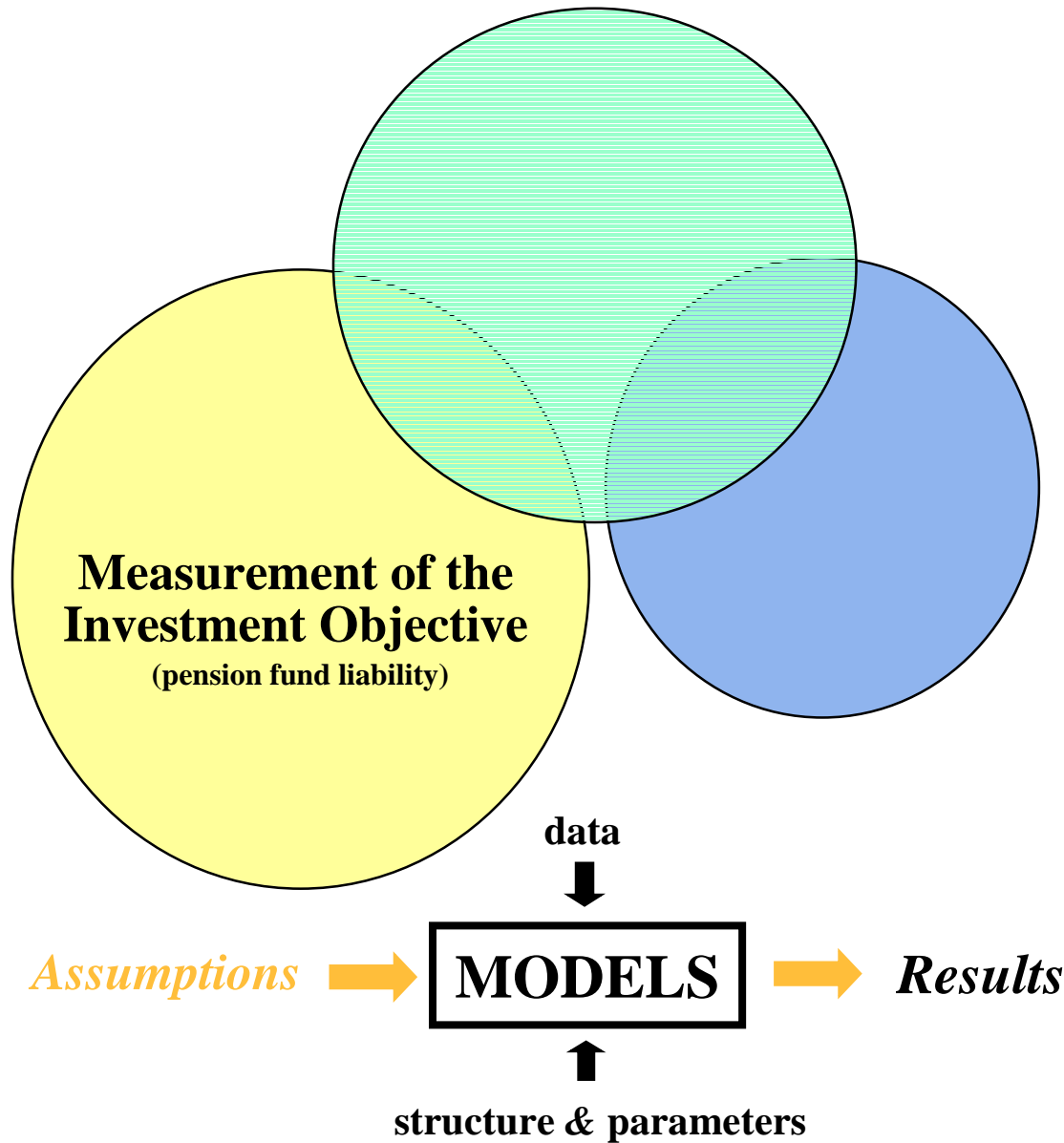
X-axis (bottom): 0%, 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%

Asset Price Distortion from a "Hot Sector"

Asset Price Distortion from Central Bank Policy

Measurement of the Investment Objective
(pension fund liability)

data

Assumptions ➡ **MODELS** ➡ *Results*

structure & parameters

Specification of the Investment Objective

Approaches to measuring the pension fund liability:

➢ **Financial** (FAS 87 "pension *expense*")

- VBO: ABO less unvested staff
- **ABO**: accrual from actual service & salary
- **PBO**: ABO plus salaries projected to retirement
- PV of Benefits: PBO plus years of service projected to retirement

➢ **Regulatory** (ERISA & IRS "funding status")

- **A**ctuarial **A**ccrued **L**iability
- Actuarial value of plan assets (multi-year smoothing & phase in)

➢ **Economic**

- IBO: PBO plus post-retirement indexing to inflation
- **EBO**: IBO plus demographic recomposition of workforce

Measuring the Objective

➢ Magnitude & riskiness of investment objective influences "aggressiveness" of portfolio … and risk tolerance.

- *Need* for equity in the asset mix (& its risk **composition**) influenced by current status & goals for *surplus* or *wealth*.
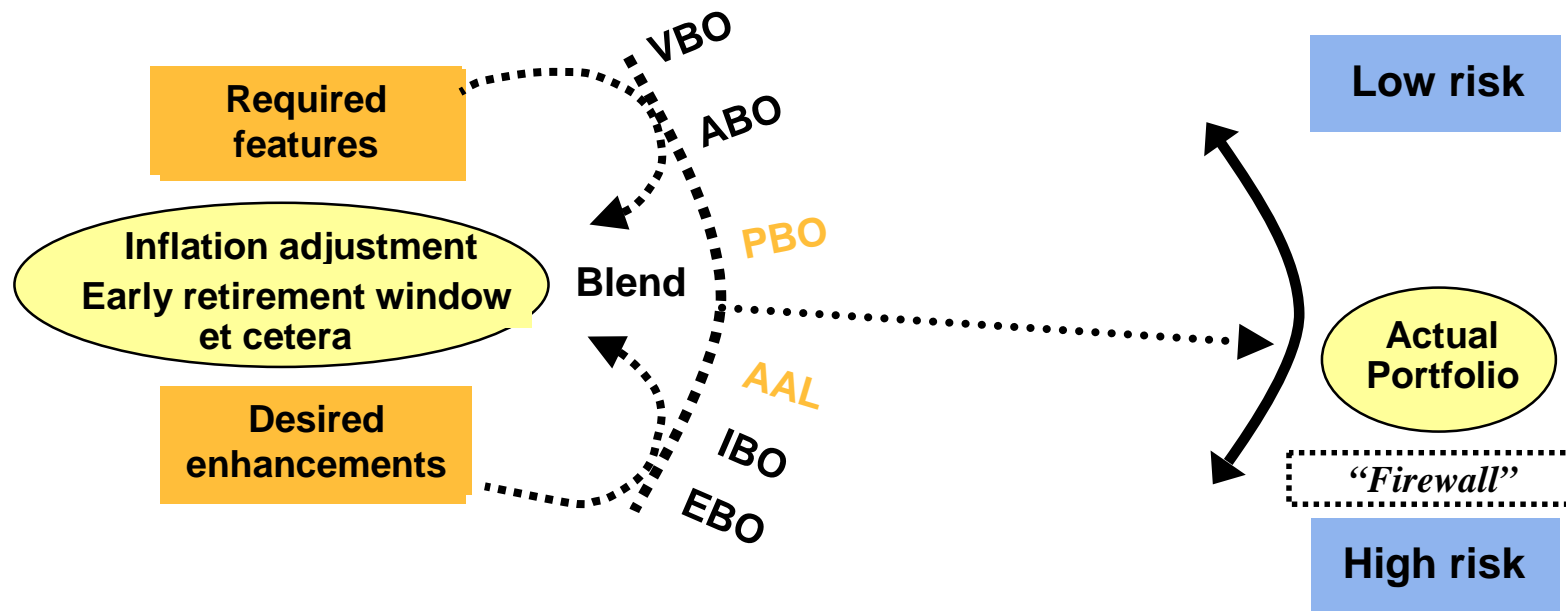
-

**Comparative Risk Levels of
Alternative Measures of
Pension Fund Liabilities**

	Annualized Standard Deviation
ABO	14.76 %
PBO	17.39 %
IBO	30.28 %
T-bills	0.97 %
T-bonds	13.93 %
Equity	19.12 %

Source: D. Ezra, FAJ, Jan-Feb 1991.

How you measure the objective sets the required risk?

"Plan Liabilities" ┄┄┄┄┄┄► *Investment Fund Structure*

VBO

ABO

PBO

AAL

IBO

EBO

Blend

Required features

Inflation adjustment
Early retirement window et cetera

Desired enhancements

Low risk

Actual Portfolio

"Firewall"

High risk

model "plan liabilities"

Tolerance for risk is conditional

Environment (Capital Markets) — vertical axis: Unfavorable → Favorable

Perceived **Skill** Level — horizontal axis: Episodic → Reliable

Diagonal arrow: Cautious → Highly Confident

degree of **Conviction** in taking decisions
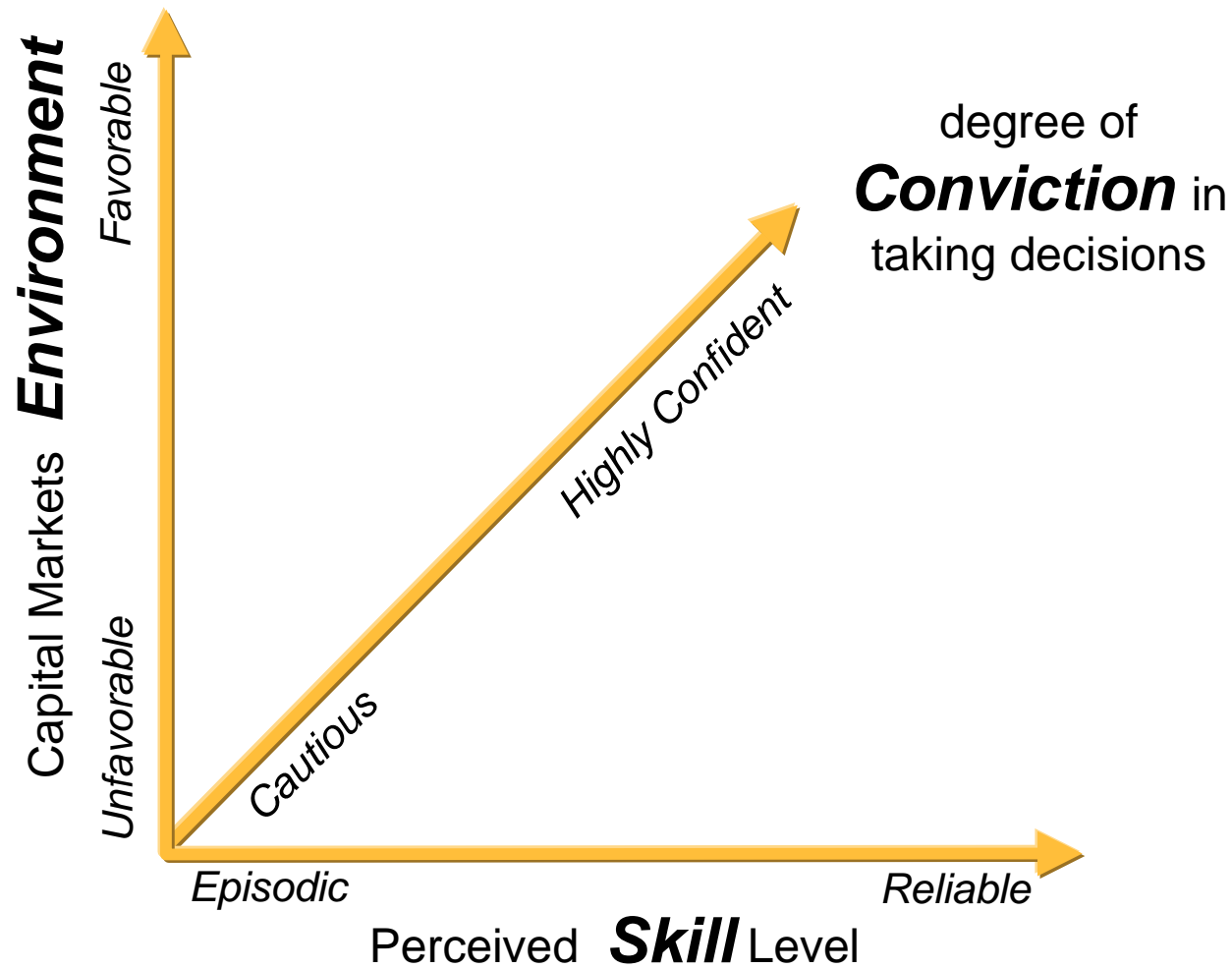
Risk tolerance changes with the capital market environment

RISK AVERSION LEVEL IMPLIED BY S&P 500 OPTIONS

Chart: y-axis labeled "RISK AVERSION COEFFICIENT" ranging from 0 to 140%. x-axis dates: 6/15/94, 6/15/94, 10/28/95, 3/11/97, 7/24/98, 12/6/99. Annotations: "Asian currency crisis" and "Russia / LTCM".
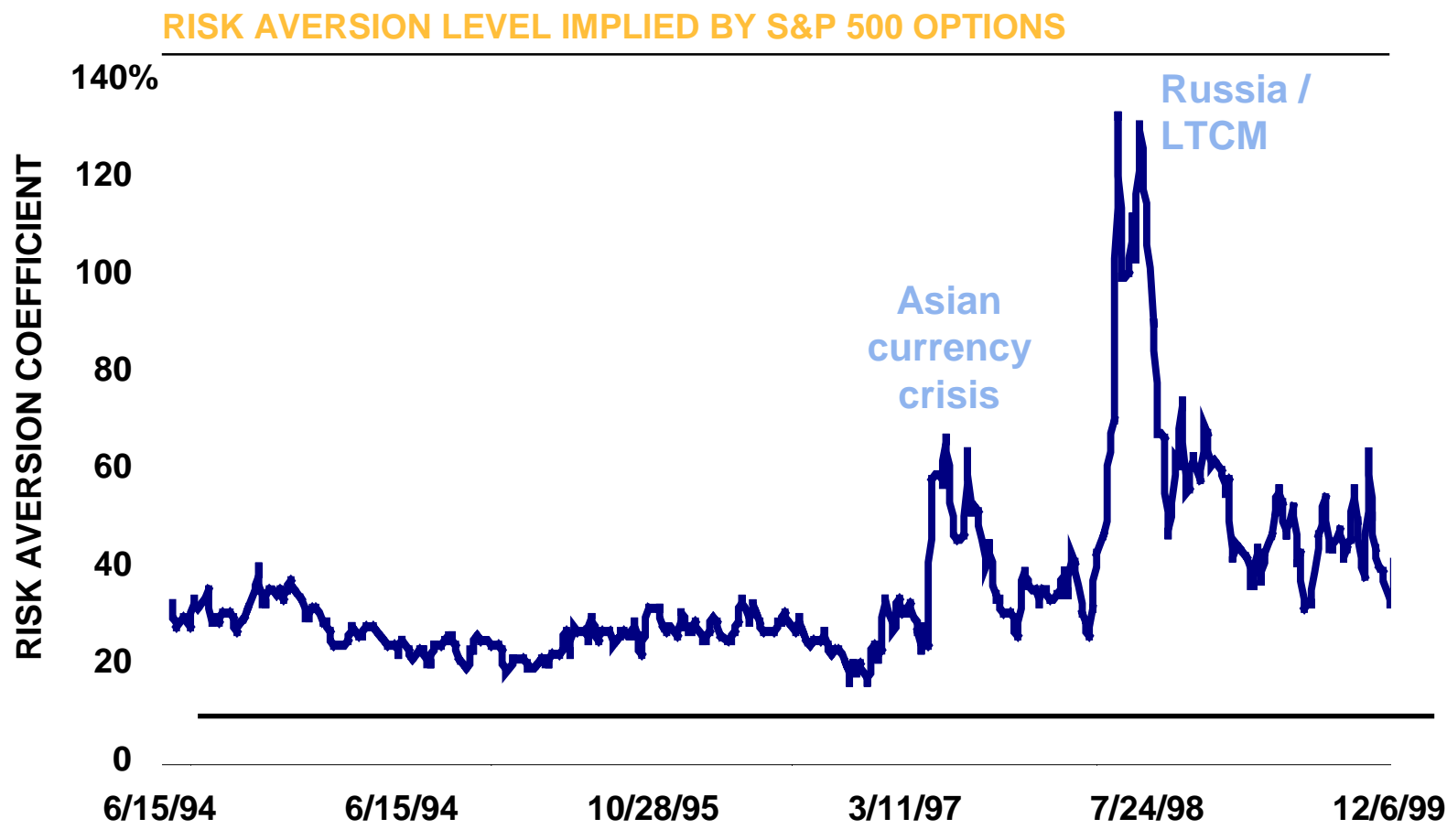
Source: Putnam.

How much risk *should* you take ?

Is the market environment rewarding risk-taking?

Chart: Return (quarterly) vs. Risk, showing two curves — "S&P 500, 4th Quarter 1998" (green) and "S&P 500, 3rd Quarter 1998" (orange), each with a red star marker.
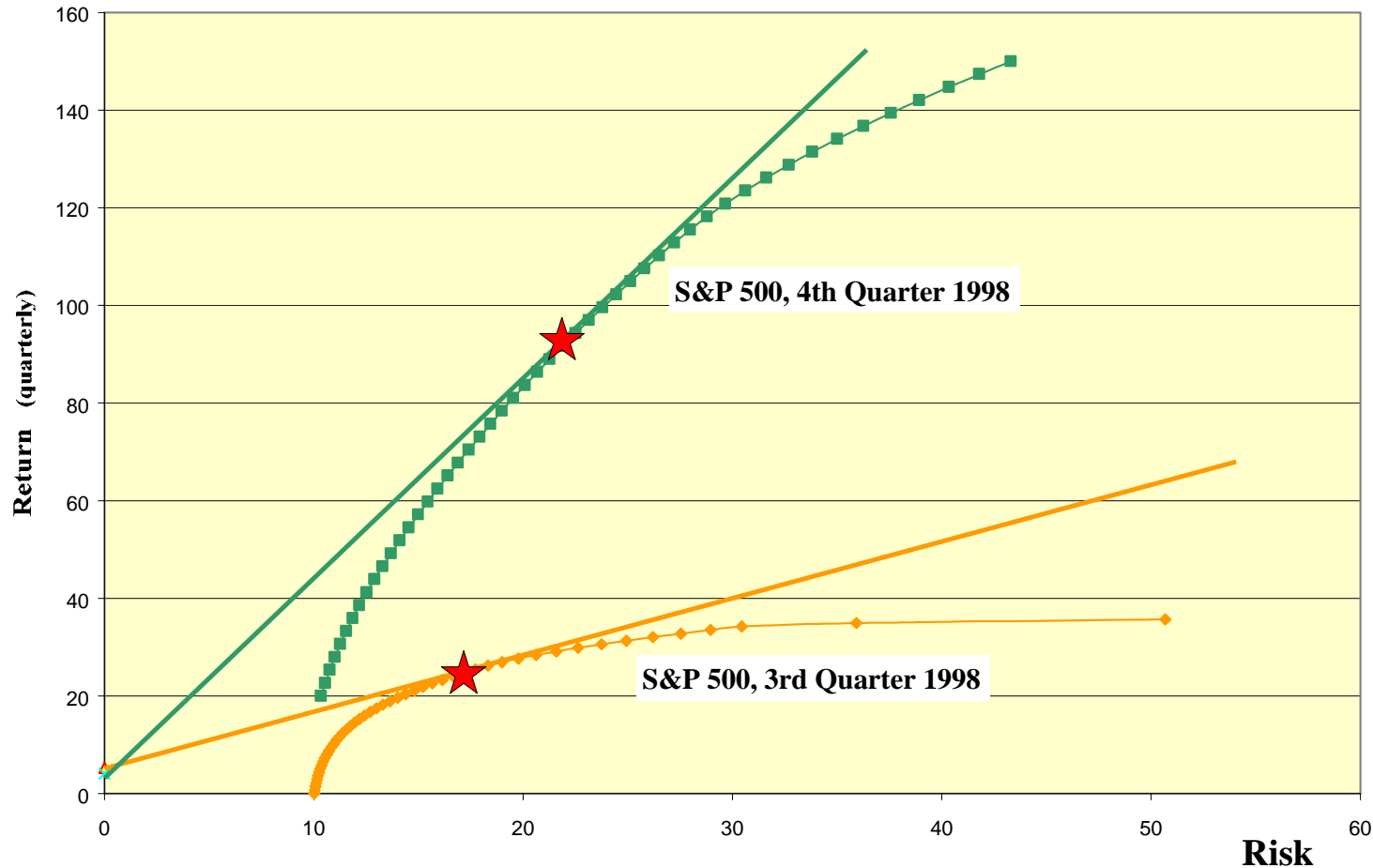
Conviction:
the *financial capacity* to take risk

Financial flexibility (liquidity)

Financial strength (wealth)

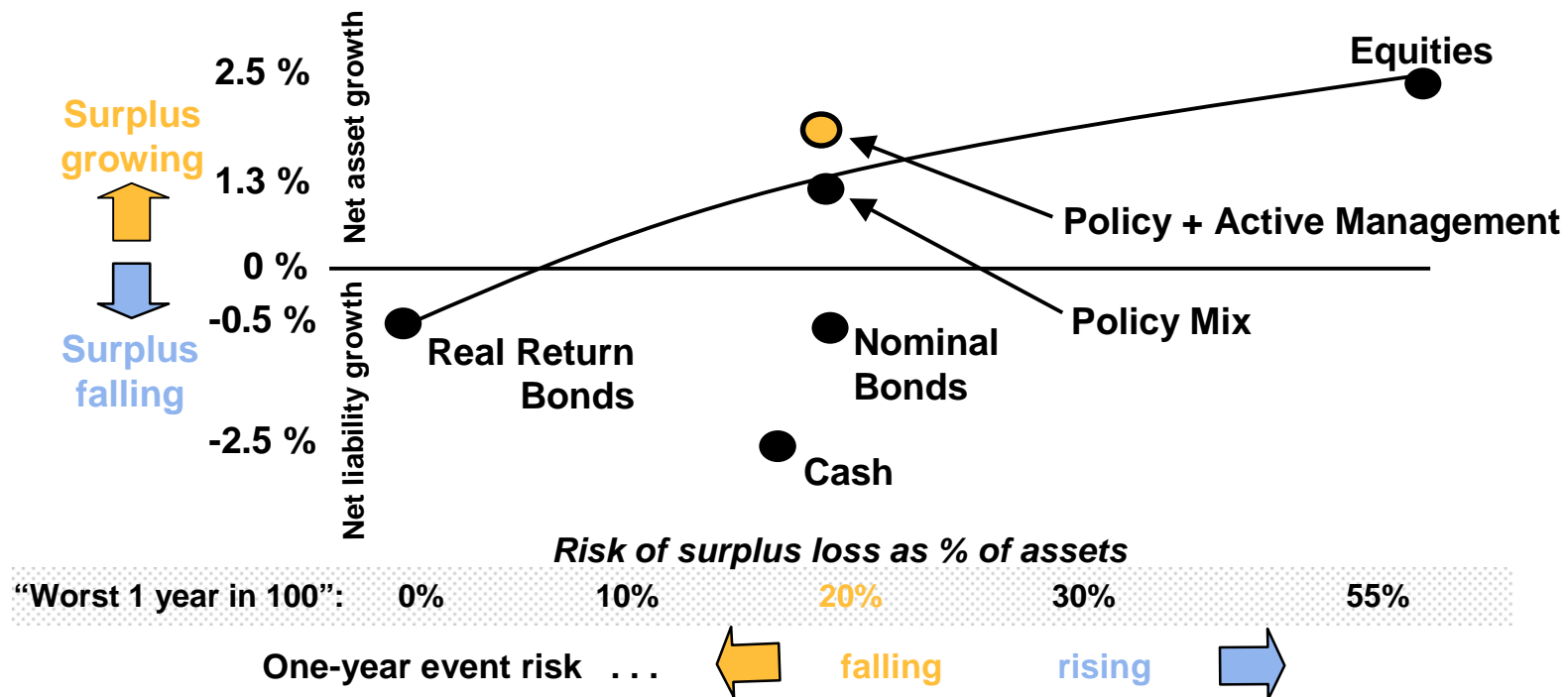**Financial endurance** (earning power & stability)
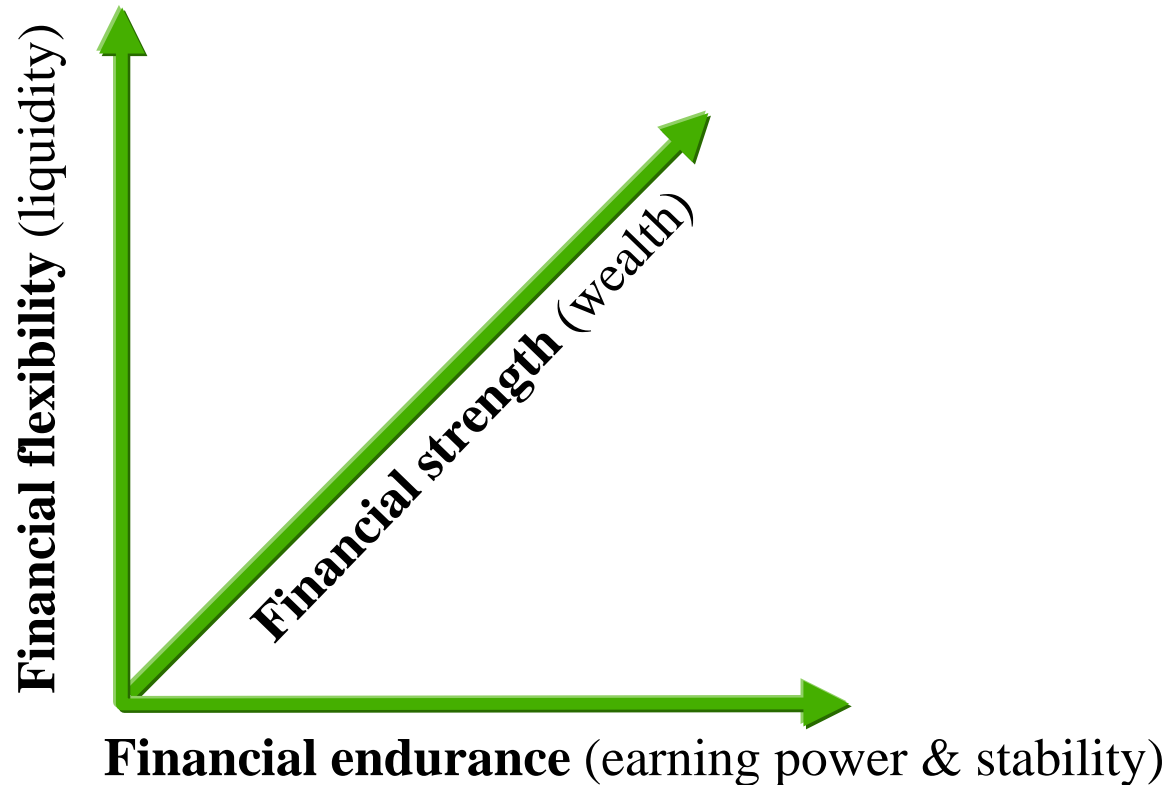
Ability to make up for mistakes

Skill can add value over the naïve "model" even for 5-year horizons.
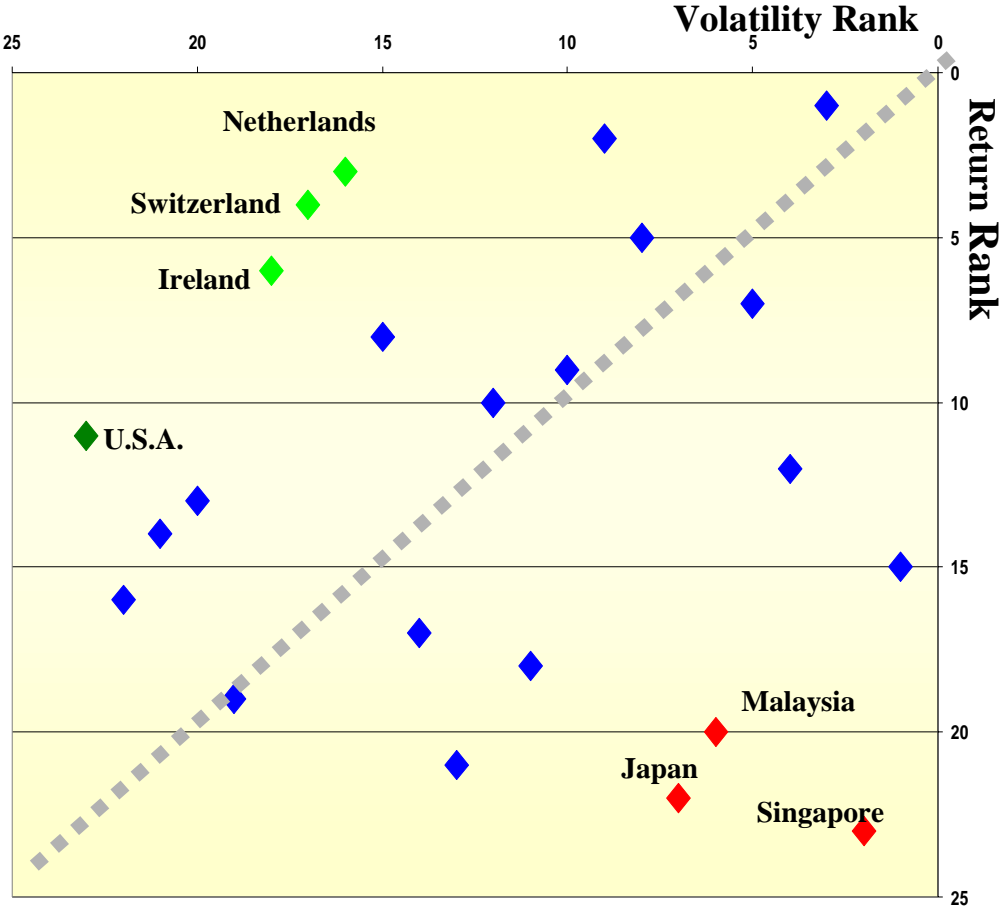
Trade off the risk you *need* for the risk you can *tolerate*
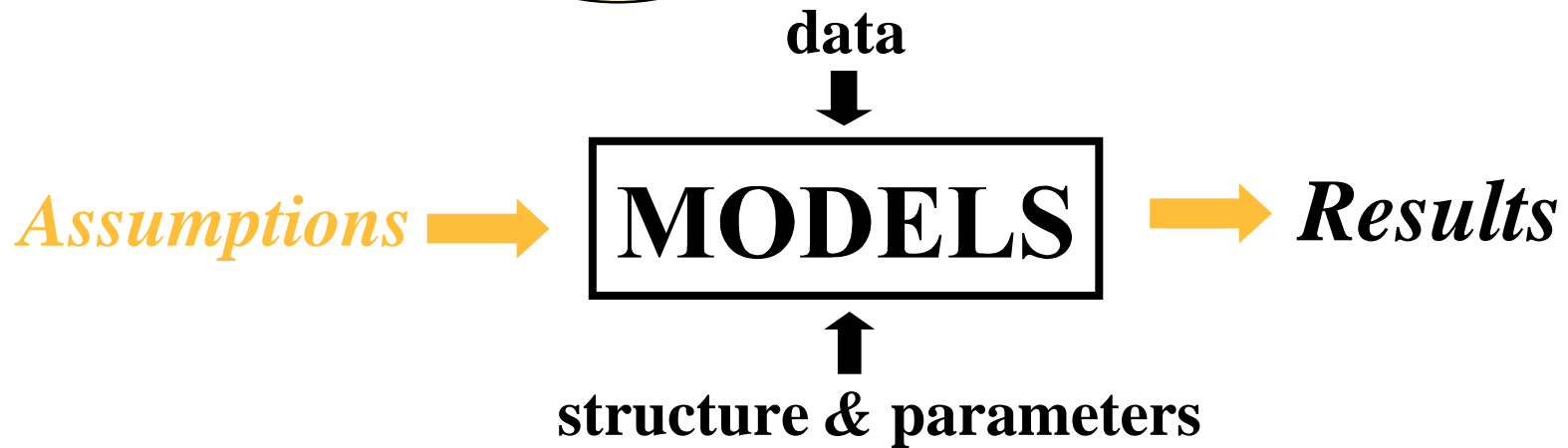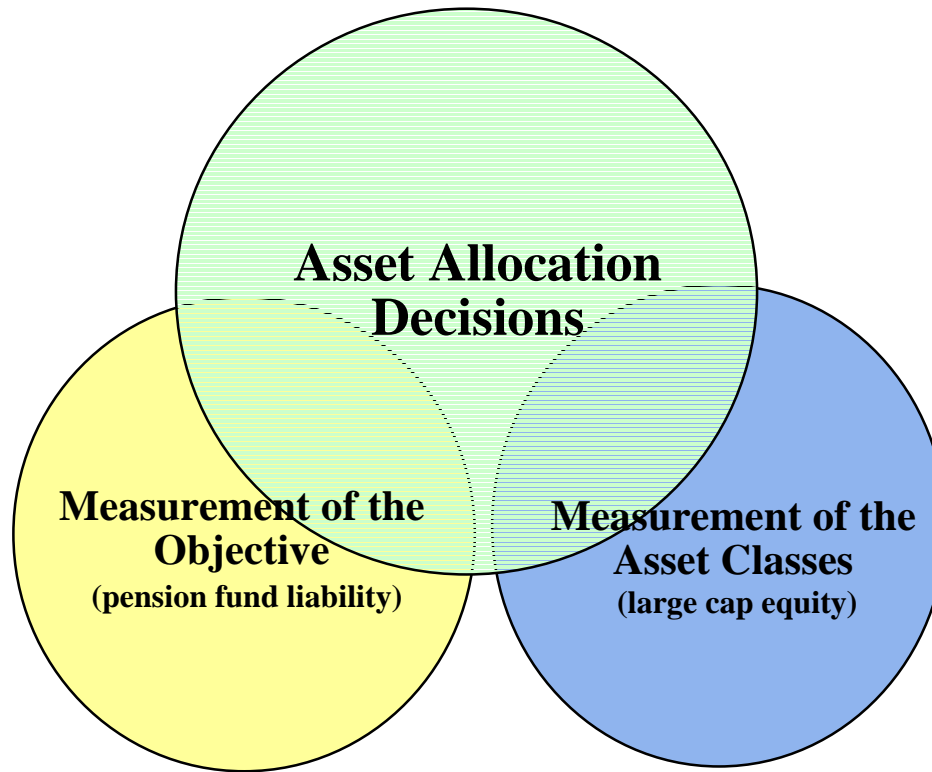
Net asset growth

2.5 %

1.3 %

0 %

-0.5 %

-2.5 %

Net liability growth

Surplus growing

Surplus falling

Equities

Policy + Active Management

Policy Mix

Real Return Bonds

Nominal Bonds

Cash

Risk of surplus loss as % of assets

"Worst 1 year in 100": 0% 10% 20% 30% 55%

One-year event risk . . . **falling** **rising**

Source: Ontario Teachers' Pension Plan Board.

Institutions have followed fixed-mix asset allocation policies since the beginning of time.
What's the problem?

➢ **Findings**
- Investment funds go beyond probable limits of risk tolerance during episodes of extremes in markets risk.

- Level risk-taken probably too low . . .
  Result: relatively less efficient (*Sharpe ratio*) and less effective (*total return*) investment programs.

- Asset-price distortions can persist for extended periods . . .
  Result: capital market expectations that throw off asset allocation policy-making & strategies.

- Investment fund liabilities are more equity-like and larger than conventional measures represent them to be . . .
  Result: lower than optimal equity-targeting.

➢ *Implications*

➢ *Actions*

Institutions have followed fixed-mix asset allocation policies since the beginning of time. *What's the problem?*

➢ *Findings*

➢ **Implications**

- Higher long-range targets for equity *and* higher risk-composition targets (with more small cap & international exposure) for equity.

- Broader policy ranges for equity allocations.

- Faster tactical rebalancing strategies to achieve targeted risk levels.

- Use of derivatives for low cost asset allocation adjustments and to preserve health from cash-market investment program.

➢ **Actions**

- Extend research to examine shorter-horizon rebalancing rules & new ranges for rebalancing.

- Apply Information Ratio concept for proxying assets segments to construct asset composites; i.e., to build a fair-value index.

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- W. F. Sharpe. "Asset Allocation," in Maginn and Tuttle, editors, *Managing Investment Portfolios*, Boston: Warren, Gorham & Lamont 1990.

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➢ Research Papers

Risk Standards for Institutional Investors and Investment Managers

video clips