



Modernizing Portfolio Theory & The Liquid Endowment UMA

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Modern Portfolio Theory

Definition and Key Concept

Modern Portfolio Theory (MPT)

“A theory of finance which attempts to maximize portfolio expected return for a given amount of portfolio risk, or equivalently minimize risk for a given level of expected return, by carefully choosing the proportions of various assets.”

Correlations between assets are key

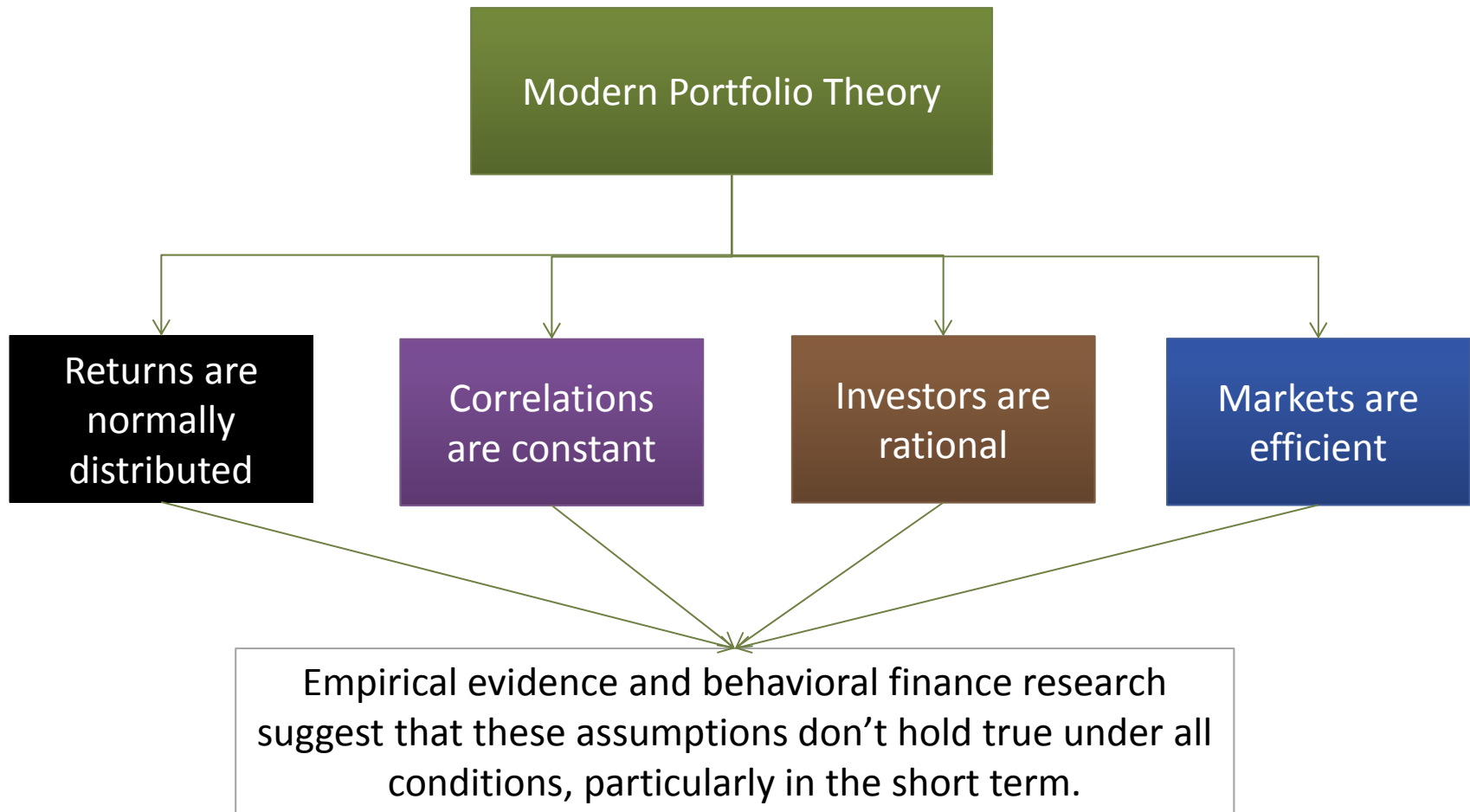
“The fundamental concept behind MPT is that the assets in an investment portfolio should not be selected individually, each on their own merits. Rather, it is important to consider how each asset changes in price relative to how every other asset in the portfolio changes in price.”

Source: www.wikipedia.org

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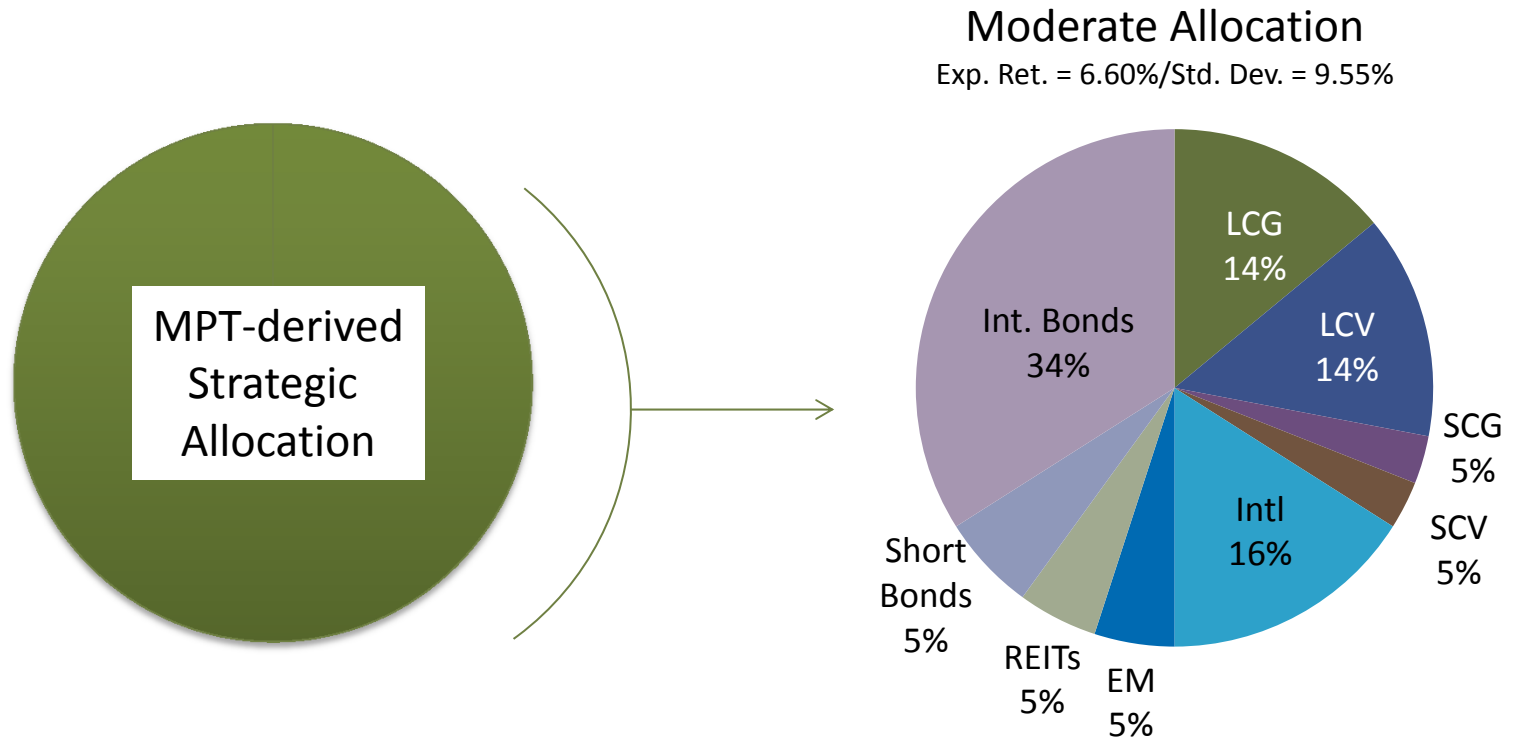
Modern Portfolio Theory

Key Assumptions



MPT in Practice

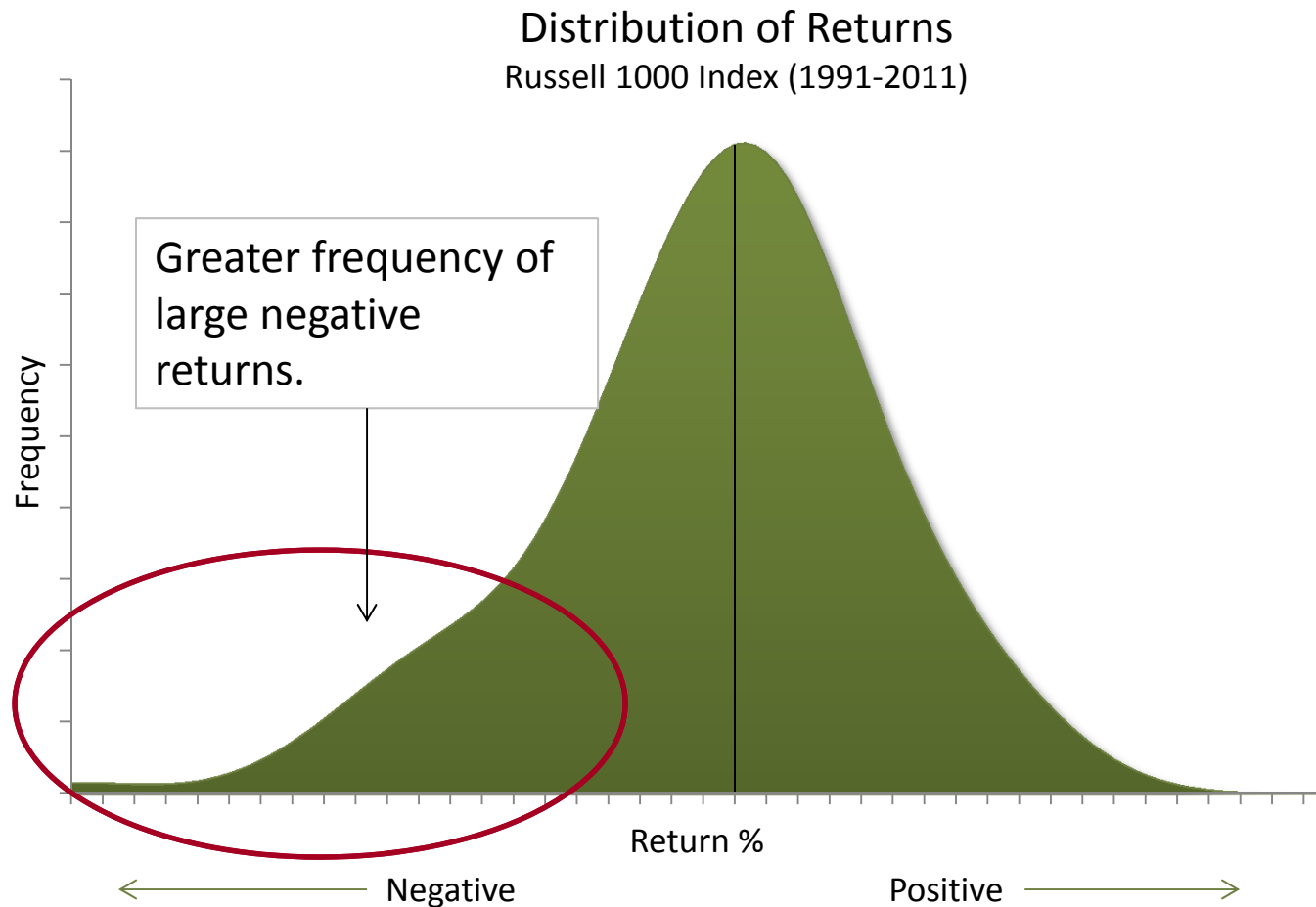
Strategic Allocations Comprised of Traditional Asset Classes are Derived using MPT



Source: PMC Suggested Asset Allocations, 2012

MPT and Return Distributions

In Reality, Returns Exhibit “Fat Left Tails,” and are Not Normally Distributed



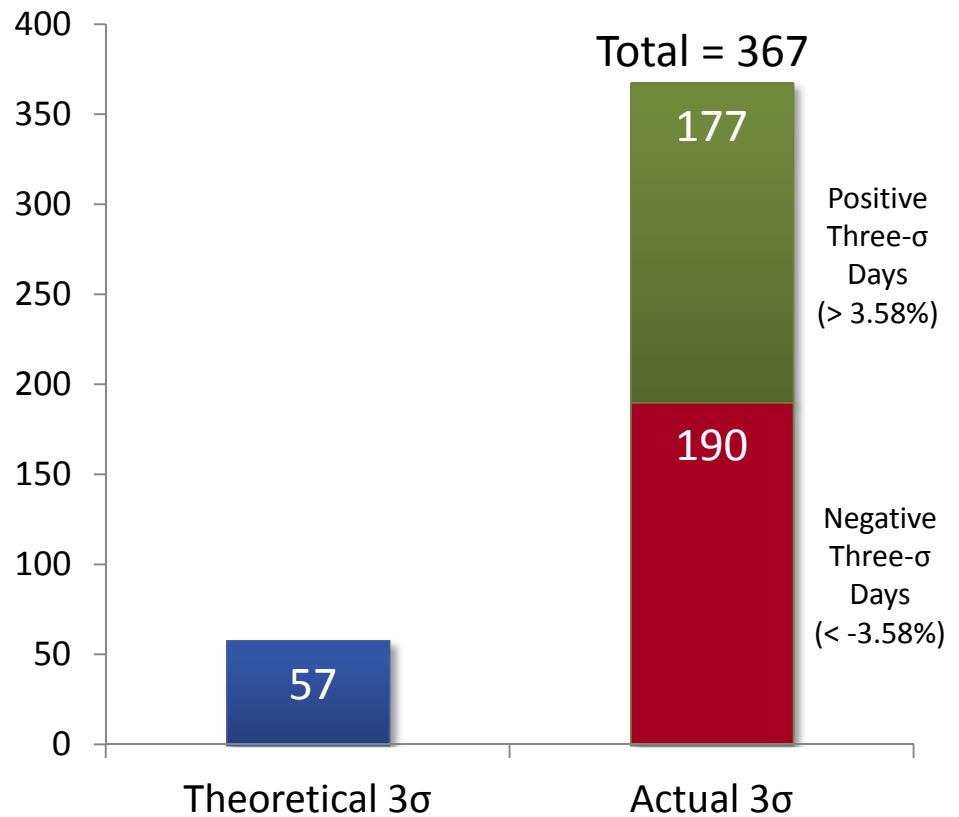
MPT and Three- σ Events

“Black Swan” Days Occur More Frequently than a Normal Distribution Would Suggest

S&P 500: 1/1/26-8/31/12	
Trading Days	21,265
Avg. Daily Return	0.028%
Std. Dev. (σ)	1.19%
Three- σ	3.58%
Theoretical # of Three- σ Days (= 0.27% of days)	57
Actual Negative Three- σ Days	190
Actual Positive Three- σ Days	177
Total Actual Three- σ Days	367

Theoretical and Actual Number of Days Exceeding Three Standard Deviations

S&P 500: 1/1/26 – 8/31/12



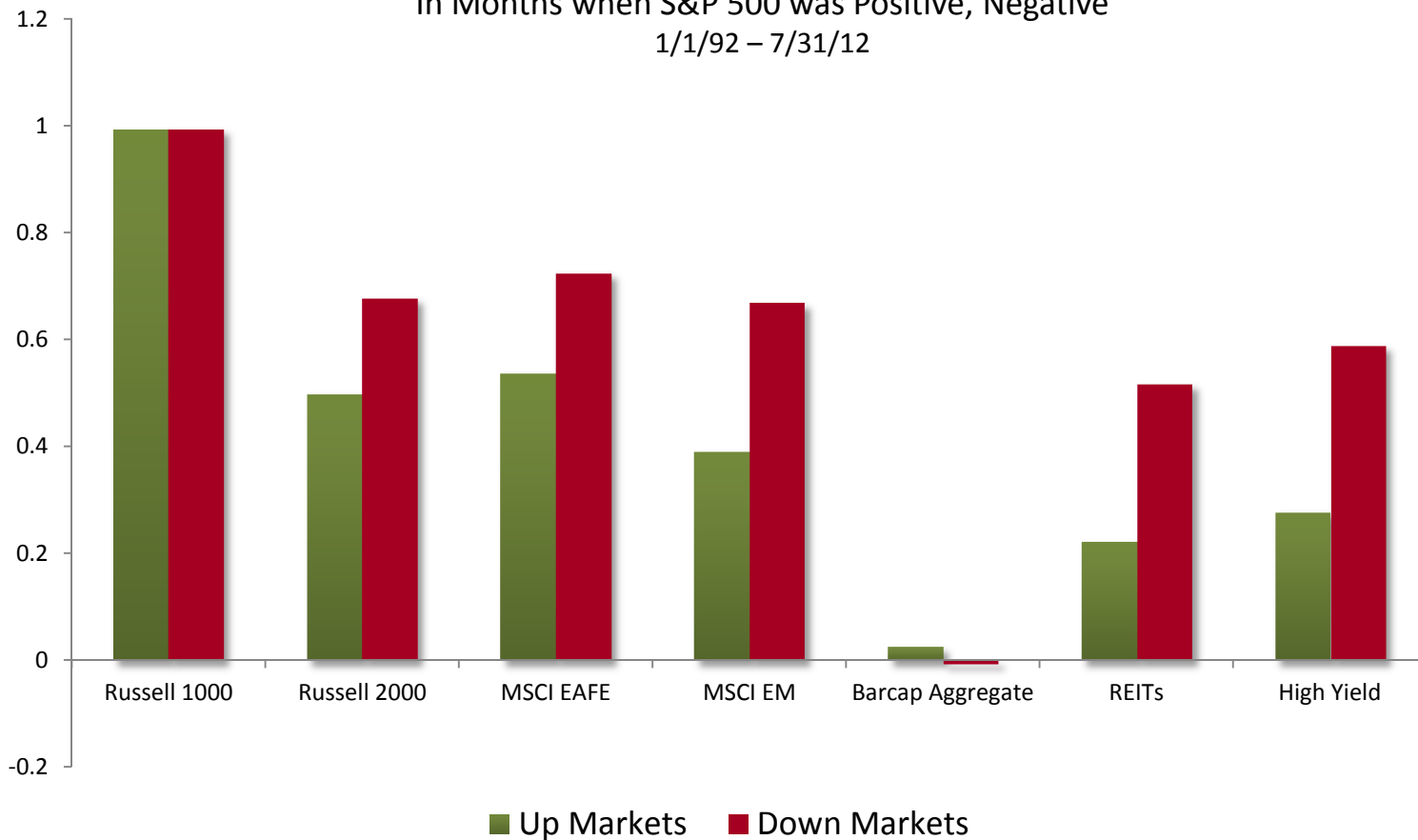
Sources: Bloomberg, PMC

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MPT and Correlations

Correlations with Equities Tend to Rise When the Market Declines

Asset Class Correlations with S&P 500
In Months when S&P 500 was Positive, Negative
1/1/92 – 7/31/12



Sources: Zephyr Associates, PMC

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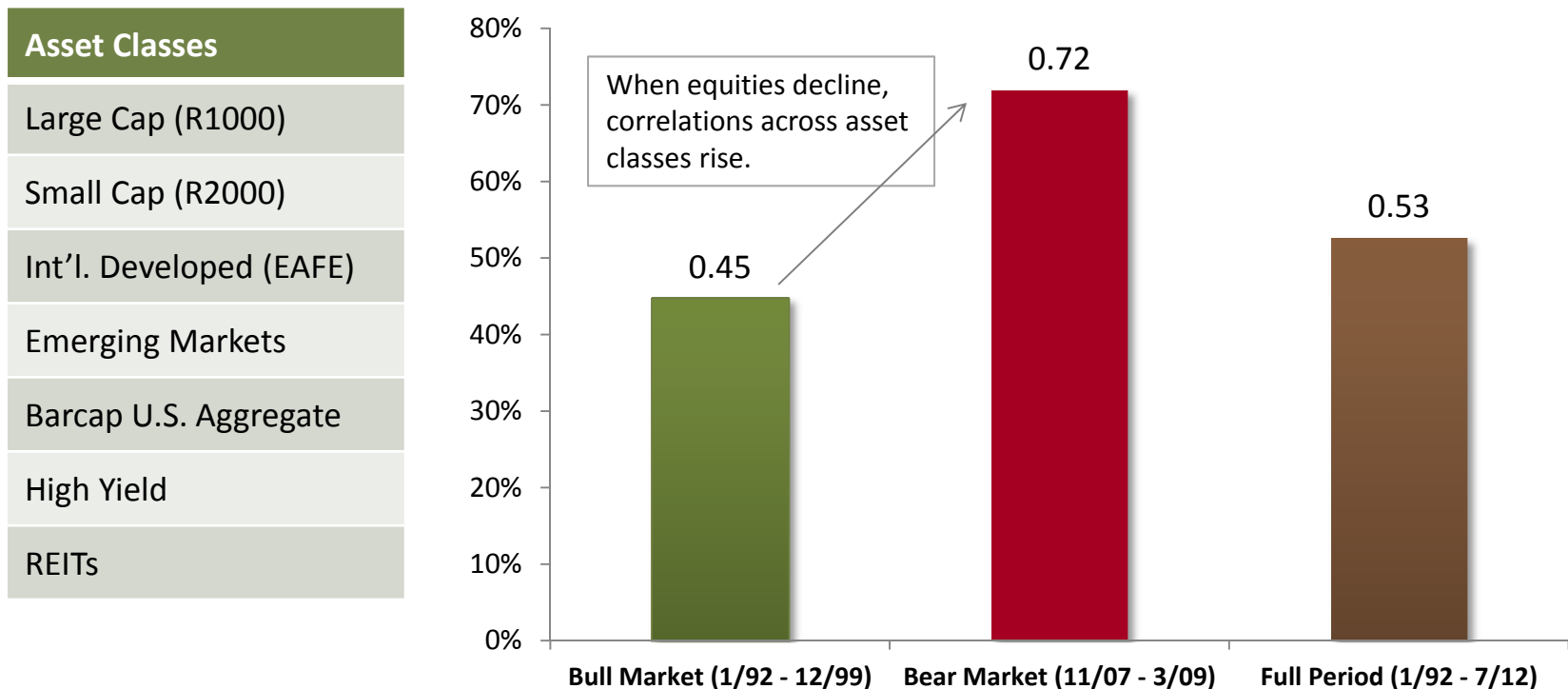
MPT and Correlations

Cross-Correlations Rise in Times of Market Stress

Average Cross-Asset Class Correlations

Various Market Environments

1/1/92 – 7/31/12



Sources: Zephyr Associates, PMC

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MPT and Investor Behavior

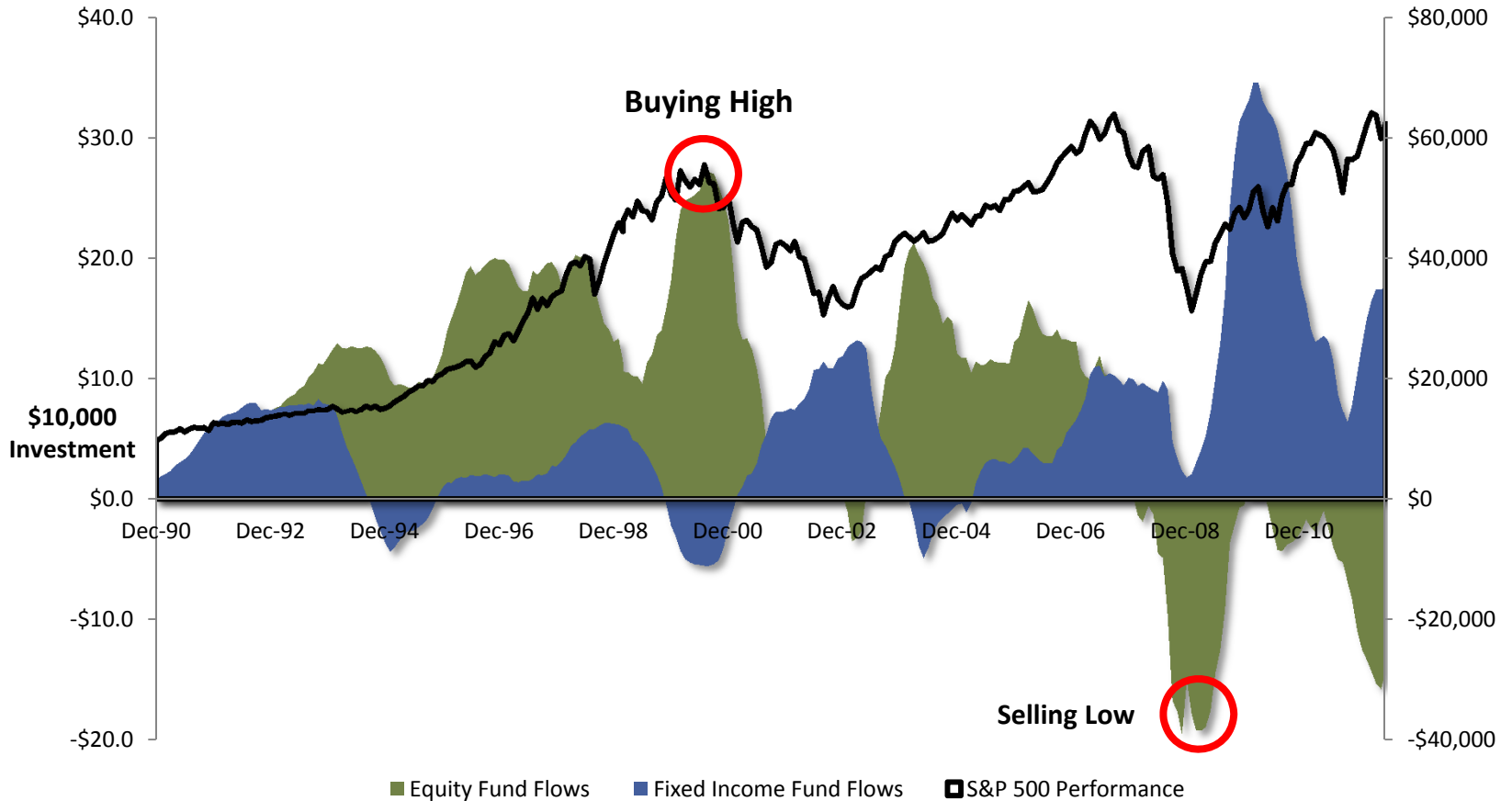
S&P 500 Performance of a \$10,000 Investment vs. Industry Equity and Bond Fund Flows

Equity and Bond

Fund Flows (12-month MA; \$B)

S&P 500

Performance

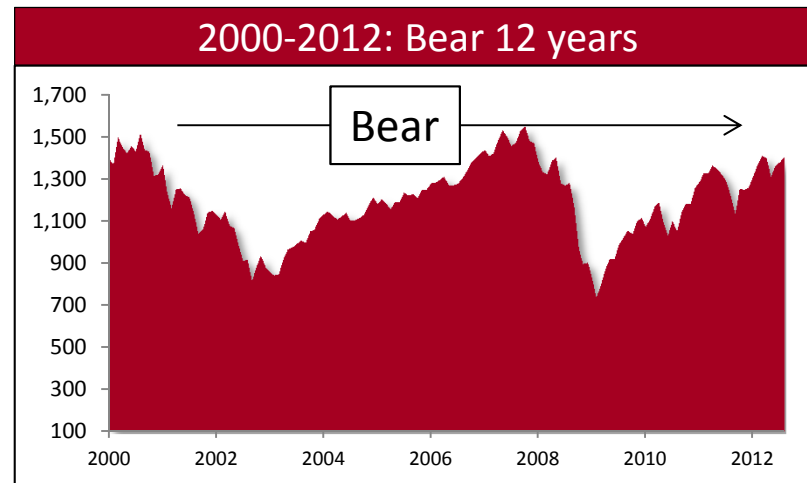
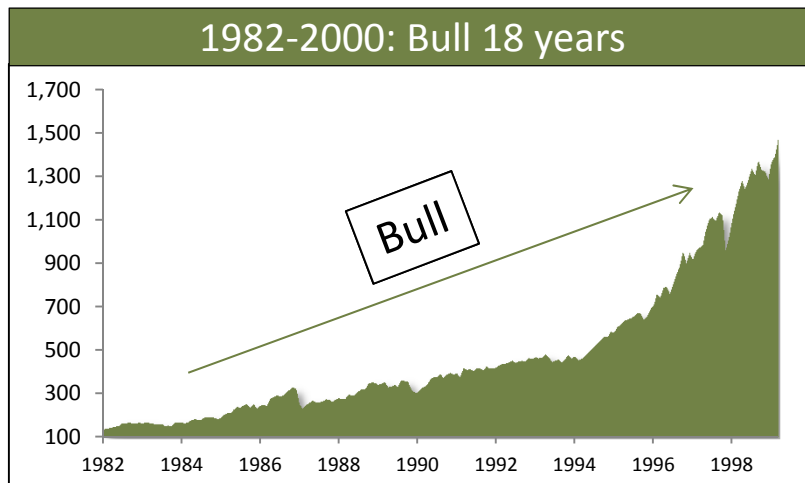
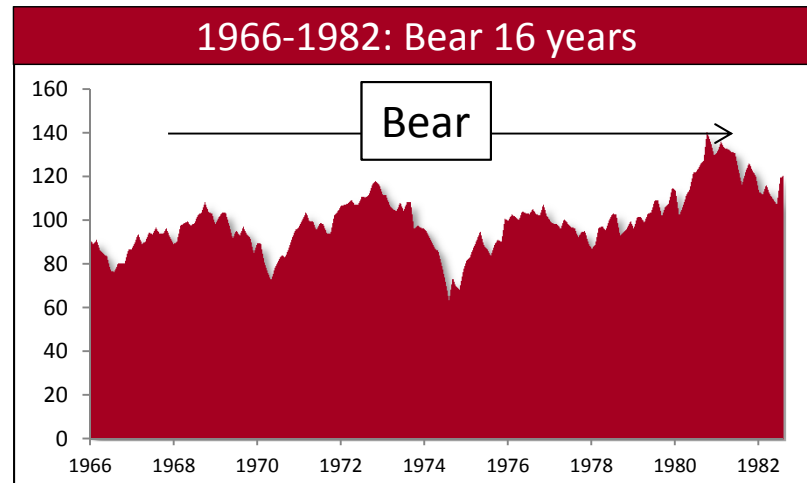
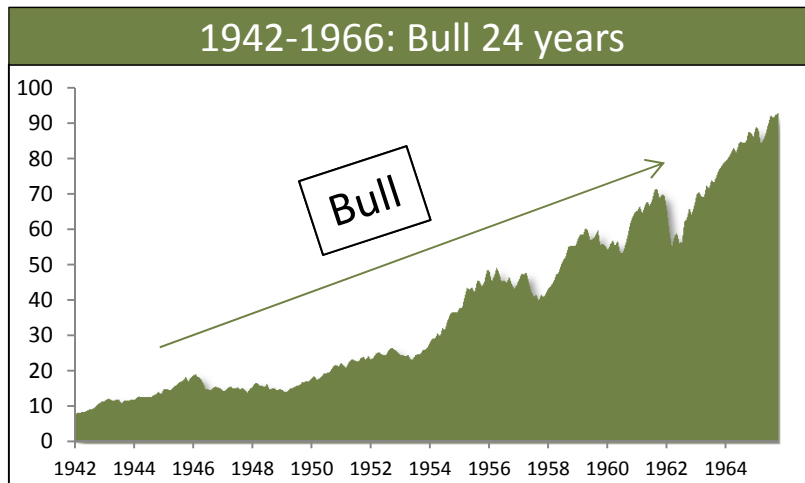


Sources: S&P; Strategas

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Efficacy of MPT

S&P 500 Performance During Various Market Environments



Sources: Bloomberg, PMC

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Efficacy of MPT Over Time

Since 2000, the traditional application of MPT has encountered headwinds for the following reasons:

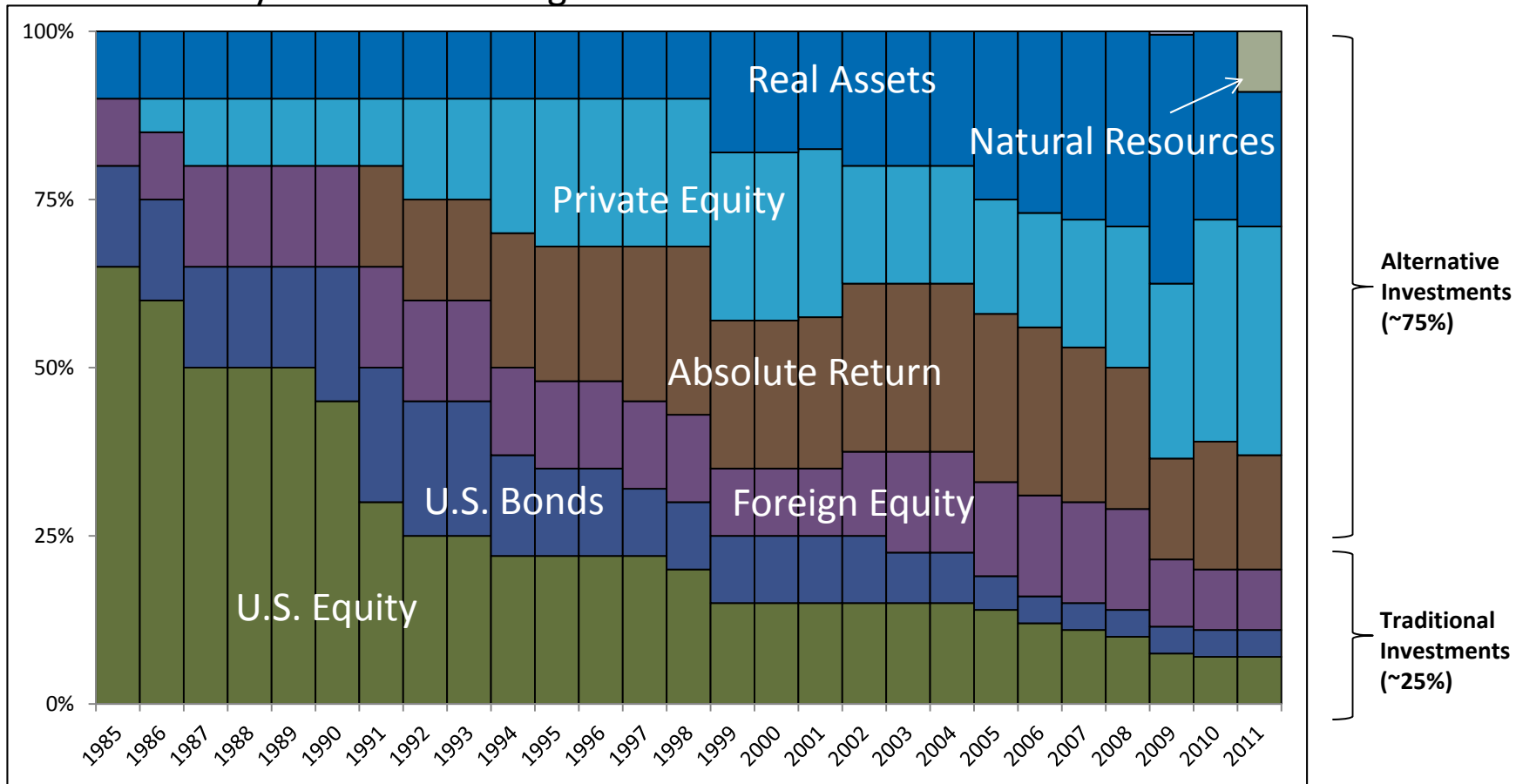
- Globalization of the world economy
- Instantaneous dispersion of global market news via the internet
- Proliferation of the ETF structure across equity and fixed-income indices
- Increased speed of investment trading via web-based trading platforms

Sources: PMC and Zephyr Associates

The Endowment Model

Institutions Effectively Employing Market Movement, Active Management and Diversifying Assets Components

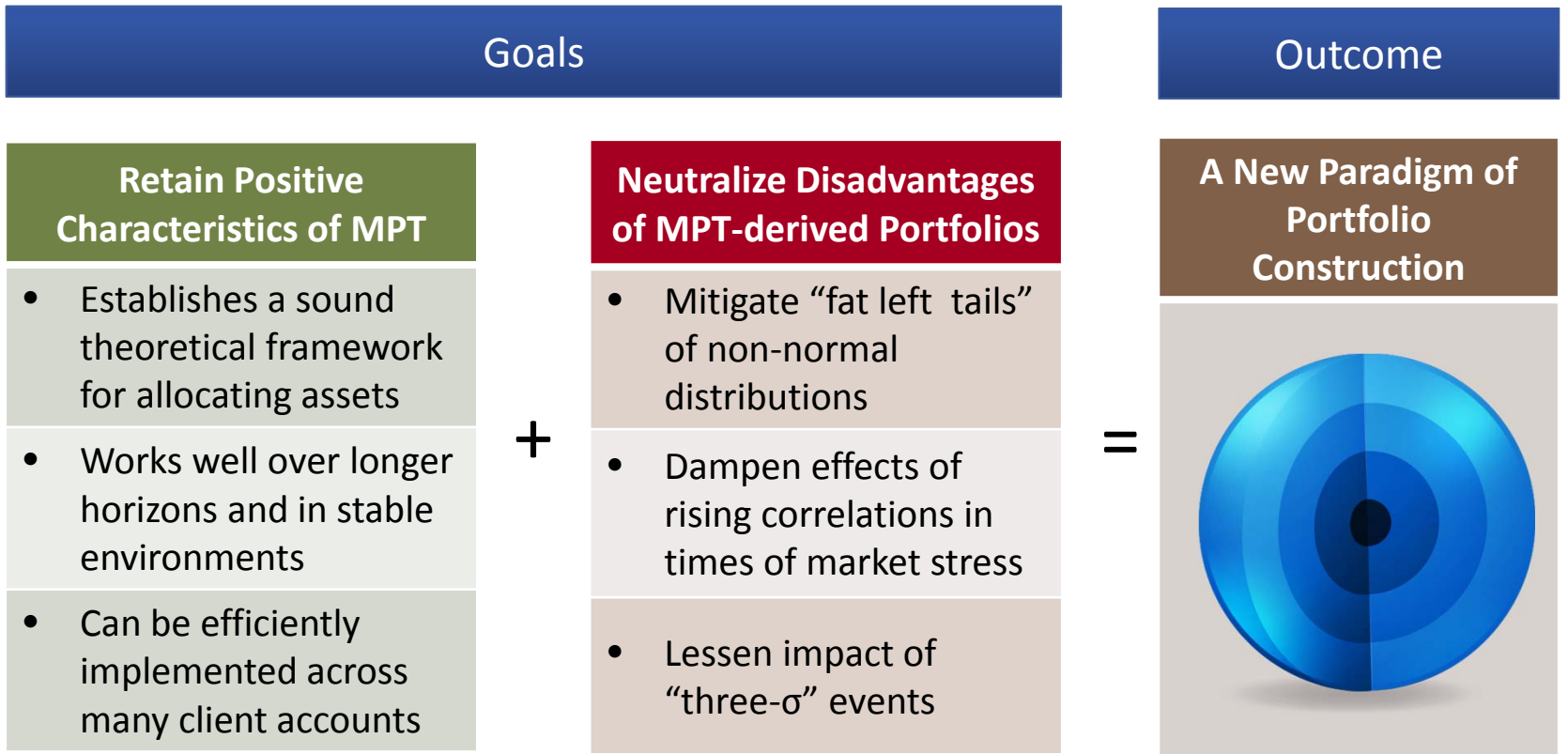
Yale University Endowment Target Asset Allocation: 1985-2011



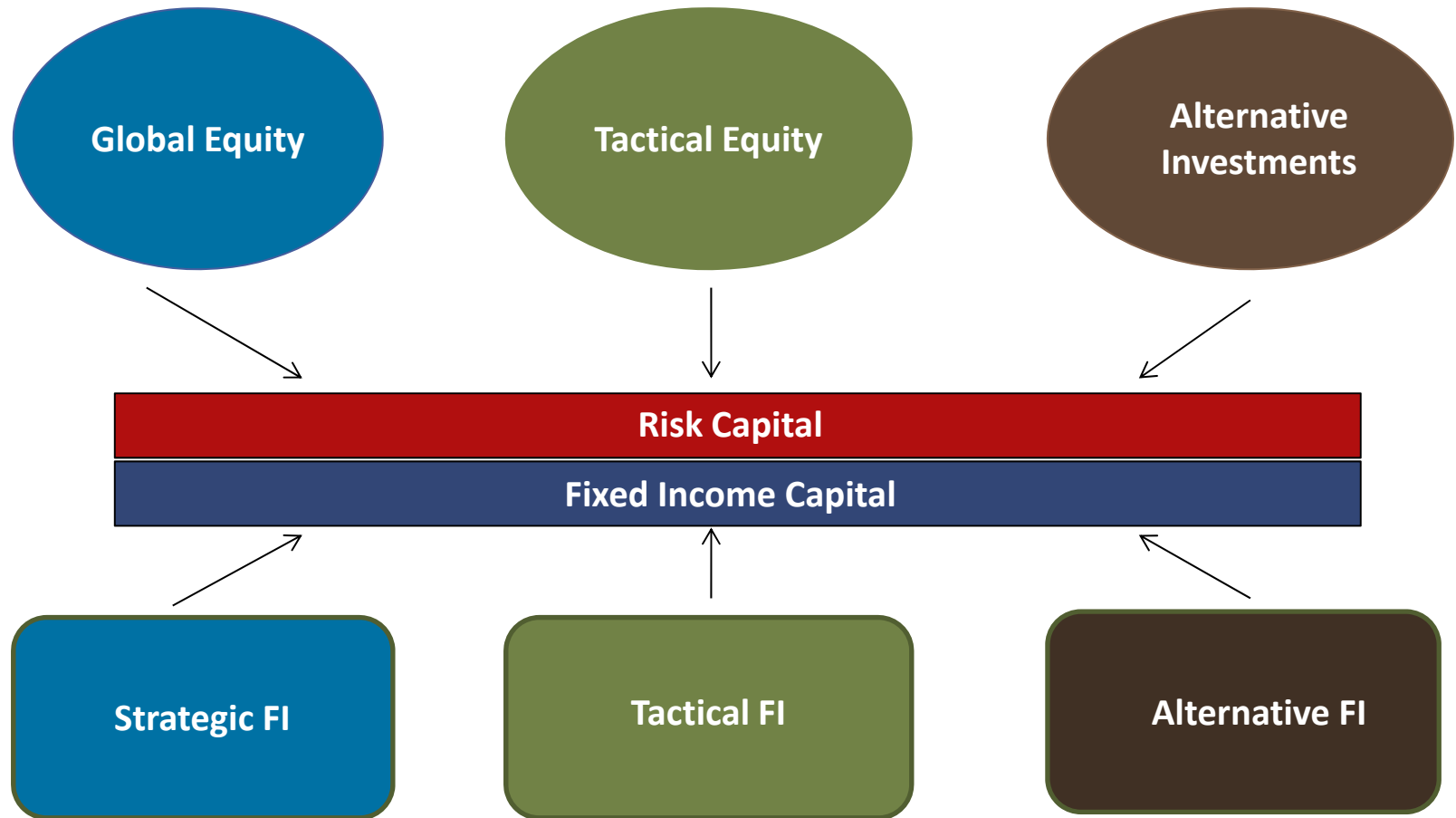
Source: Yale University

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Toward a New Paradigm of Portfolio Construction



The Liquid Endowment Model



Source: PMC

Moderate - Model Tiers

	Allocation Strategy	Strategy Name	Tier I \$250,000	Tier II \$500,000	Tier III \$1,000,000
EQUITY	Strategic	Large Cap Mutual Fund	12%	12%	
	Strategic	Small Cap Mutual Fund	3%	3%	
	Strategic	International Mutual Fund	7%	7%	
	Strategic	Emerging Markets Mutual Fund	2%	2%	2%
	Strategic	Large Cap Value SMA			5%
	Strategic	Large Cap Growth SMA			4%
	Strategic	Real Estate Mutual Fund			1%
	Strategic	Small Cap Core SMA			7%
	Strategic	International SMA			5%
	Alternative	Alternative SMA		16%	16%
Alternative	Alternative Mutual Fund	16%			
Tactical	Tactical Equity Manager		10%	10%	
Tactical	Tactical Equity Manager	20%	10%	10%	
FIXED INCOME	Strategic	Strategic Fixed Mutual Fund		12%	16%
	Tactical	Tactical Fixed SMA	30%	18%	14%
	Tactical	Tactical Fixed Mutual Fund	10%		
	Alternative	Alternative Fixed Income SMA		10%	10%
		Total	100%	100%	100%

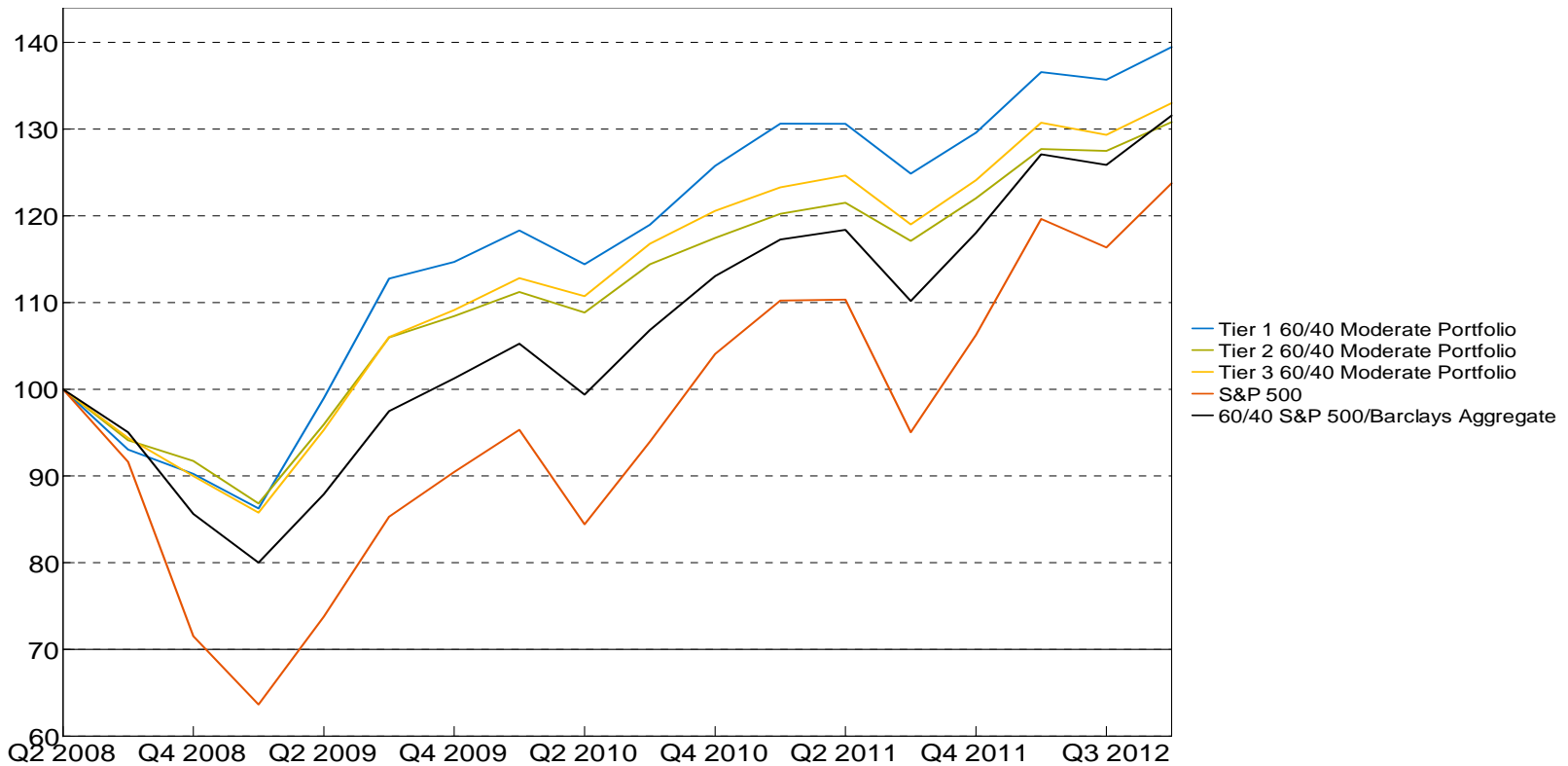
Liquid Endowment Model

Moderate

Manager Performance

Single Computation

July 2008 - September 2012

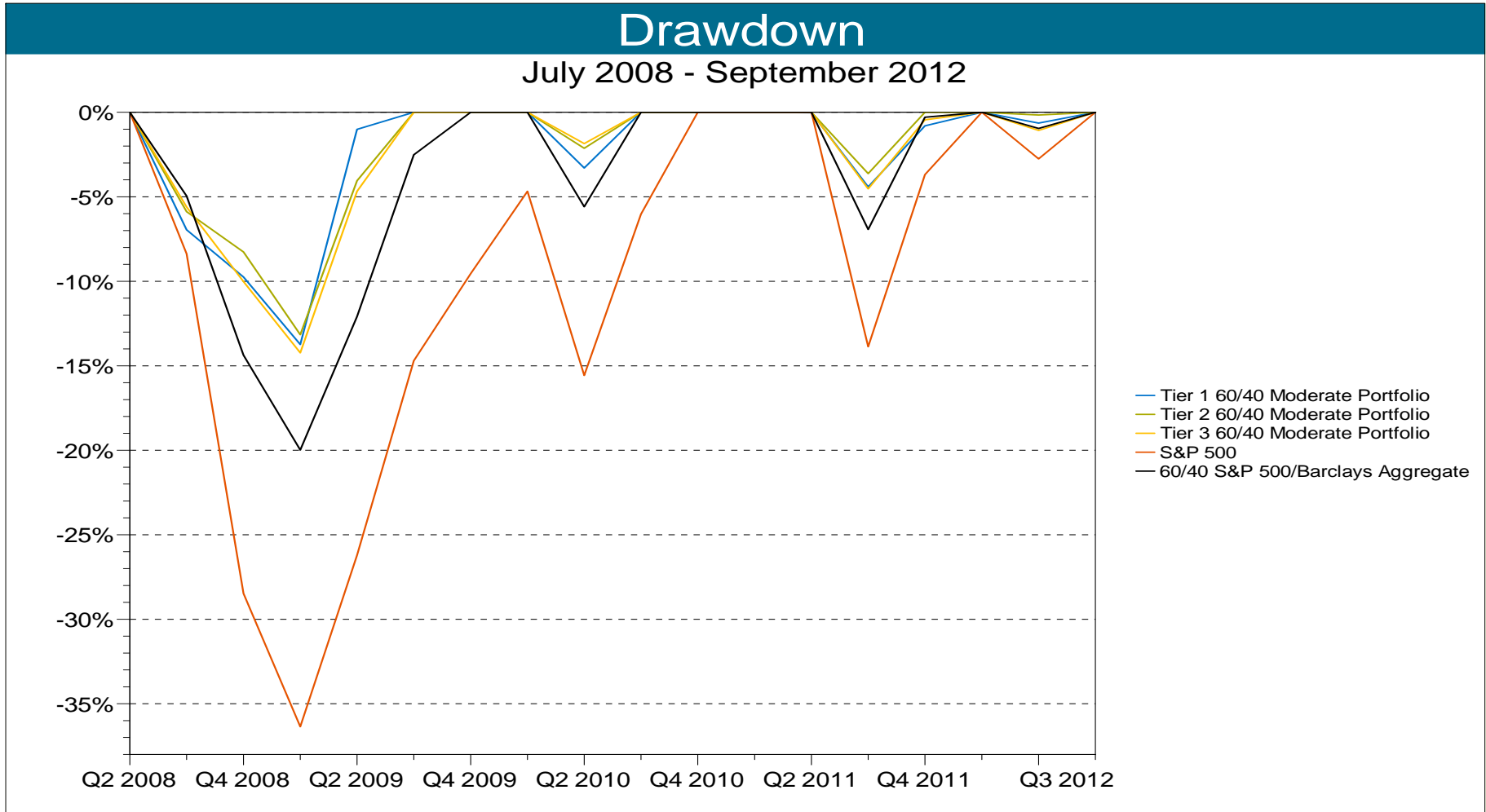


Sources: PMC and Zephyr Associates

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Liquid Endowment Model

Moderate

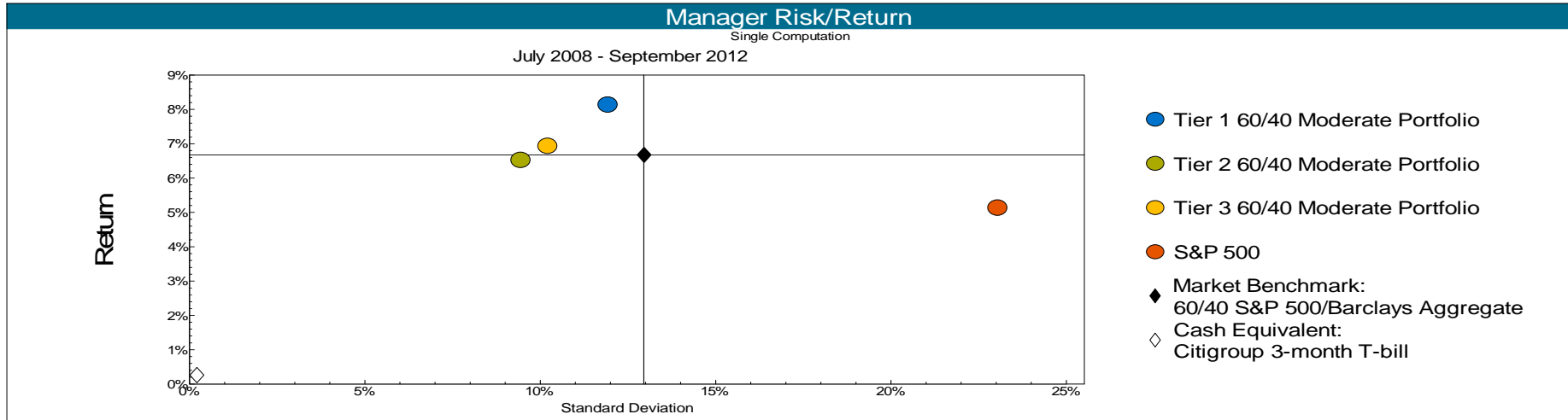


Sources: PMC and Zephyr Associates

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Liquid Endowment Model

Moderate



Risk-Return Table
July 2008 - September 2012: Annualized Summary Statistics

	Return (%)	Std Dev (%)	Beta vs. Market	Alpha vs. Market (%)	Sharpe Ratio
Tier 1 60/40 Moderate Portfolio	8.14	11.92	0.82	2.58	0.66
Tier 2 60/40 Moderate Portfolio	6.53	9.43	0.67	1.88	0.66
Tier 3 60/40 Moderate Portfolio	6.94	10.20	0.75	1.80	0.66
S&P 500	5.14	23.03	1.77	-5.16	0.21
60/40 S&P 500/Barclays Aggregate	6.67	12.95	1.00	0.00	0.49

Sources: PMC and Zephyr Associates

Sources: PMC and Zephyr Associates

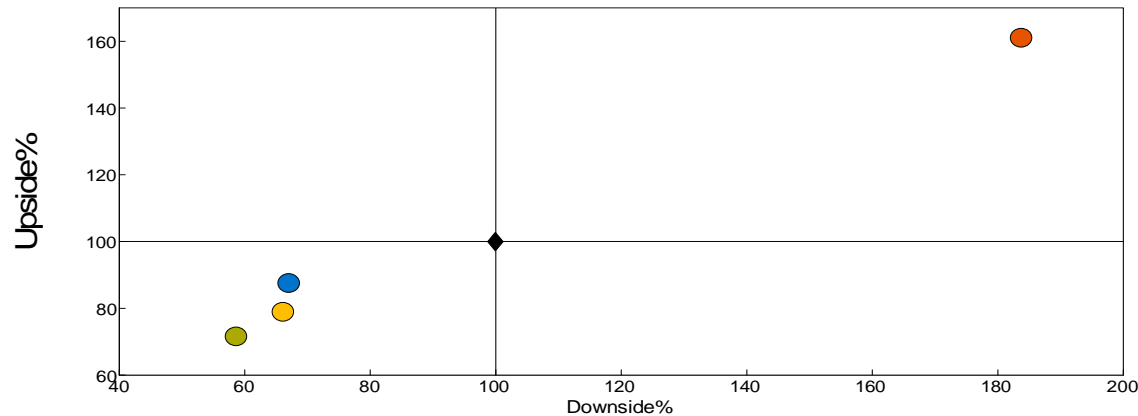
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Liquid Endowment Model Performance

Moderate

Upside Downside

July 2008 - September 2012



- Tier 1 60/40 Moderate Portfolio
- Tier 2 60/40 Moderate Portfolio
- Tier 3 60/40 Moderate Portfolio
- S&P 500
- ◆ 60/40 S&P 500/Barclays Aggregate

Single Computation

Up/Down Table

July 2008 - September 2012. Single Computation

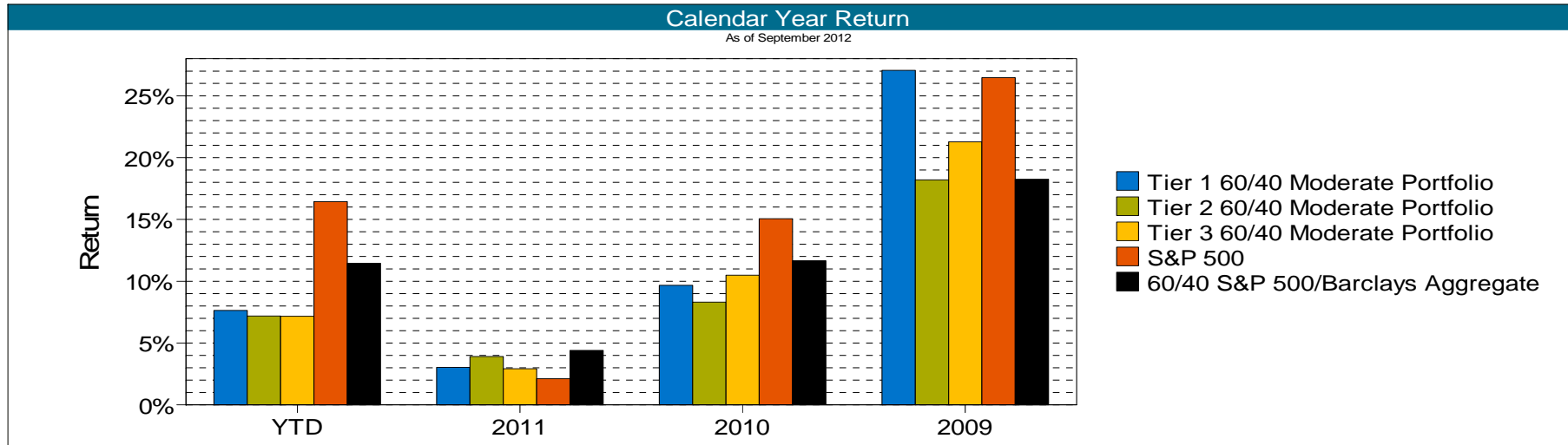
	# of Quarters		Average Return (%)		Average Return (%) vs. Market		Quarter (%)		1-Year (%)		Market Benchmark (%)		
	Up	Down	Up	Down	Up Market	Down Market	Best	Worst	Best	Worst	Up Capture	Down Capture	R-Squared
Tier 1 60/40 Moderate Portfolio	10.0	7.0	5.9	-3.2	5.4	-3.8	14.8	-7.0	37.1	-1.0	87.7	67.0	79.6
Tier 2 60/40 Moderate Portfolio	11.0	6.0	4.4	-3.3	4.4	-3.3	10.5	-5.9	28.1	-4.1	71.6	58.5	85.4
Tier 3 60/40 Moderate Portfolio	11.0	6.0	4.8	-3.7	4.8	-3.7	11.2	-5.6	31.5	-4.7	79.0	66.1	90.2
S&P 500	11.0	6.0	9.3	-11.6	9.3	-11.6	15.9	-21.9	49.8	-26.2	161.2	183.6	98.7
60/40 S&P 500/Barclays Aggregate	11.0	6.0	6.0	-5.8	6.0	-5.8	10.9	-9.9	31.5	-12.1	100.0	100.0	100.0

Sources: PMC and Zephyr Associates

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Liquid Endowment Model Performance

Moderate



Calendar Year Return
As of September 2012

	YTD	2011	2010	2009
Tier 1 60/40 Moderate Portfolio	7.63%	3.04%	9.67%	27.07%
Tier 2 60/40 Moderate Portfolio	7.19%	3.91%	8.31%	18.20%
Tier 3 60/40 Moderate Portfolio	7.17%	2.92%	10.49%	21.29%
S&P 500	16.44%	2.11%	15.06%	26.46%
60/40 S&P 500/Barclays Aggregate	11.46%	4.40%	11.65%	18.25%

Sources: PMC and Zephyr Associates

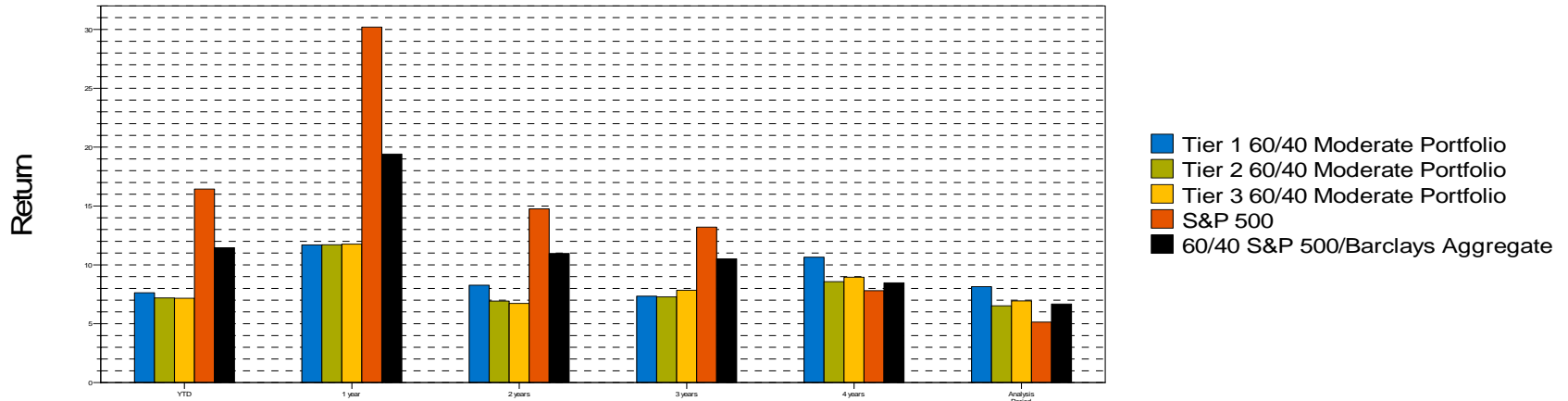
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Liquid Endowment Model Performance

Moderate

Manager vs Benchmark: Return through September 2012

(not annualized if less than 1 year)



Manager vs Benchmark: Return through September 2012

(not annualized if less than 1 year)

	YTD	1 year	2 years	3 years	4 years	Analysis Period
Tier 1 60/40 Moderate Portfolio	7.63%	11.70%	8.27%	7.35%	10.65%	8.14%
Tier 2 60/40 Moderate Portfolio	7.19%	11.71%	6.93%	7.27%	8.58%	6.53%
Tier 3 60/40 Moderate Portfolio	7.17%	11.75%	6.72%	7.85%	8.95%	6.94%
S&P 500	16.44%	30.20%	14.76%	13.20%	7.80%	5.14%
60/40 S&P 500/Barclays Aggregate	11.46%	19.42%	10.97%	10.51%	8.47%	6.67%

Sources: PMC and Zephyr Associates

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Appendix

The Alpha/Beta Model

The Alpha/Beta model strives to improve the relationship between active investment management and the fees required to hire an active investment manager.

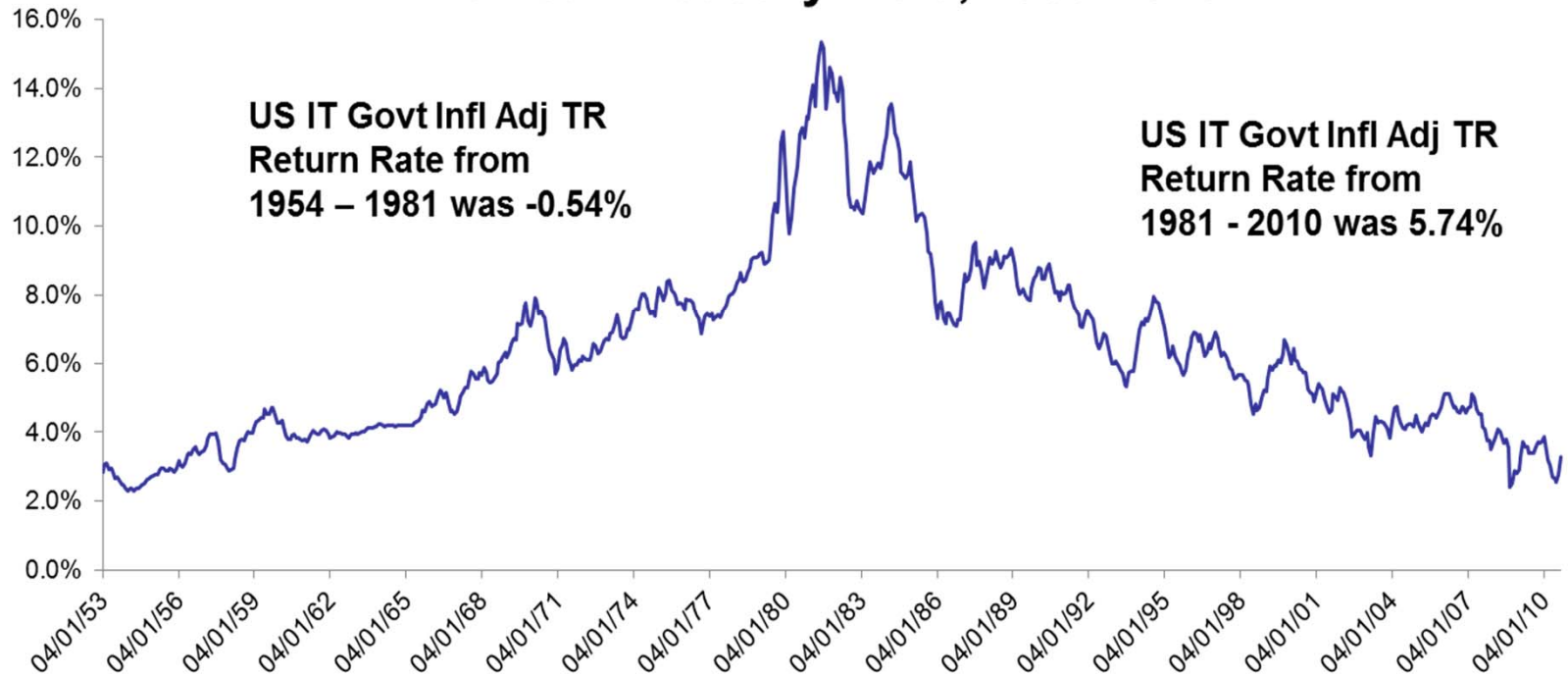
Highly liquid and intensely scrutinized asset classes, like Domestic Large-Cap Equity, can be invested as Beta allocations through low-cost index reproducing ETFs.

Less liquid and inefficient asset classes, like Small-Cap Equity, International Emerging Market Equity and High-Yield Fixed Income, represent investment styles where an active manager may have a higher probability of generating alpha in excess of an 'active investment management fee'.

Source: PMC

Treasury Yield Over Time

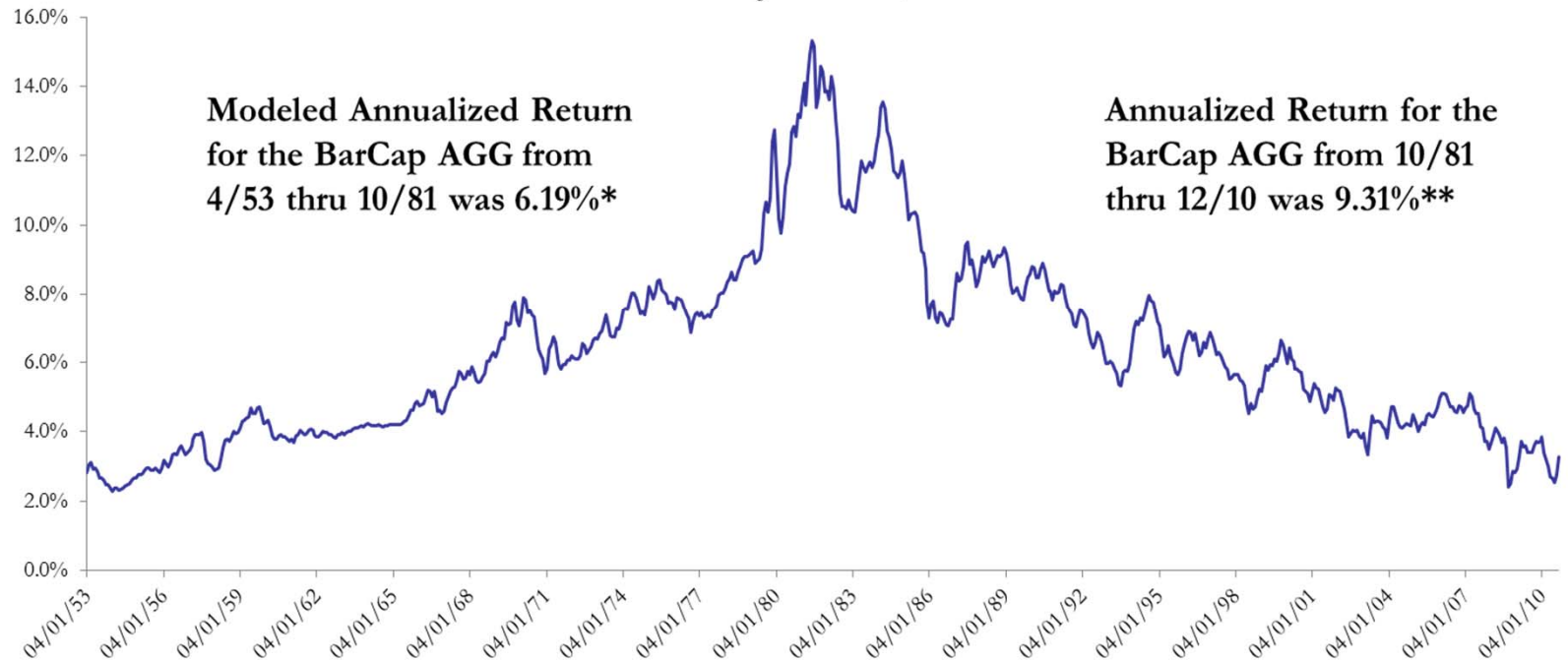
10-Year Treasury Yield, 1953-2010



Source: Board of Governors of the Federal Reserve System and Ibbotson S&P IT Govt Return Series

BarCap Aggregate Yield Over Time

10-Year Treasury Yield, 1953-2010



Source: Board of Governors of the Federal Reserve System and Ibbotson SBBI IT Govt Return Series

Source: Singer Partners*

Source: Zephyr**

Disclosure

The performance shown in the sample portfolio is that of a hypothetical investment return utilizing specific separate account managers and asset allocation that would have been employed at the time based upon PMC's quantitative optimization research process. There can be no assurance that had PMC offered these products during the period shown above, an investor's investment returns would have been as shown due to the possibility that the allocations during the period may not have matched the allocations as of the date of this presentation. Accordingly, the returns do not represent the impact that material economic and market factors might have had on PMC's decision making process had PMC actually been managing the portfolio during this time. Hypothetical investment returns have the benefit of hindsight in that the returns are being presented after the fact and the allocations could be slanted to provide the best performance possible. Hypothetical results have certain inherent limitations, the most important of which is that past results give no assurance of future returns. Current performance for the sample portfolio may be higher or lower than the data shown. All performance results are calculated assuming reinvestment of dividends, income and capital appreciation. Performance is shown gross of platform fees and expenses. Actual performance results will be reduced by fees including, but not limited to, investment management fees and other costs such as custodial, reporting, evaluation and advisory services. For example, an account with annual fees of 1.5%, deducted quarterly, whose annualized performance was 15.0% before fees, would have net annualized performance approximately of 13.3%. For a complete description of all fees, costs and expenses, please refer to the sponsor's Form ADV Part 2A or Form ADV Part 2A – Appendix 1as applicable. The investment return and principal value of an investment will fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original cost. An investment in this portfolio is subject to market risk and an investor may experience loss of principal. Past performance is not indicative of future results.

Blended benchmark of the sample portfolio refers to the Russell 1000 Growth Index 8.4%, Russell 1000 Value Index 11.6%, Russell 2000 Index 10.5%, MSCI EAFE Index 14.7%, MSCI Emerging Markets Index 3.2%, Wilshire REIT Index 4.1%, Citigroup 3-month T-bill Index 17.5% and Barclays Capital U.S. Aggregate Index 30.0%. The reported benchmark is a combination of unmanaged indices that do not have any fees or expense charges and are not available for direct investment. The blended benchmark is not intended as a direct comparison to the performance of the portfolio. Instead, it is intended to represent the performance of certain sectors of the overall securities markets.

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For More Information

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