

Asset Allocation, Style Diversification & Rebalancing Techniques

Consultiva Internacional, Inc.

2nd Annual Investment Management
Conference

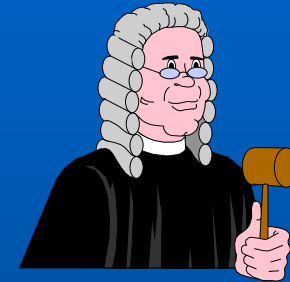
November 16, 2001

Agenda

- The Fiduciary Standard
- Asset Allocation
 - What it is
 - What does it entail?
 - A Process for determining proper asset allocation
- Style Diversification
 - Equities
 - Fixed Income
- Define the Optimum Portfolio
- Rebalancing: Staying with the Program!

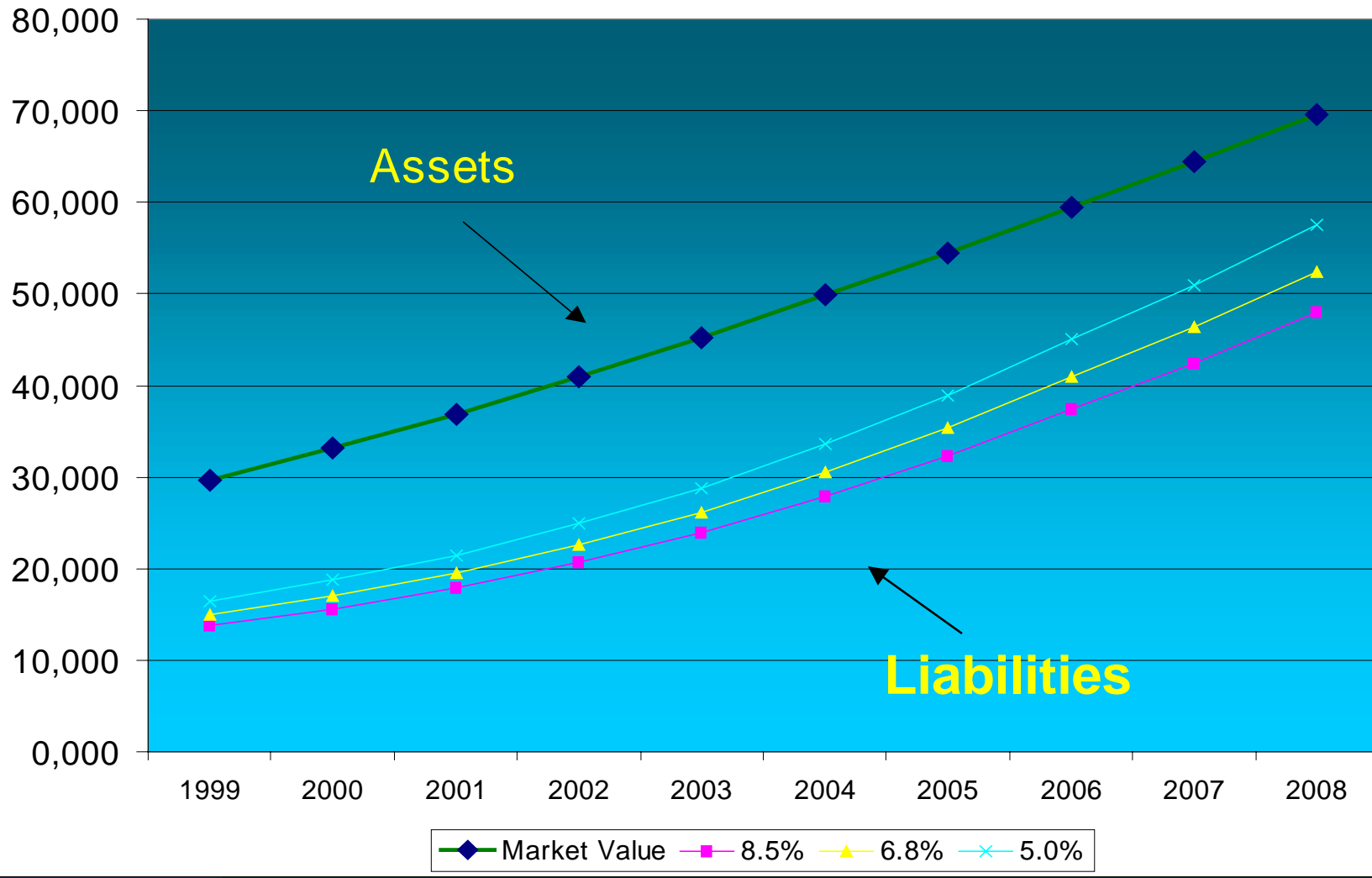
STANDARDS OF FIDUCIARY CONDUCT

A Fiduciary must act...



- 1. Solely in the interest of fund...**
- 2. For the exclusive purpose of achieving fund objectives and defraying administrative expenses...**
- 3. In accordance with documents and instruments governing the fund...**
- 4. With the care, skill, prudence and diligence of an expert...**
- 5. Diversifying the investments to minimize the risk of large losses..**

Curves of Convergence
(000)



Asset Allocation

- Definition: The decision how to divide a portfolio's investments among asset classes.
 - Stocks vs. Bonds
- Several issues must be considered:
 - Defined Benefit Plans:
 - Accumulated benefit obligation
 - Projected benefit obligation
 - Assumed future rate of return
 - Free cash flow and funding strategy

Asset Allocation

- **Foundations**
 - **Spending Rules based on**
 - 501(c) (3)
- **Insurance Companies**
 - **Premium income**
 - **Claims**
 - **NAIC**
- **Other Taxable entities**
 - **“After-tax” returns**

Asset Allocation

- Several mathematical and statistical assumptions
 - Expected rates of return for each asset class and sub-asset class
 - Risk measures
 - Asset class correlations
- “The fine art of diversification...”
- A mechanism for managing risk.
 - Risk must first be assessed.

Must first assess “risk”

- Defining “risk”:
 - Variation in Return
 - Negative Returns
 - Underperformance
 - Inconsistency
 - Style Characteristics
 - Organization Stability
 - Quality of Names in Portfolio
 - Actuarial Assumptions

Major Asset Classes

- Domestic Equities

- Large Value
- Large Growth
- Small Value
- Small Growth

- Foreign Equities

- Pacific
- European
- Emerging markets
- Style categories
(large/small,
value/growth)

Major Asset Classes

- Domestic Bonds

- Long-term governments and agencies
- Intermediate governments and agencies
- Long-term corporates
- Intermediate corporates
- Municipal bonds

- Foreign bonds

- Long-term governments
- Intermediate governments
- Long-term corporates
- Intermediate corporates

Major Asset Classes

- Real Estate
- Short-term cash equivalents
 - Treasury Bills
 - Commercial Paper
 - Money Market investments
 - Long & short currency positions
- Private Equity
- Hedge funds

Domestic Equity

- Some factors used to differentiate securities
 - Price-earnings ratios
 - Price-book ratios
 - Dividend yield
 - Market capitalization
 - Earnings per share growth
 - Free cash flow
- Sub-asset classes
 - Large, mid, small cap growth
 - Large, mid, small cap value

Capitalization:

- **Large/mid/small: Refers to market capitalization**

Large Cap \geq \$4.5 Bn
\$4.5 Bn \geq Mid Cap \geq \$1 Bn
\$1 Bn \geq Small Cap \geq \$50 Mn

- **Large Cap:**
 - 80% of total,
 - major portions of S&P 500
- **Mid/Small:**
 - Early stages of development
 - Less certain future is assumed.
 - Typically not as closely followed by analysts
 - In exchange for the uncertainty, tend to have higher expected returns₃

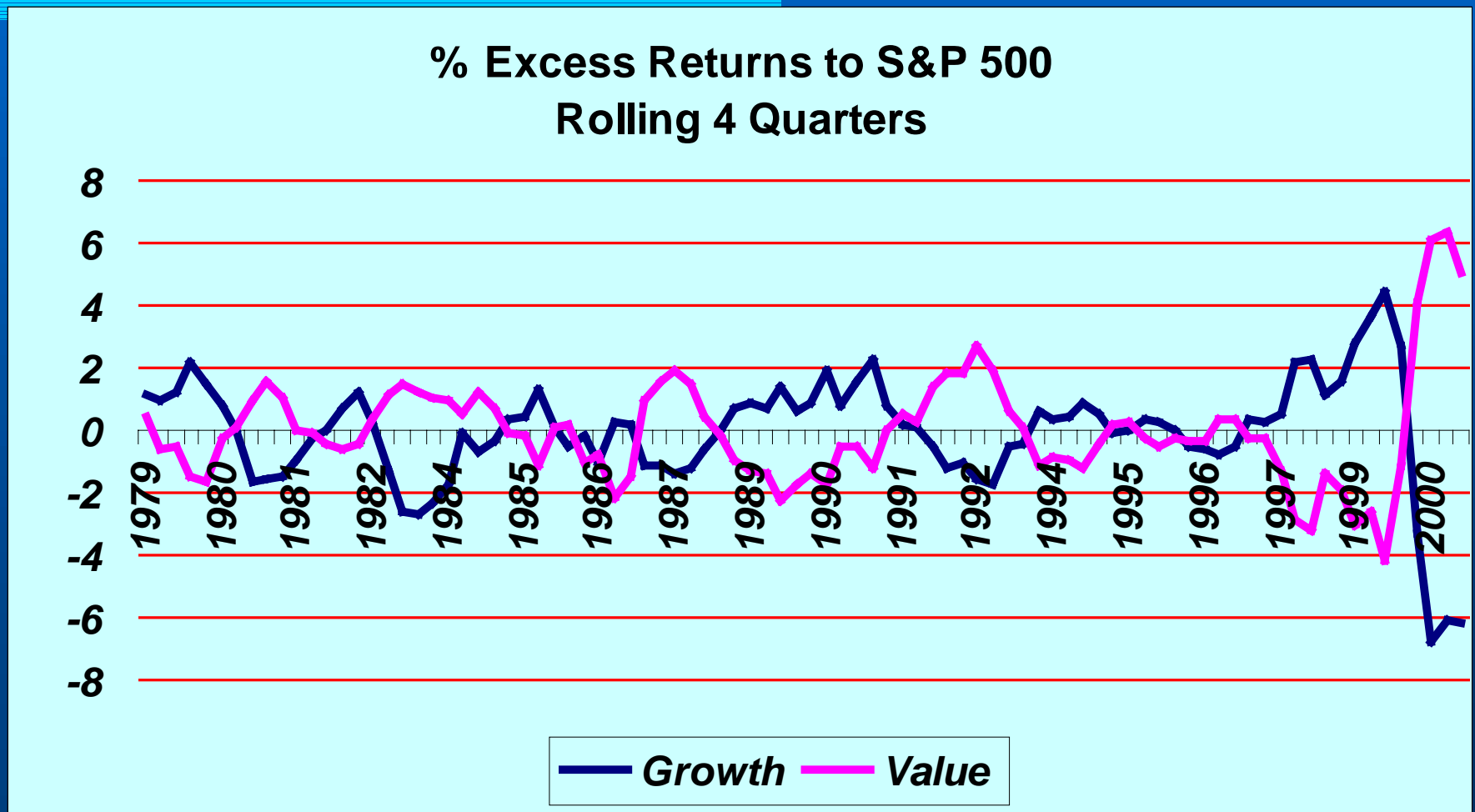
Value vs. Growth

Relative Characteristics (vs. S&P 500)	<u>Value</u>	<u>Growth</u>
Price-to-book	Lower	Higher
Price-to-earnings	Lower	Higher
Dividend Yield	Higher	Lower
Future Earnings Growth Momentum	Lower	Higher

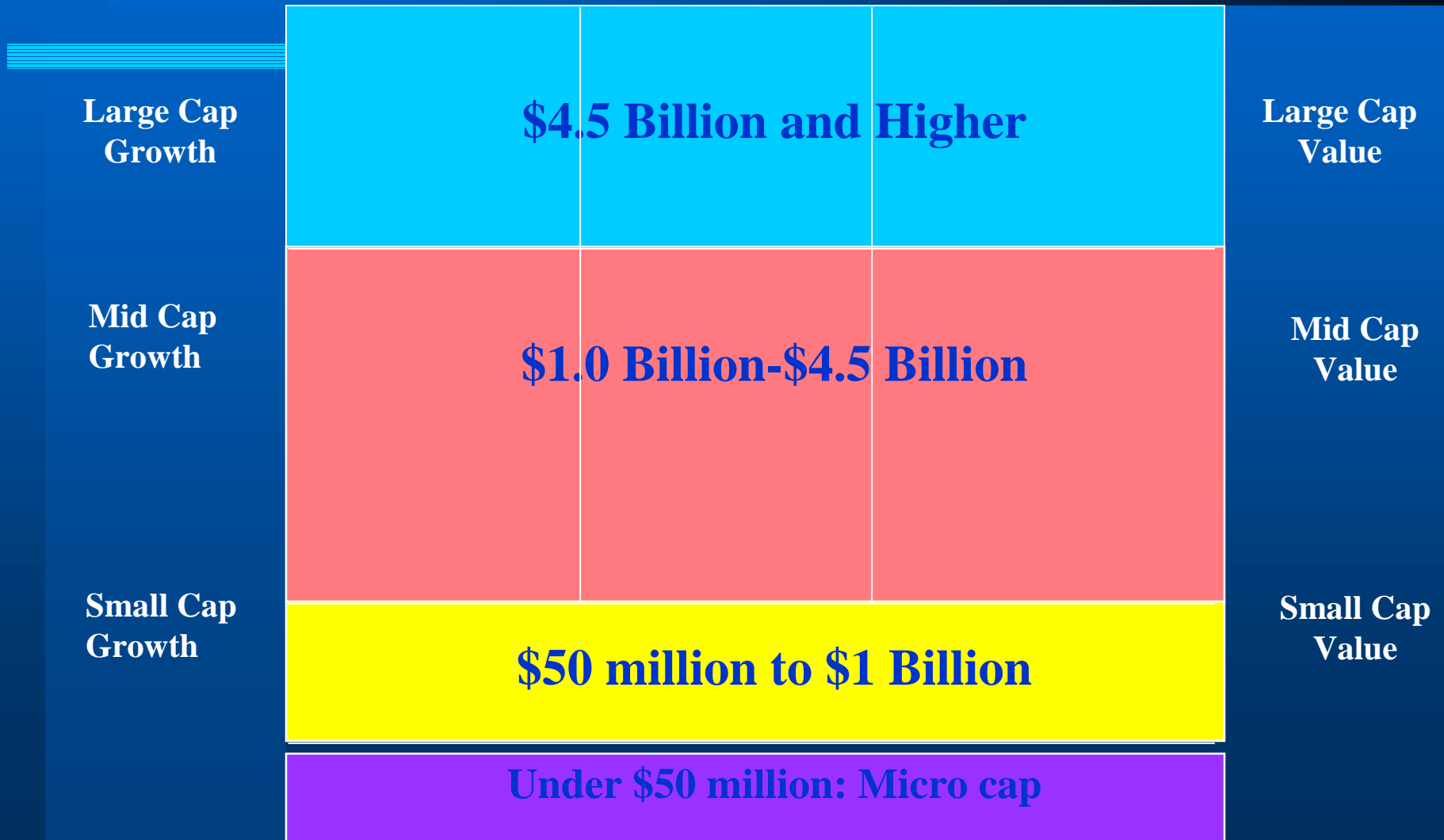
There is risk in both camps...

- Value:
 - Reliance on dividend yields
 - High yields may create vulnerability to interest rate movements
- Growth:
 - Assumed to offer greater long-term rates of return
 - Failure to meet earnings expectations creates variability and price risk.

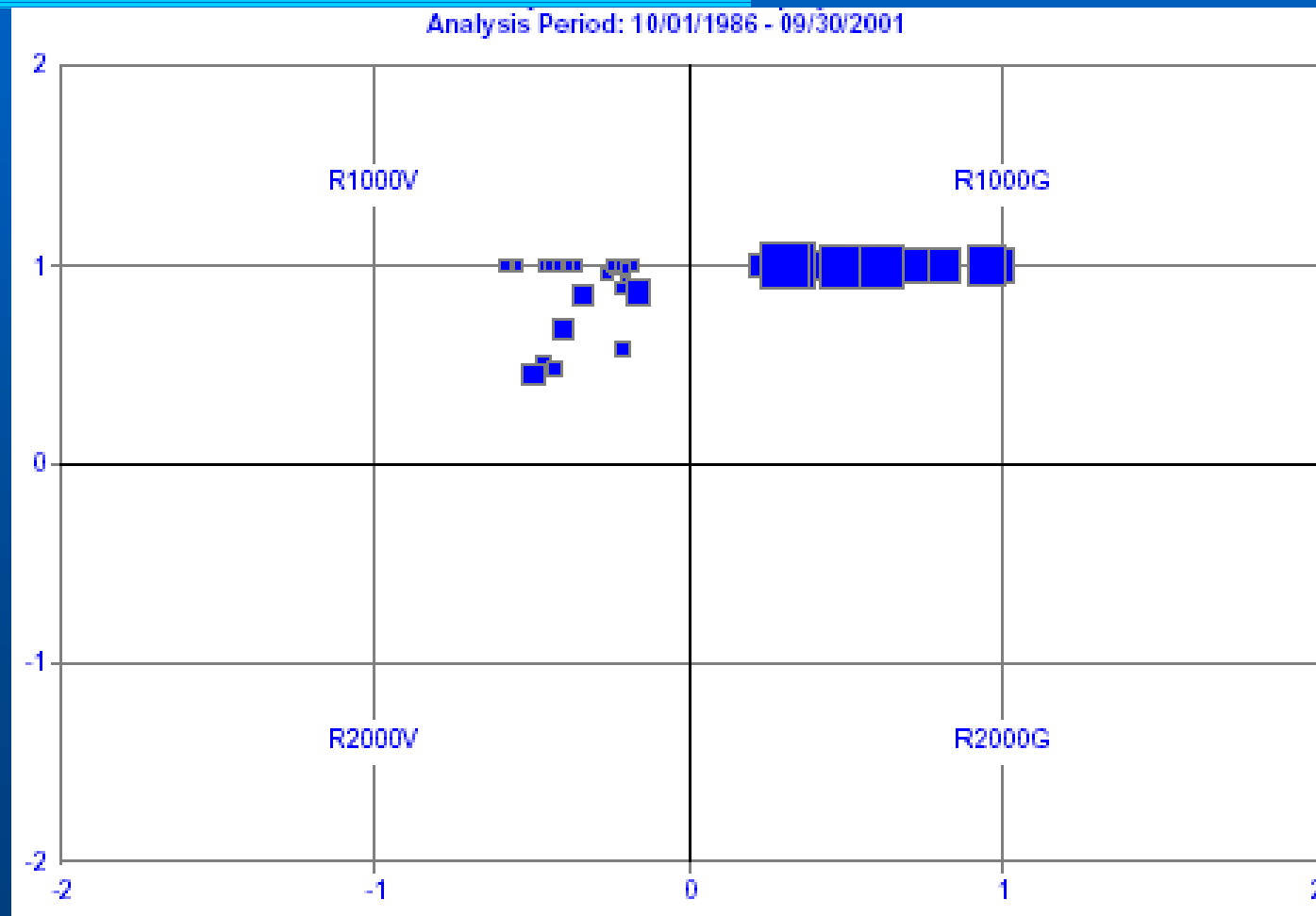
Cyclicality of Value & Growth



The Style Boxes



Style Drift or “Cartesian” Graph



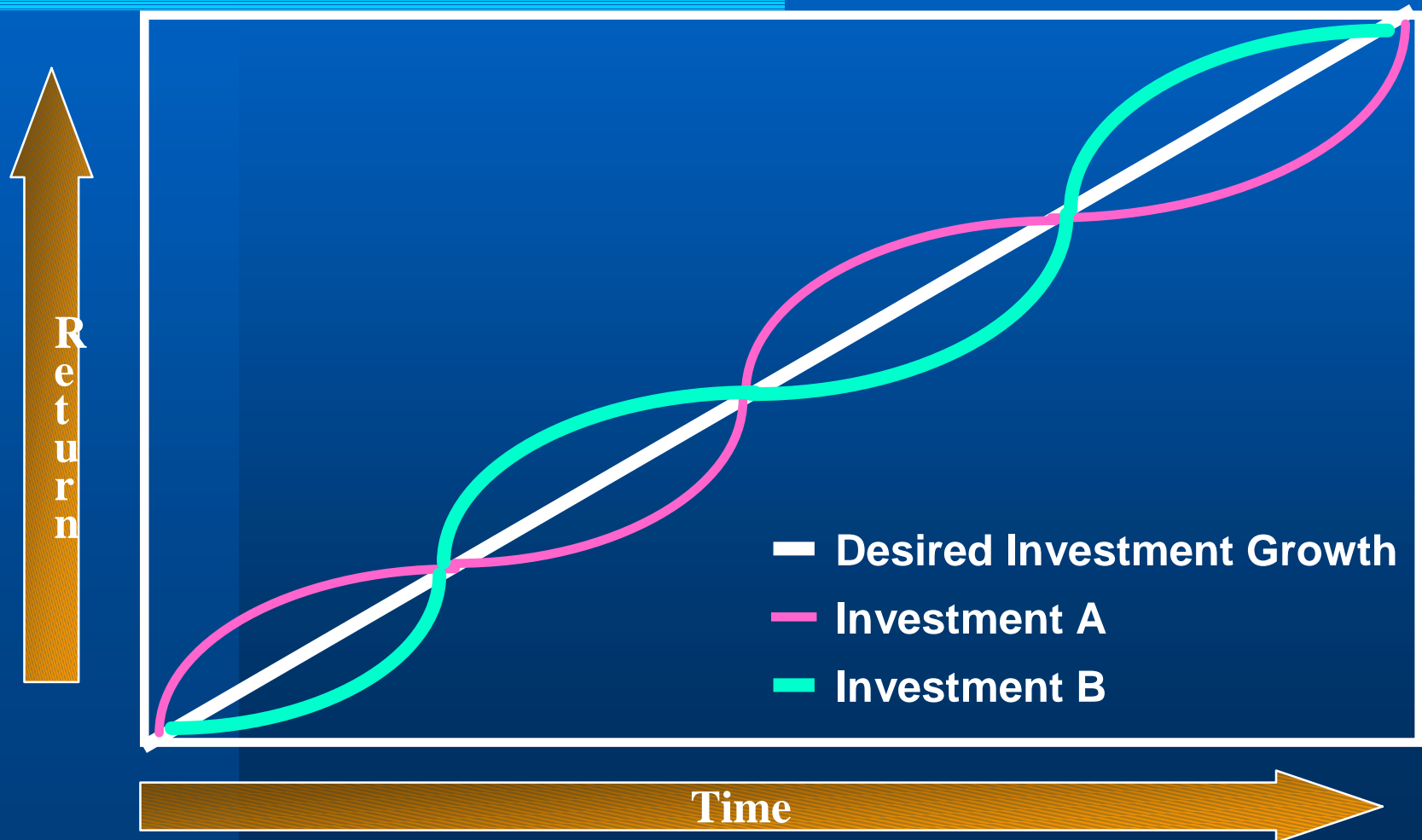
Domestic Bonds

- U.S. Government & agencies
- Municipals
- Corporates
 - Straight corporates
 - Consolidated Mortgage Obligations
 - Asset-backed securities
- Distinctive characteristics
 - Long, intermediate & short maturities/durations
 - Quality

Short-term Investments

- Typically, maturities of 180 days or less.
- Assumed: No risk to principal.
- Likely: No “real” return.

Diversification by Investment Styles: Styles are Cyclical



The Mathematics of Asset Allocation

Portfolio Asset Allocation Analysis

Client's Name: **ABC Fund**

Asset Classes:

Long-term Historical Data

	<u>Rate of Return</u>	<u>Standard Deviation</u>	<u>Current Allocation</u>
Large Cap Domestic Equities	14.04%	15.47%	0.00%
Small Cap Domestic Equities	10.15%	20.85%	0.00%
Long Term Domestic Bonds	8.90%	9.13%	0.00%
Intermediate Domestic Bonds	7.51%	3.70%	50.00%
International Equity	8.06%	18.06%	0.00%
International Bonds	7.24%	8.04%	0.00%
Cash Equivalents	5.50%	0.71%	50.00%
Total Portfolio Using Current Allocation	6.51%	3.06%	100.00%

The Mathematics of Asset Allocation

Asset Correlation Matrix:

	Large Cap Domestic Equities	Small Cap Domestic Equities	Long Term Domestic Bonds	Intermediate Domestic Bonds	International Equity	International Bonds	Cash Equivalents
Large Cap Domestic Equities	1.00	0.82	0.37	0.31	0.44	-0.04	0.09
Small Cap Domestic Equities	0.82	1.00	0.16	0.07	0.34	-0.20	-0.05
Long Term Domestic Bonds	0.37	0.16	1.00	0.91	0.24	0.35	0.06
Intermediate Domestic Bonds	0.31	0.07	0.91	1.00	0.26	0.40	0.10
International Equity	0.44	0.34	0.24	0.26	1.00	0.56	0.01
International Bonds	-0.04	-0.20	0.35	0.40	0.56	1.00	-0.05
Cash Equivalents	0.09	-0.05	0.06	0.10	0.01	-0.05	1.00

Investor's Time Horizons:

5 Years

10 Years

20 Years

Riskless Interest Rate:

3.00%

The Mathematics of Asset Allocation

Constraints:

1. Ranges for Asset Allocations:

	<u>Minimum</u>	<u>Maximum</u>
Large Cap Domestic Equities	10.0%	60.0%
Small Cap Domestic Equities	10.0%	25.0%
Long Term Domestic Bonds	5.0%	20.0%
Intermediate Domestic Bonds	10.0%	20.0%
International Equity	10.0%	20.0%
International Bonds	0.0%	10.0%
Cash Equivalents	0.0%	5.0%
		100%

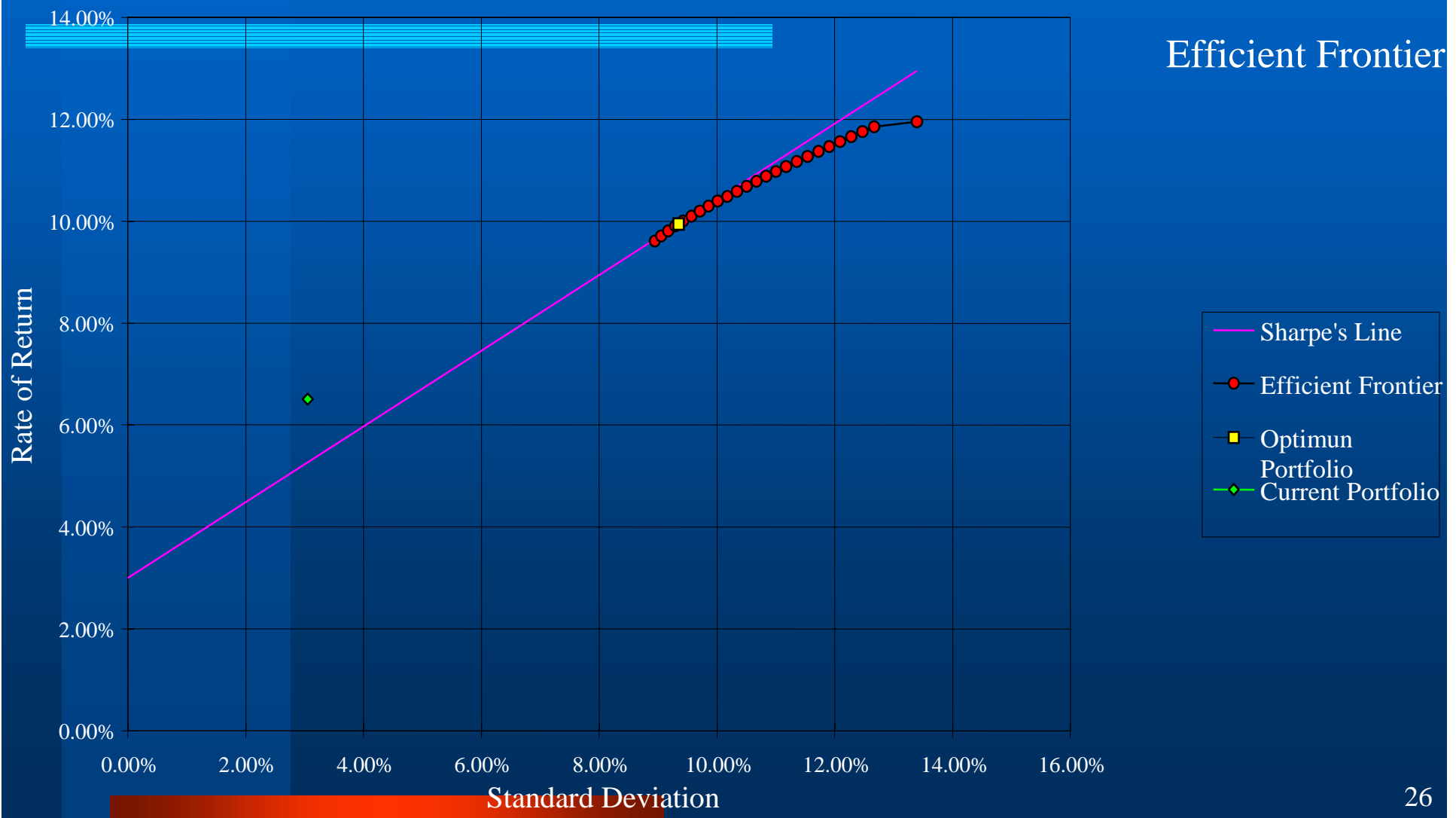
25 Efficient Portfolios:

	Expected Return	Standard Deviation	Sharpe's Measure	Large Cap Domestic Equities	Small Cap Domestic Equities	Long T Domestic Bonds	Intermediate D. Bonds	International Equity	International Bonds	Cash Equivalents
# 1	9.61%	8.95%	0.7391	25.00%	10.00%	20.00%	20.00%	10.00%	10.00%	5.00%
# 2	9.71%	9.05%	0.7410	26.89%	10.00%	18.11%	20.00%	10.00%	10.00%	5.00%
# 3	9.81%	9.17%	0.7422	28.79%	10.00%	16.21%	20.00%	10.00%	10.00%	5.00%
# 4	9.90%	9.30%	0.7427	30.68%	10.00%	14.32%	20.00%	10.00%	10.00%	5.00%
# 5	10.00%	9.43%	0.7427	32.49%	10.00%	12.76%	20.00%	10.00%	9.74%	5.00%
# 6	10.10%	9.57%	0.7421	34.21%	10.00%	11.61%	20.00%	10.00%	9.18%	5.00%
# 7	10.20%	9.71%	0.7411	35.92%	10.00%	10.46%	20.00%	10.00%	8.62%	5.00%
# 8	10.29%	9.86%	0.7398	37.63%	10.00%	9.31%	20.00%	10.00%	8.06%	5.00%
# 9	10.39%	10.01%	0.7380	39.35%	10.00%	8.16%	20.00%	10.00%	7.49%	5.00%
# 10	10.49%	10.17%	0.7360	41.06%	10.00%	7.01%	20.00%	10.00%	6.93%	5.00%
# 11	10.59%	10.34%	0.7337	42.50%	10.00%	6.37%	20.00%	10.00%	6.68%	4.45%
# 12	10.68%	10.51%	0.7313	43.53%	10.00%	6.55%	20.00%	10.00%	6.91%	3.02%
# 13	10.78%	10.67%	0.7291	44.55%	10.00%	6.72%	20.00%	10.00%	7.15%	1.58%
# 14	10.88%	10.84%	0.7269	45.57%	10.00%	6.89%	20.00%	10.00%	7.39%	0.15%
# 15	10.97%	11.01%	0.7246	47.21%	10.00%	5.88%	20.00%	10.00%	6.91%	0.00%
# 16	11.07%	11.18%	0.7222	48.86%	10.00%	5.00%	20.00%	10.00%	6.14%	0.00%
# 17	11.17%	11.36%	0.7195	50.29%	10.00%	5.00%	20.00%	10.00%	4.71%	0.00%
# 18	11.27%	11.54%	0.7165	51.76%	10.00%	5.00%	19.09%	10.00%	4.16%	0.00%
# 19	11.36%	11.72%	0.7136	53.26%	10.00%	5.00%	17.35%	10.00%	4.39%	0.00%
# 20	11.46%	11.91%	0.7106	54.76%	10.00%	5.00%	15.61%	10.00%	4.63%	0.00%
# 21	11.56%	12.09%	0.7077	56.26%	10.00%	5.00%	13.88%	10.00%	4.86%	0.00%
# 22	11.66%	12.28%	0.7048	57.76%	10.00%	5.00%	12.14%	10.00%	5.10%	0.00%
# 23	11.75%	12.47%	0.7020	59.19%	10.00%	5.34%	10.11%	10.00%	5.36%	0.00%
# 24	11.85%	12.67%	0.6988	60.00%	10.00%	7.90%	10.00%	10.00%	2.10%	0.00%
# 25	11.95%	13.39%	0.6681	60.00%	15.00%	5.00%	10.00%	10.00%	0.00%	0.00%

Portfolio with Highest Sharpe Ratio

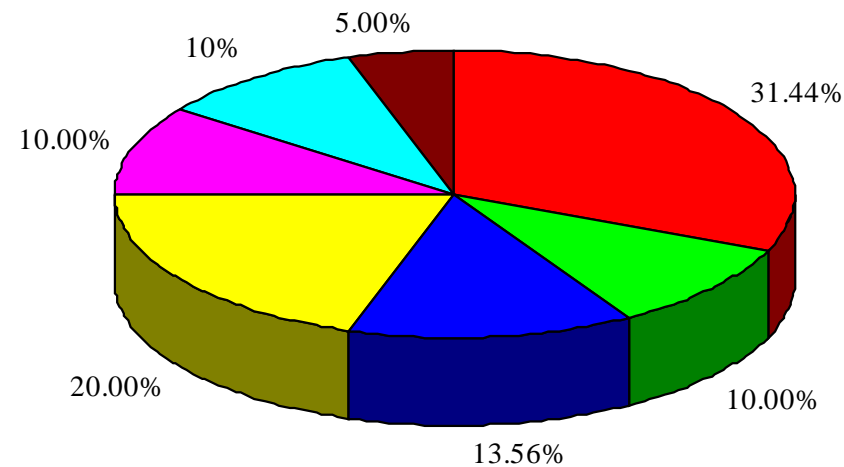
Expected Return	Standard Deviation	Sharpe's Measure	Large Cap Domestic Equities	Small Cap Domestic Equities	Long T Domestic Bonds	Intermediate D. Bonds	International Equity	International Bonds	Cash Equivalents
9.94%	9.35%	0.7428	31.44%	10.00%	13.56%	20.00%	10.00%	10.00%	5.00%

The Mathematics of Asset Allocation



The Mathematics of Asset Allocation

Asset Allocation for Optimun Portfolio



- | | |
|-------------------------------|-------------------------------|
| ■ Large Cap Domestic Equities | ■ Small Cap Domestic Equities |
| ■ Long Term Domestic Bonds | ■ Intermediate Domestic Bonds |
| ■ International Equity | ■ International Bonds |
| ■ Cash Equivalents | |

A More Recent Set of Assumptions

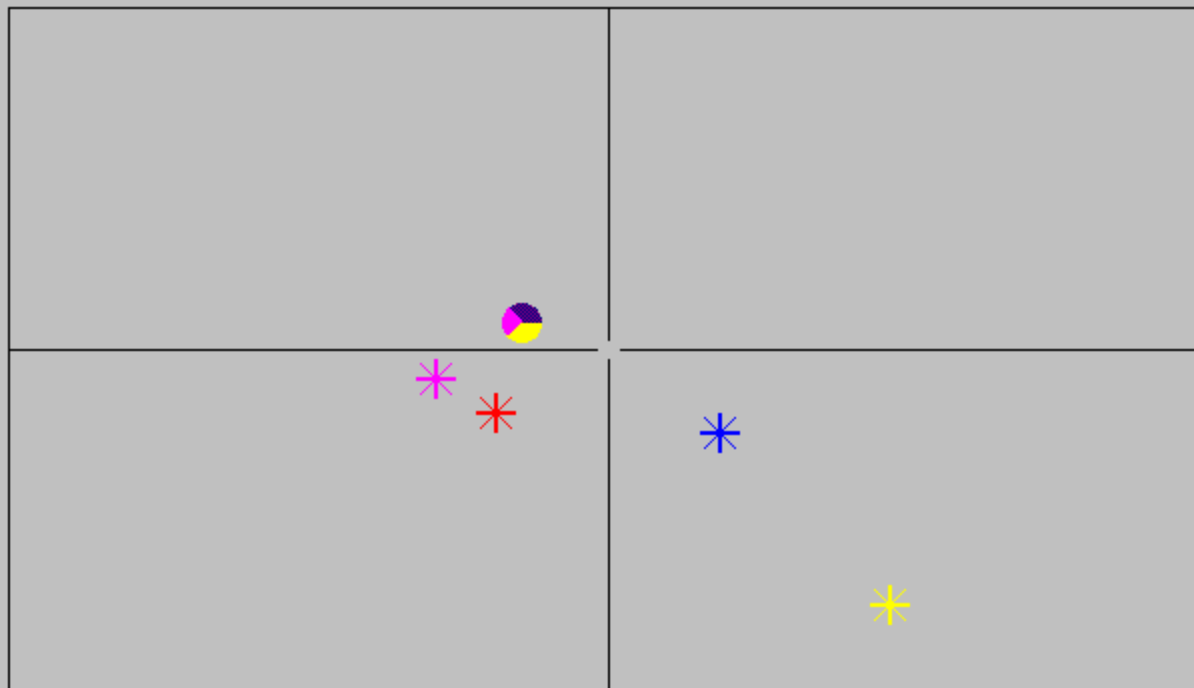
Asset Class	Expected Return	Expected Risk
Equity		
<i>Asset Class</i>		
Core Equity	8.67	22.02
Large Cap Value	9.00	16.88
Large Cap Growth	6.75	19.43
Small Cap Equity	10.04	35.37
International Equity	13.41	18.99
REITS	9.55	15.40
<i>Sector</i>		
Consumer Services	6.16	15.85
Financials	13.52	24.50
Health Care	11.66	21.64
Technology	-2.13	30.27
Utilities/Energy	6.06	13.71
Fixed Income		
Convertibles	7.02	14.14
US High Qlty Bond	5.25	4.56
US High Qlty Tax Free	5.62	9.18
Inflation Linked Treasury - TIPs	5.73	2.84

THE IMPORTANCE OF STYLE DIVERSIFICATION

- * LARGE VALUE
- * FOREIGN STOCKS
- * SMALL GROWTH
- * LARGE GROWTH
- * SMALL VALUE
- DIVERSIFIED MIX

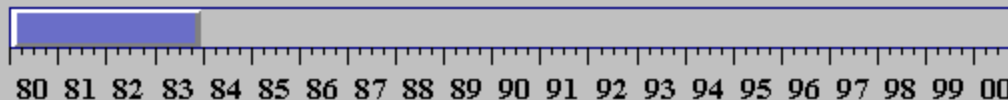
HIGH
RETURN

LOW
RETURN



LOW RISK

HIGH RISK



Rolling 3-year periods

- Run >
- Step >
- Stop
- Run <
- Step <
- Reset

Rebalancing: Staying with the Program!

- Asset classes do not move in tandem
- Markets move you away from your desired asset allocation and style diversification
- Rebalancing brings the portfolio back in line with original plan.

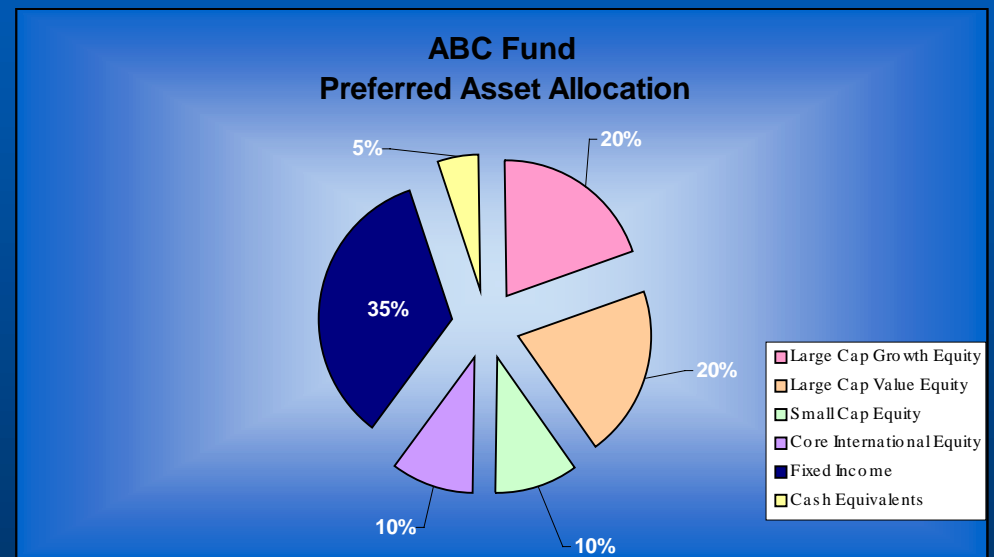
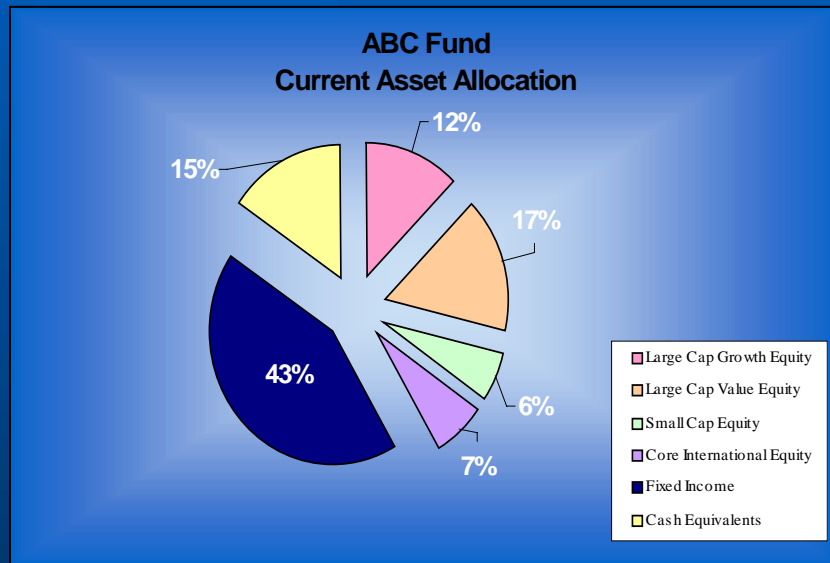
Challenges of Rebalancing

- Counter-intuitive:
 - *“Buy low/sell high...”*
 - *“What goes up must come down...”*
 - *“There’s never a free lunch...”*
- It’s easier said than done...

A Rebalancing Exercise

<i>Asset Class</i>	<i>\$ Current</i>	<i>% Current</i>	<i>% Preferred</i>	<i>\$ Preferred</i>	<i>Rebalance</i>
Large Cap Value	\$ 25,998,435	14%	20%	\$ 36,419,514	\$ 10,421,079
Large Cap Growth	\$ 34,364,725	19%	20%	\$ 36,419,514	\$ 2,054,789
Small Cap	\$ 11,619,846	6%	10%	\$ 18,209,757	\$ 6,589,911
International	\$ 14,695,448	8%	10%	\$ 18,209,757	\$ 3,514,309
Fixed Income	\$ 89,208,948	49%	35%	\$ 63,734,149	\$ (25,474,799)
Cash & Equivalents	\$ 32,208,601	18%	5%	\$ 9,104,878	\$ (23,103,723)
Total	\$ 182,097,568	100%	100%	\$ 182,097,568	\$ -

A Rebalancing Exercise



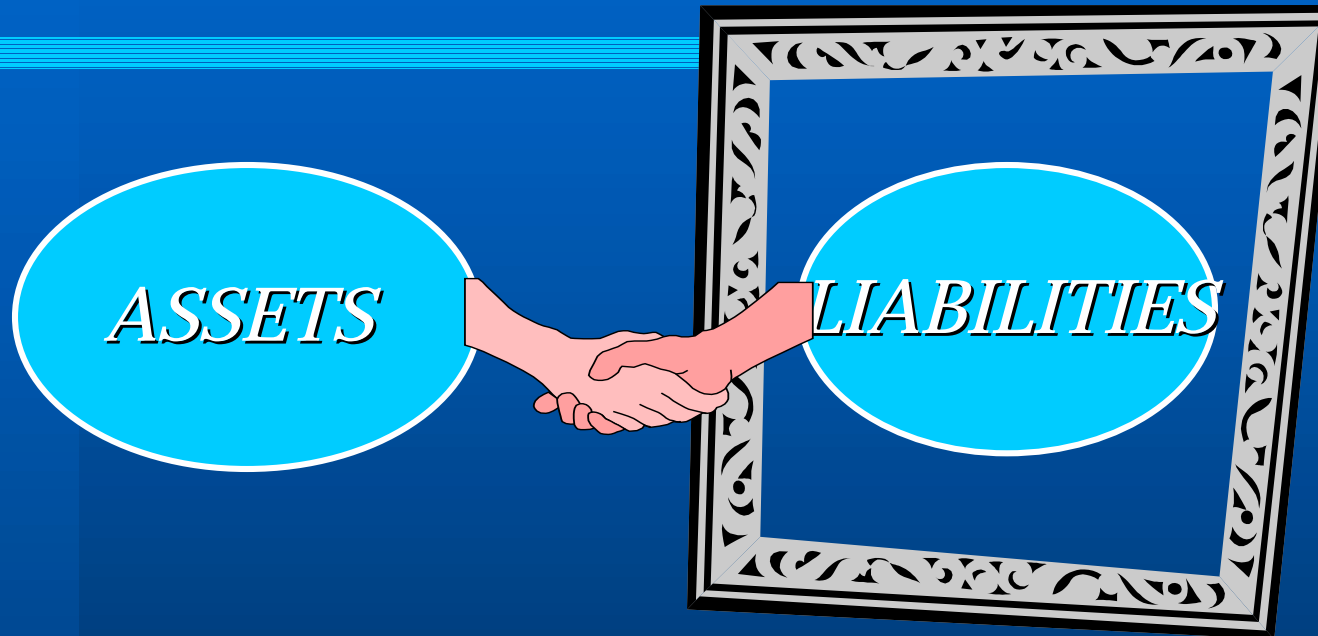
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Addendum

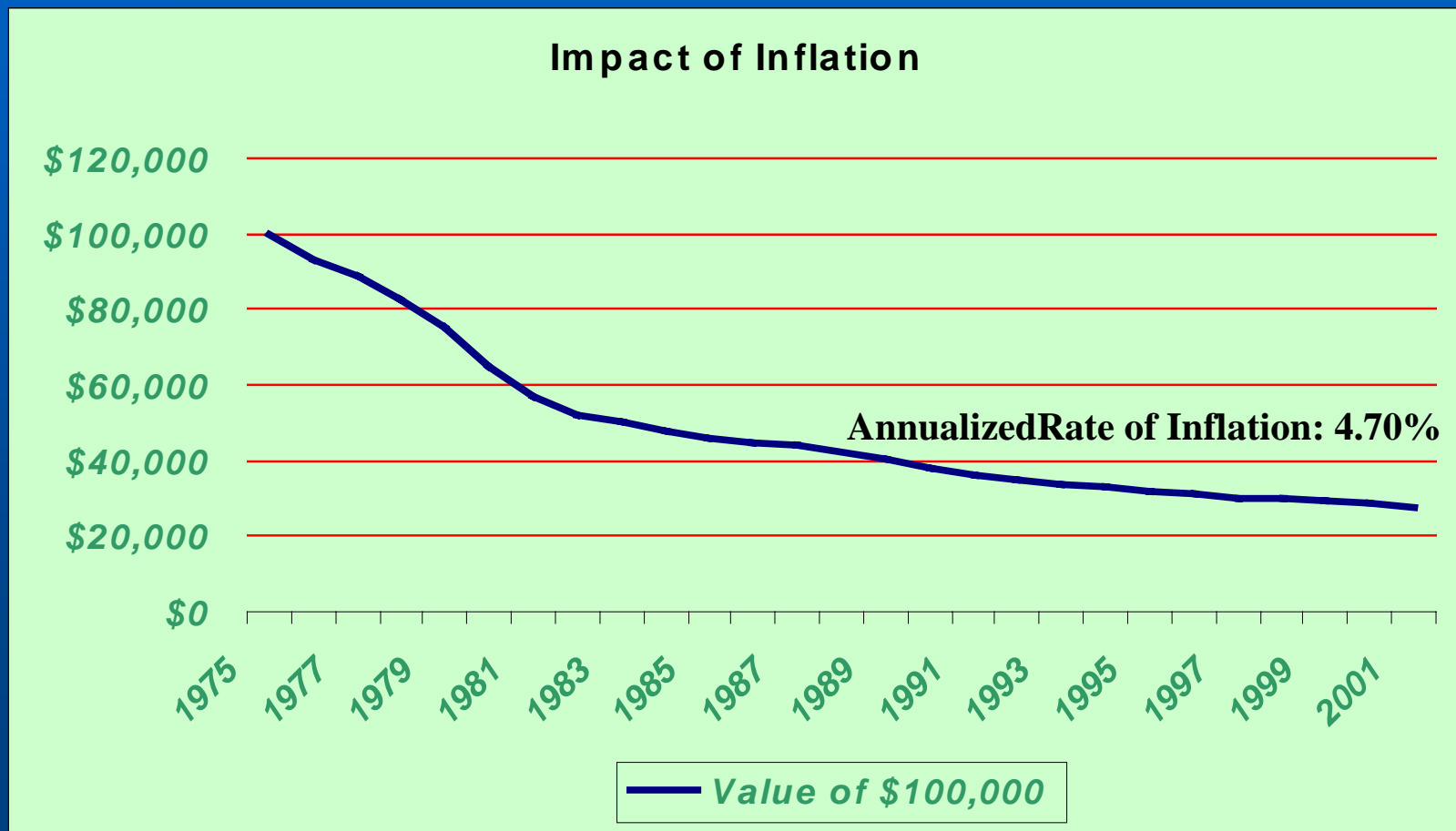
A fund's liabilities should dictate the shape of its assets...



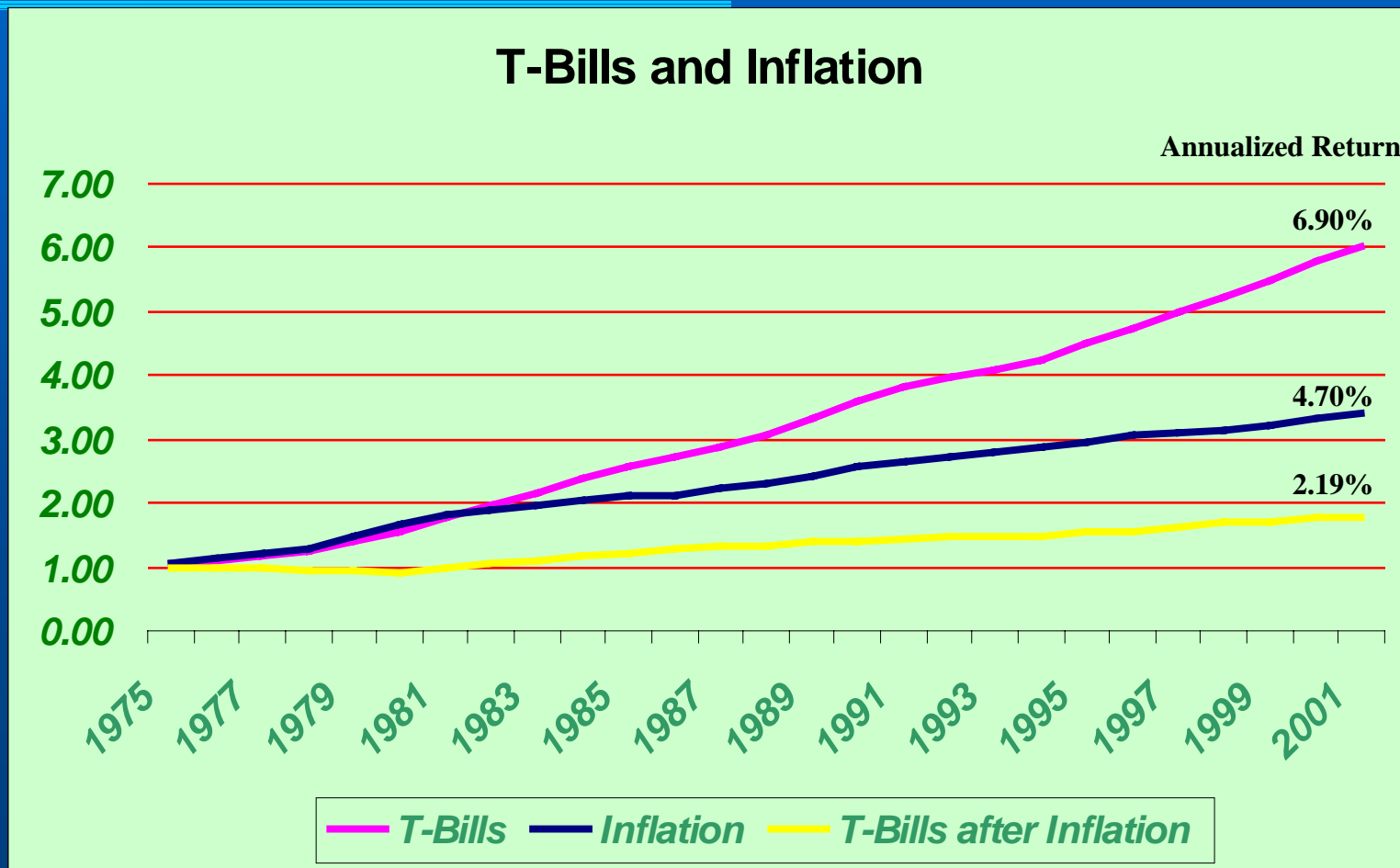
Investment Policy

***Spending Policy, or
Benefits Schedule, or
Claims, or
Retirement Cash Flows...***

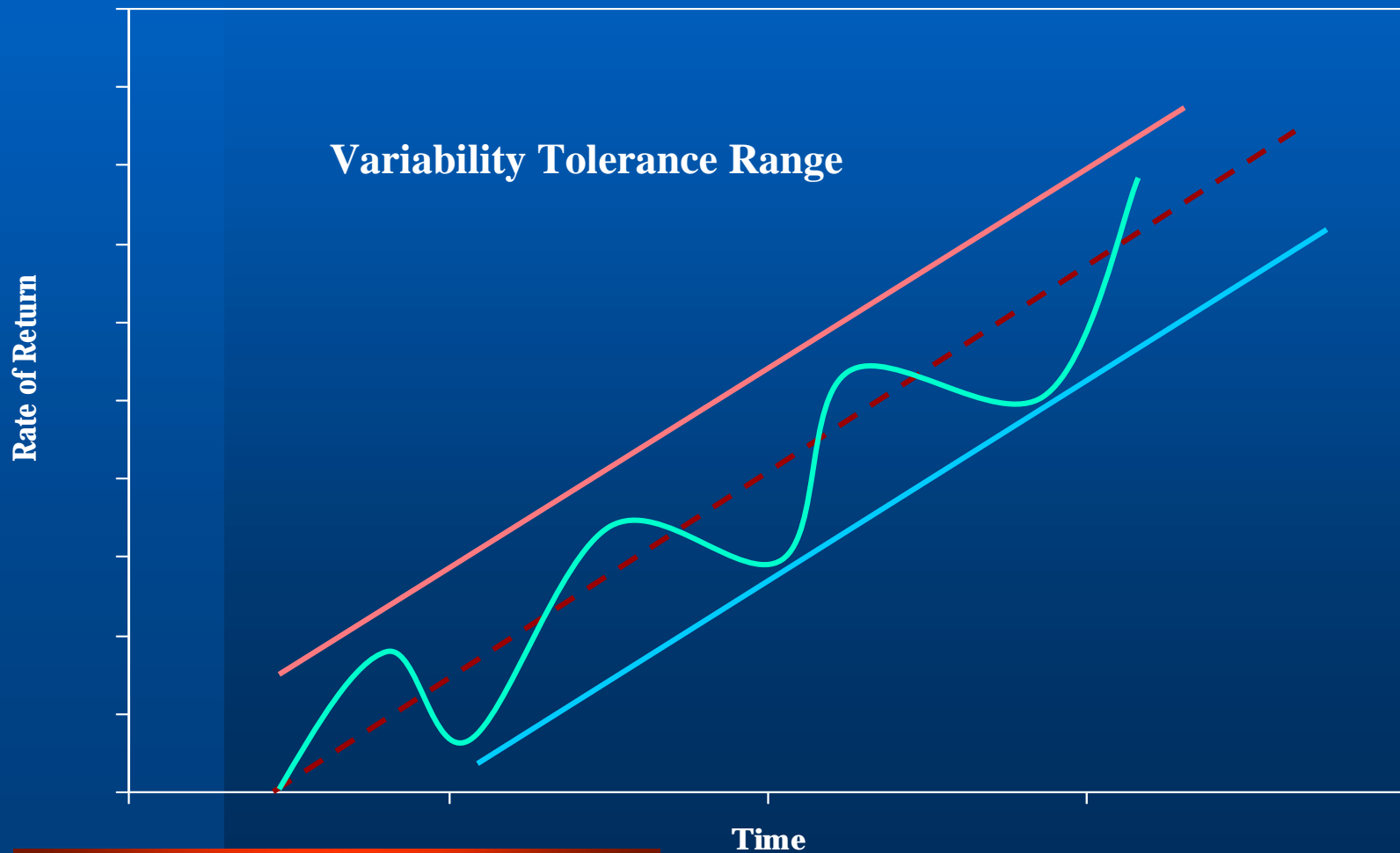
The Effect of Inflation on Purchasing Power



Treasury Bills: “Risk Free” Investing?



Identifying Tolerance for Variability



Styles can be further refined!

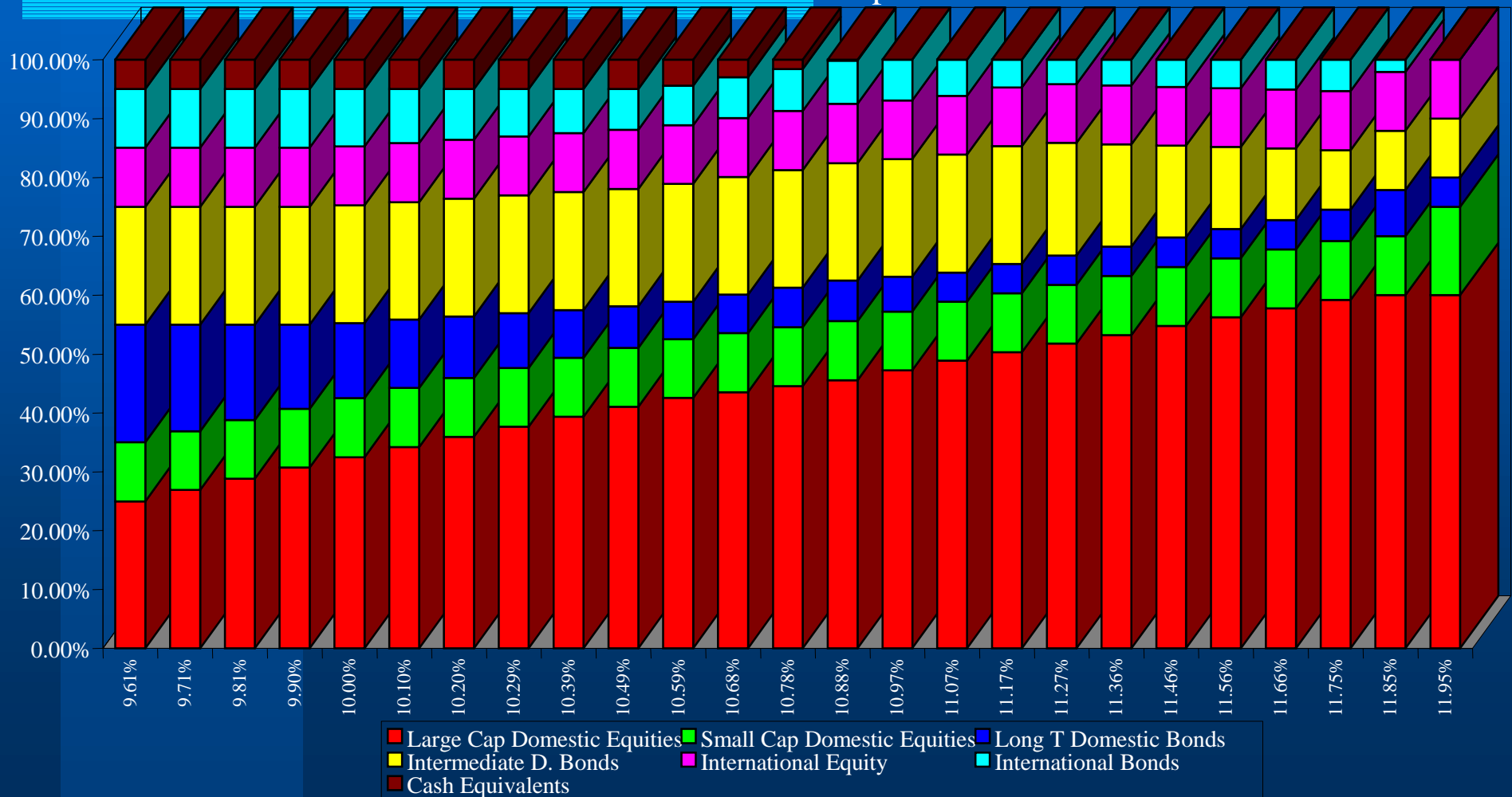
- Example: Value “subs”
 - yield strategy
 - interest-sensitive yield
 - contrarian
 - distressed

Price Volatility and Duration

- Same maturity, different coupon, changes price volatility profile of a bond.
- Duration: average time until payment
 - shorter for bond that pays high interest
 - higher for bond with no interest payment: zero coupon.
- Duration: Percent gain/loss experienced by the bond for each 1% of interest rate movement.
- Duration has a significant impact on portfolio volatility and performance.

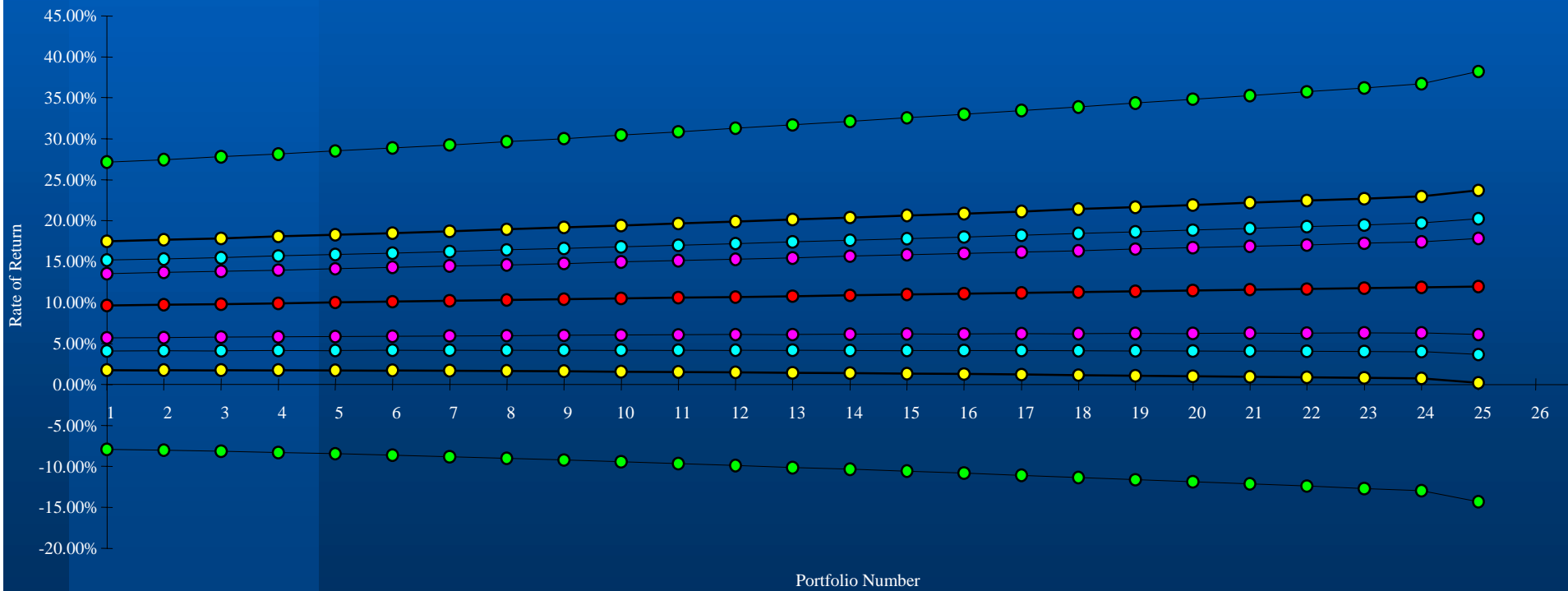
The Mathematics of Asset Allocation

Asset Allocation vs. Expected Return



The Mathematics of Asset Allocation

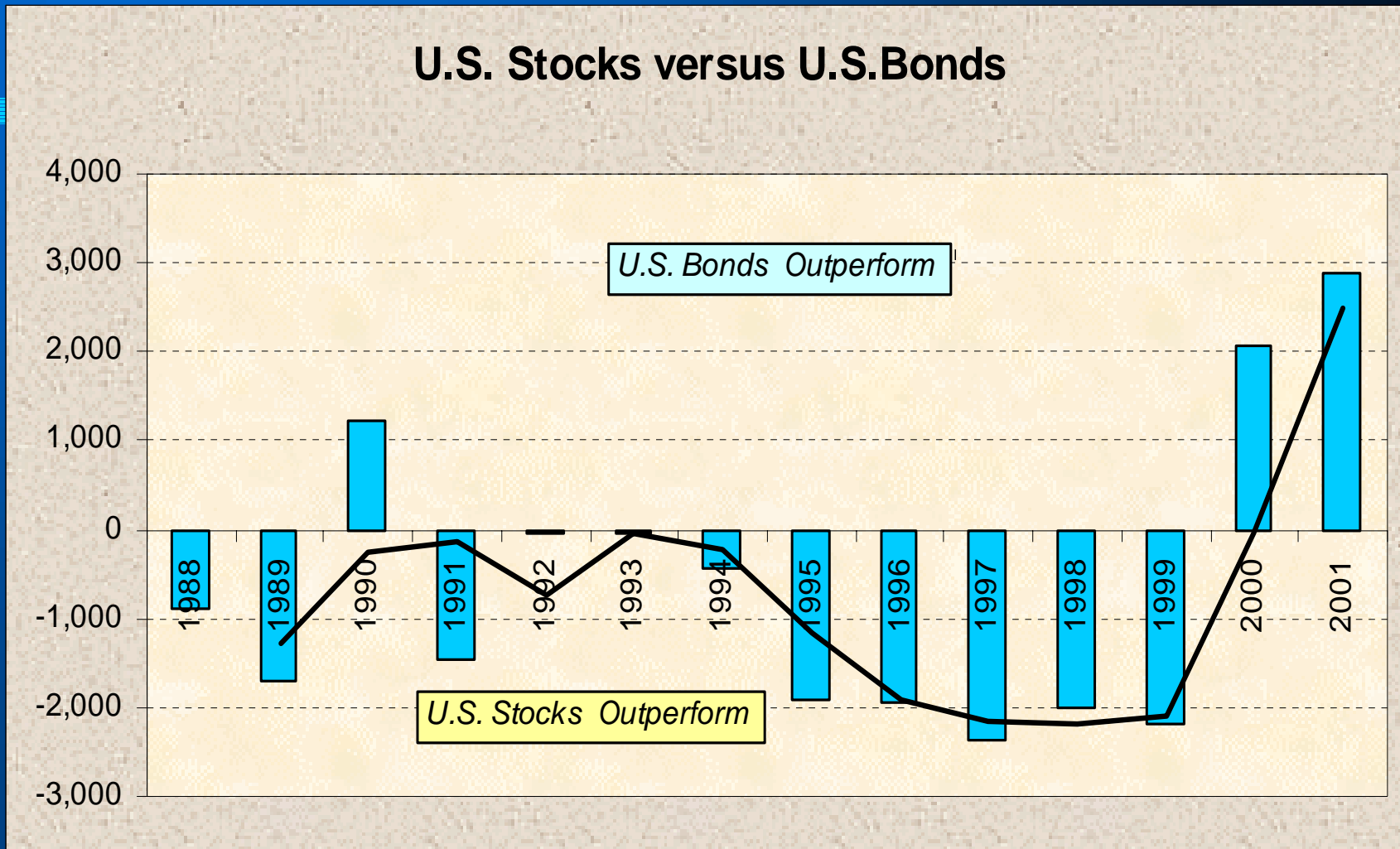
Best-Worst Case Scenarios for Time Horizons (95% Confidence Level)



● Expected
 ● Best Case
 ● Worst Case
 ● Best Case 1
 ● Worst Case 1
 ● Best Case 2
 ● Worst Case 2
 ● Best Case 3
 ● Worst Case 3

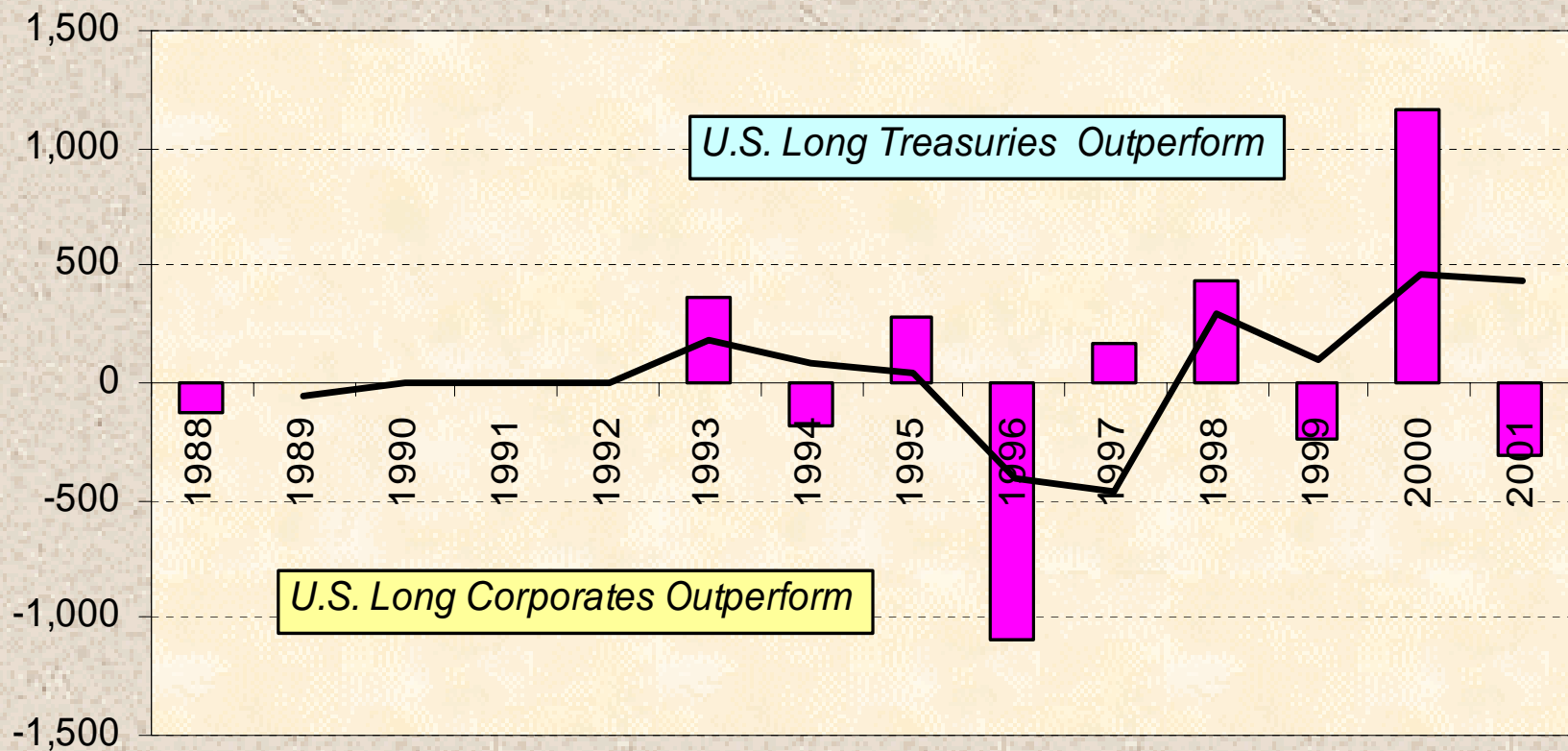
Style Cyclicality

U.S. Stocks versus U.S. Bonds



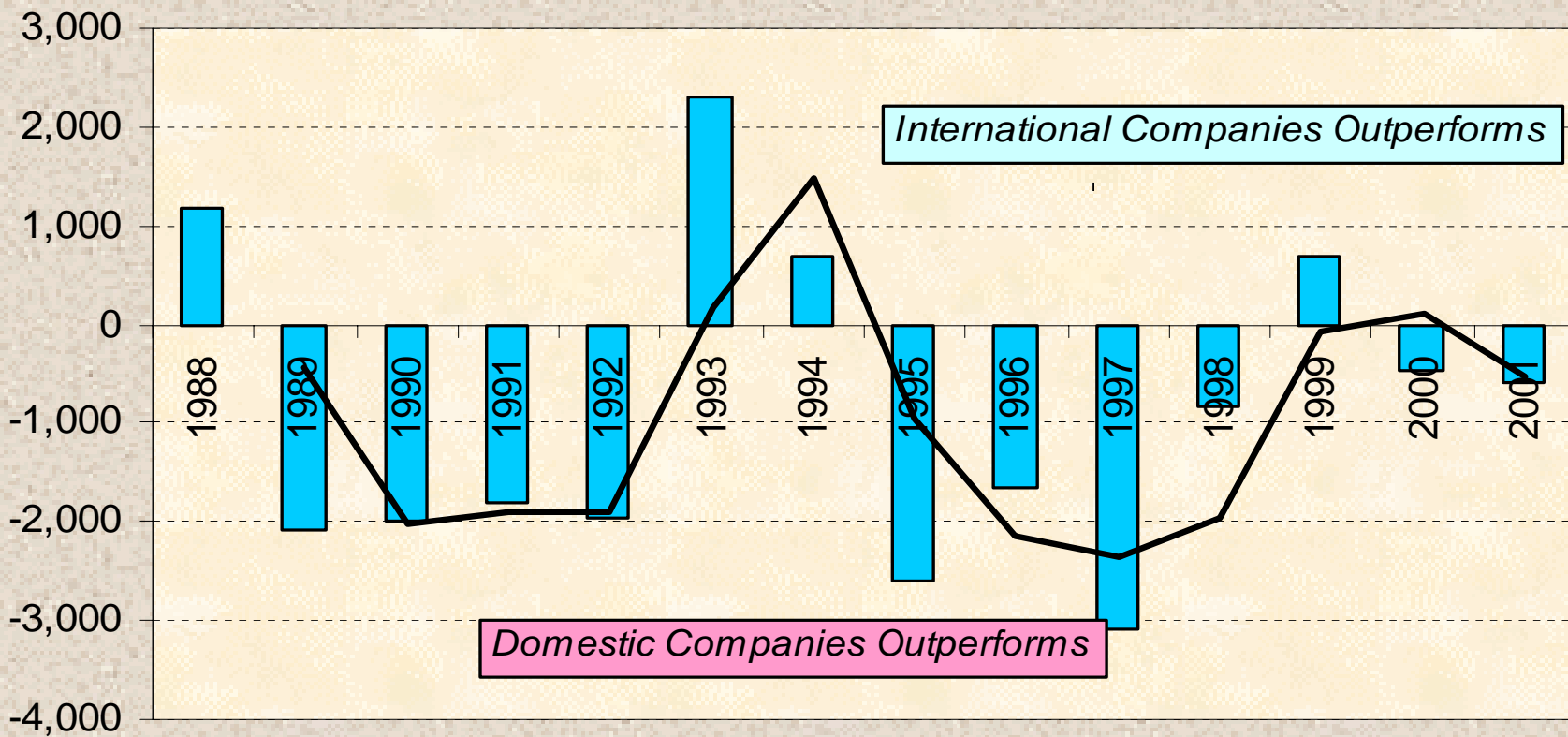
Style Cyclicality

U.S. Treasuries versus Corporates



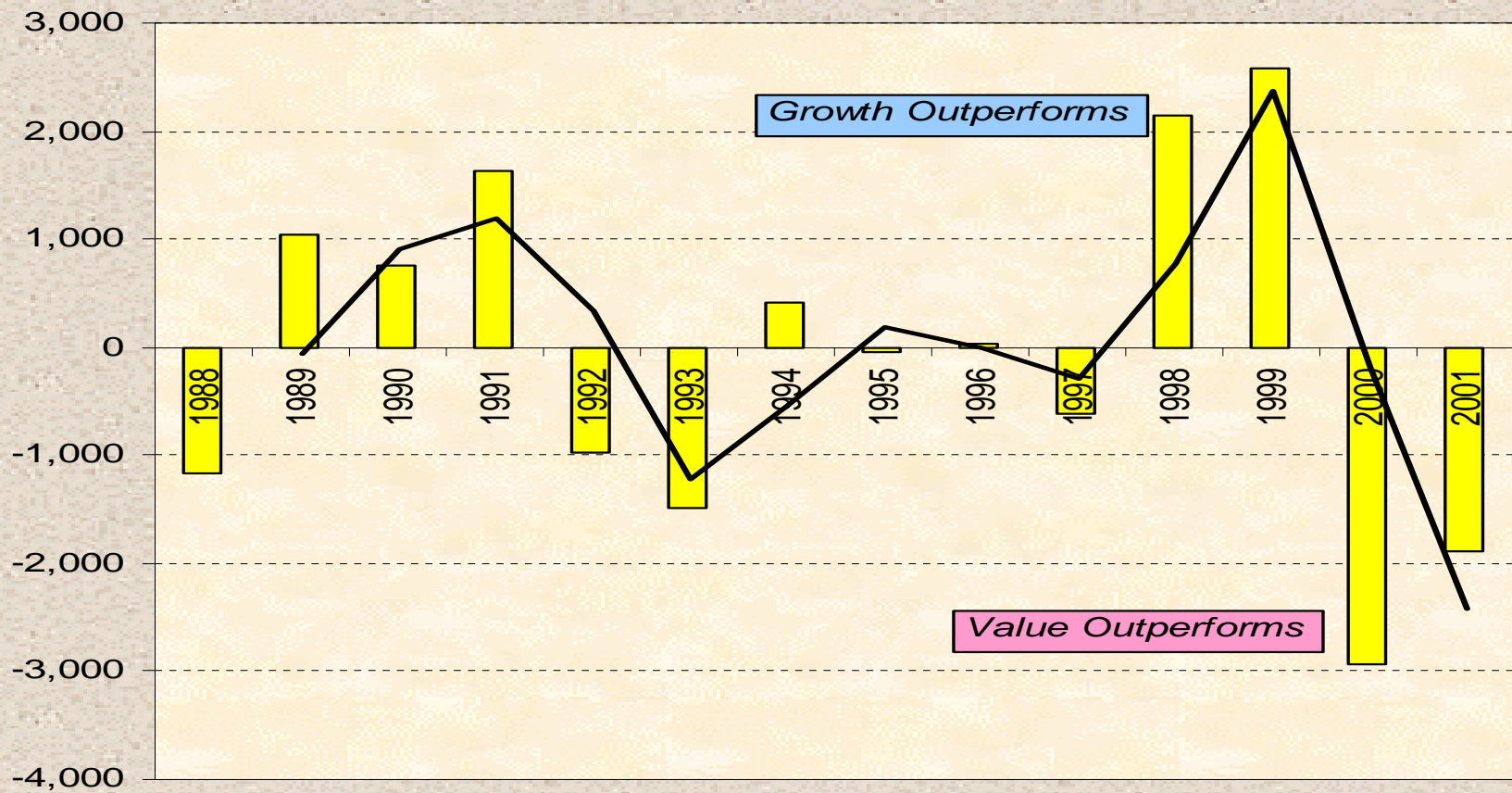
Style Cyclicality

Domestic versus International Companies



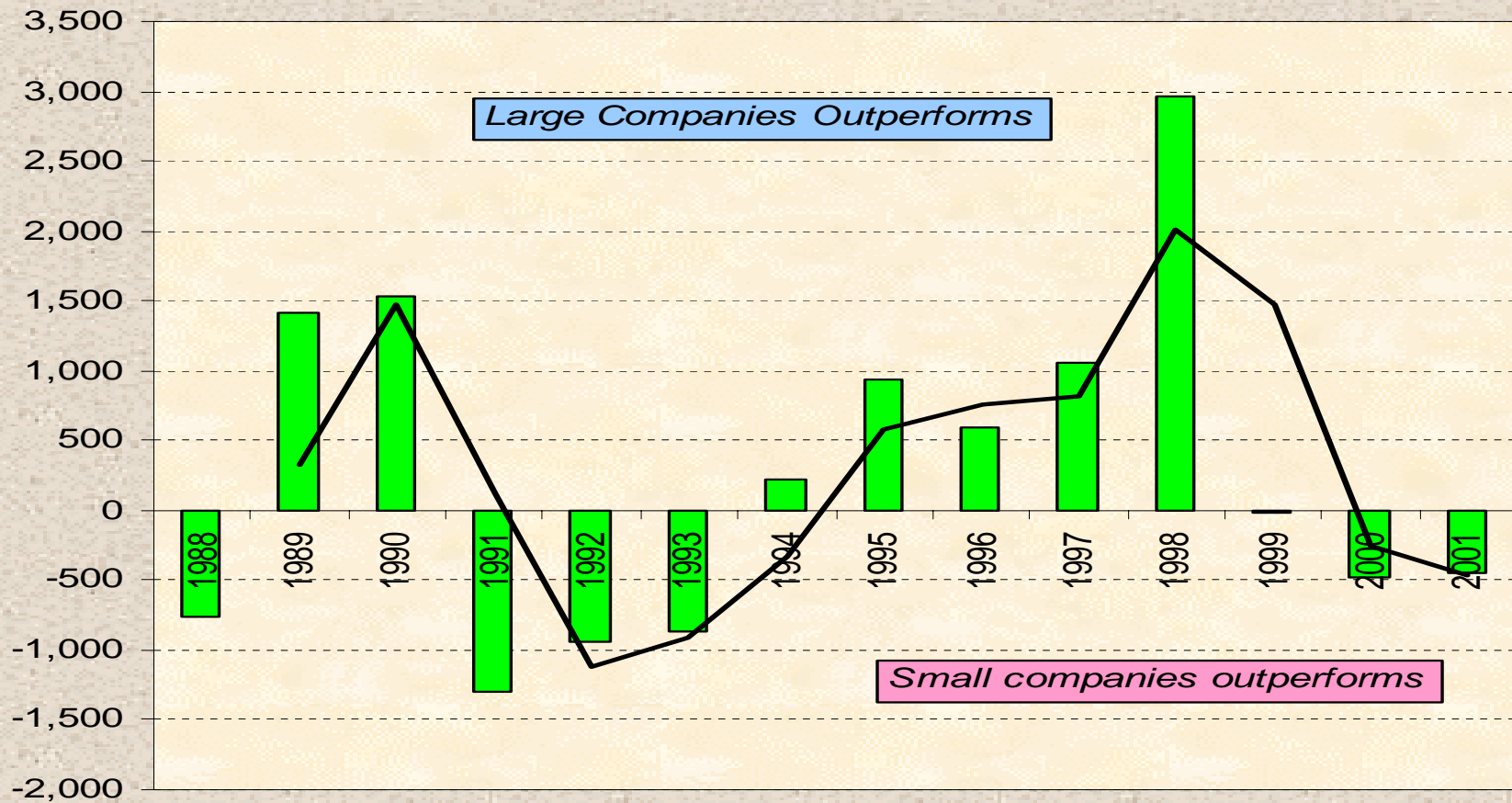
Style Cyclicality

Value versus Growth Companies



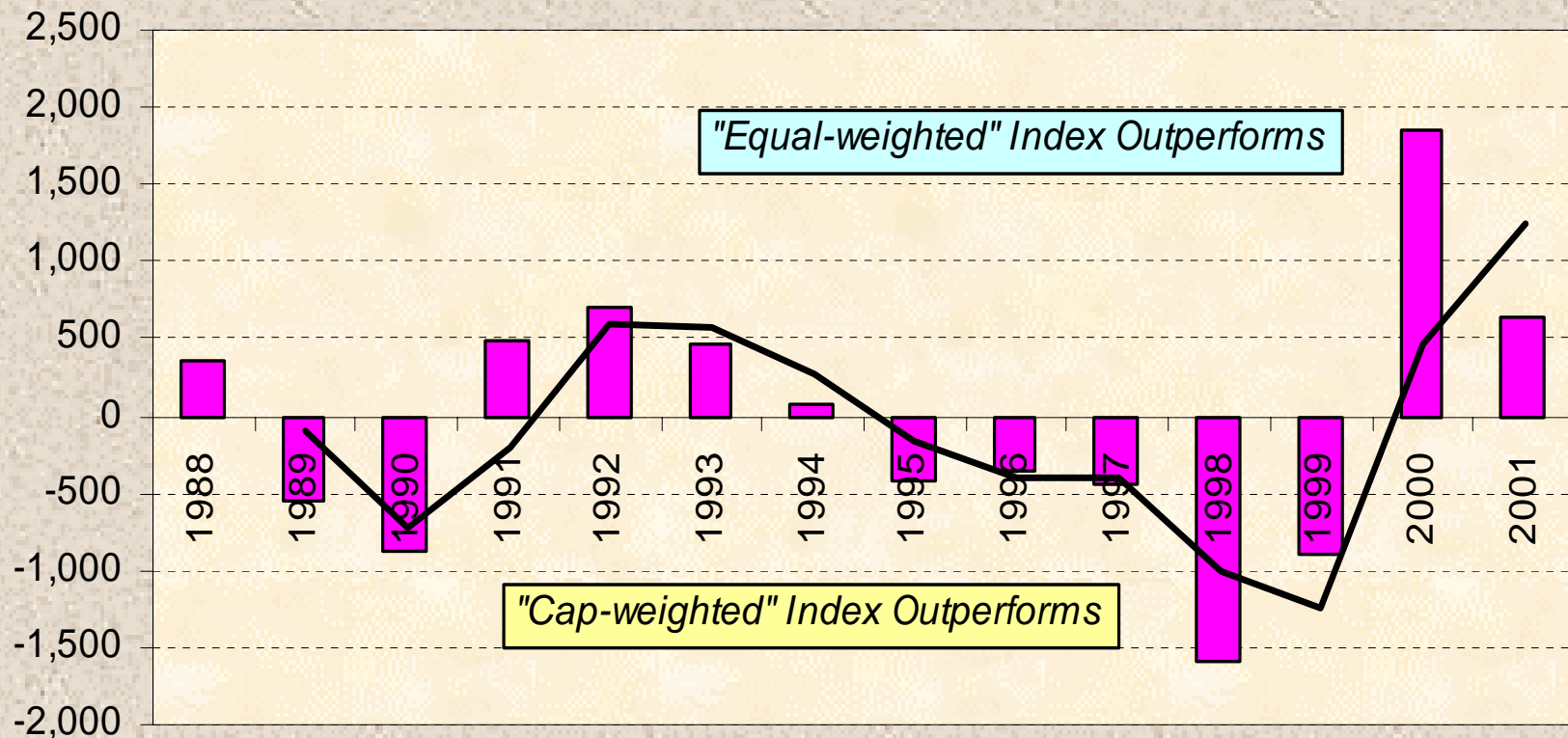
Style Cyclicality

Large versus Small Companies



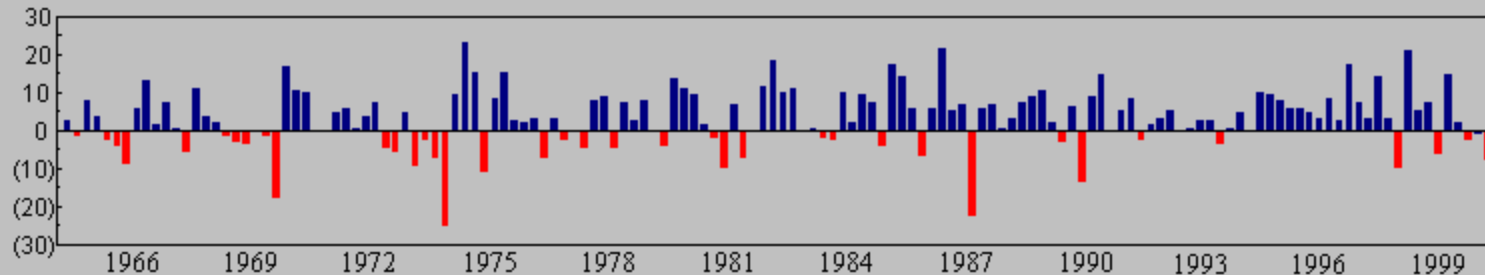
Style Cyclicality

S&P 500: Equal versus Cap Weighted



IN THE LONG RUN STOCKS DO BETTER

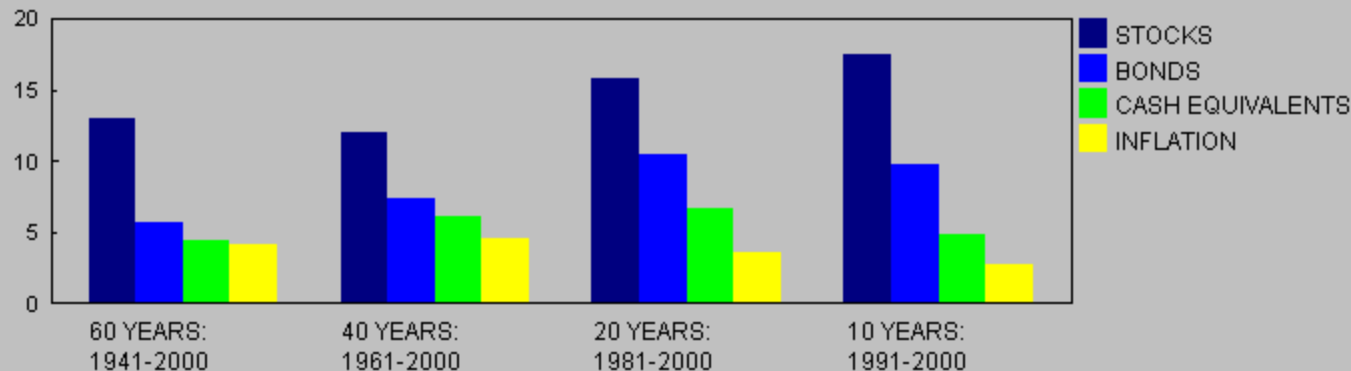
QUARTERLY RATE OF RETURN ON THE S&P 500 INDEX (%)



12/65-9/66 -15.1%	12/68-6/70 -26.2%	12/72-9/74 -42.7%	12/76-3/78 -11.9%	3/81-6/82 -13.5%	6/83-6/84 -4.7%	9/87-12/87 -22.5%	6/90-9/90 -13.7%	6/98-9/98 -9.9%	3/00-12/00 -11.2%
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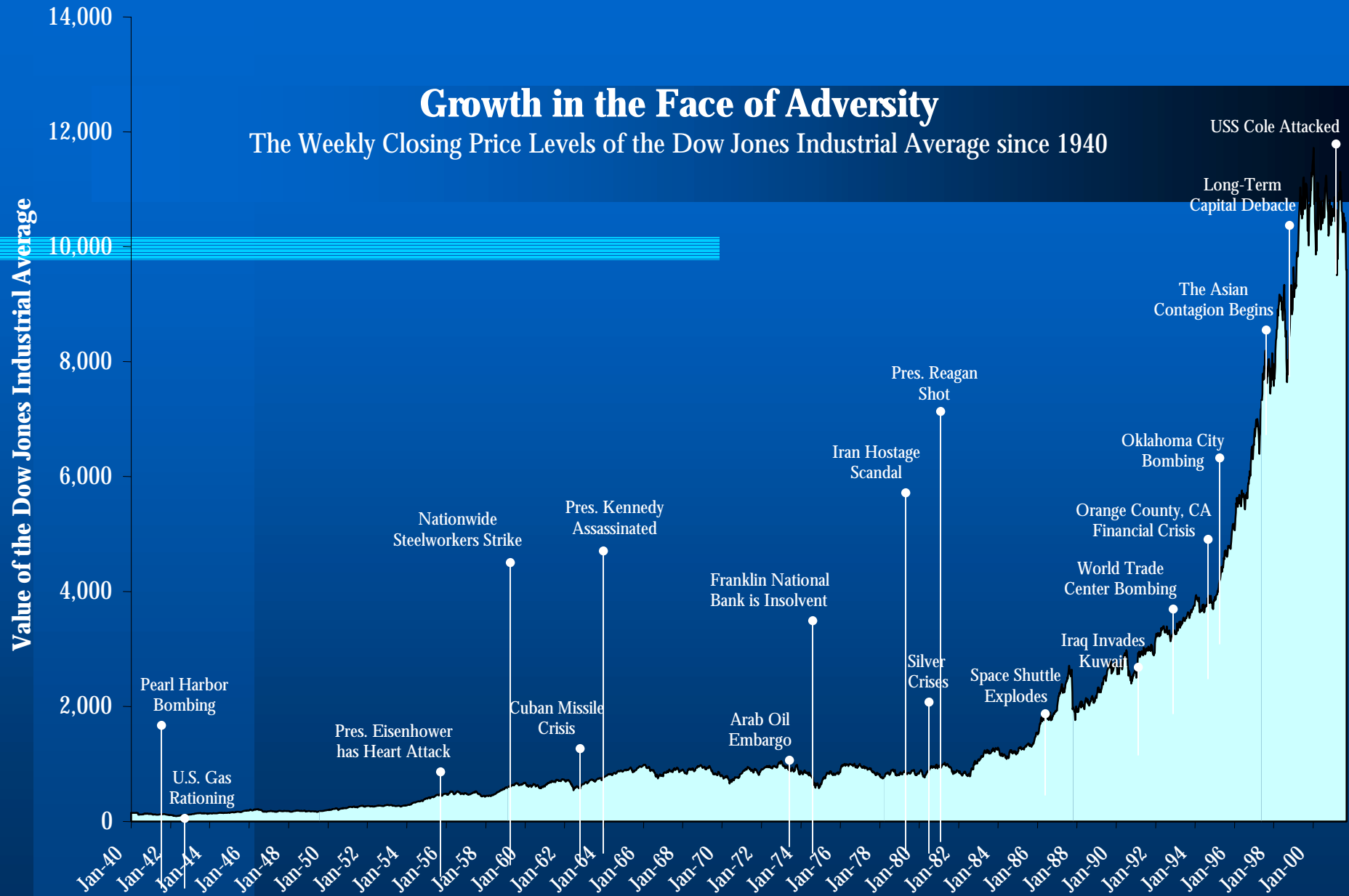
While the above chart of down market cycles since the 1960s shows that investors must be prepared for occasional, possibly deep down markets, the graph below shows that stocks outperform other investments over the long run.

ANNUALIZED RATE OF RETURN (%)



Growth in the Face of Adversity

The Weekly Closing Price Levels of the Dow Jones Industrial Average since 1940



This chart is for illustrative purposes only and may not be indicative of future performance. Source: Yahoo