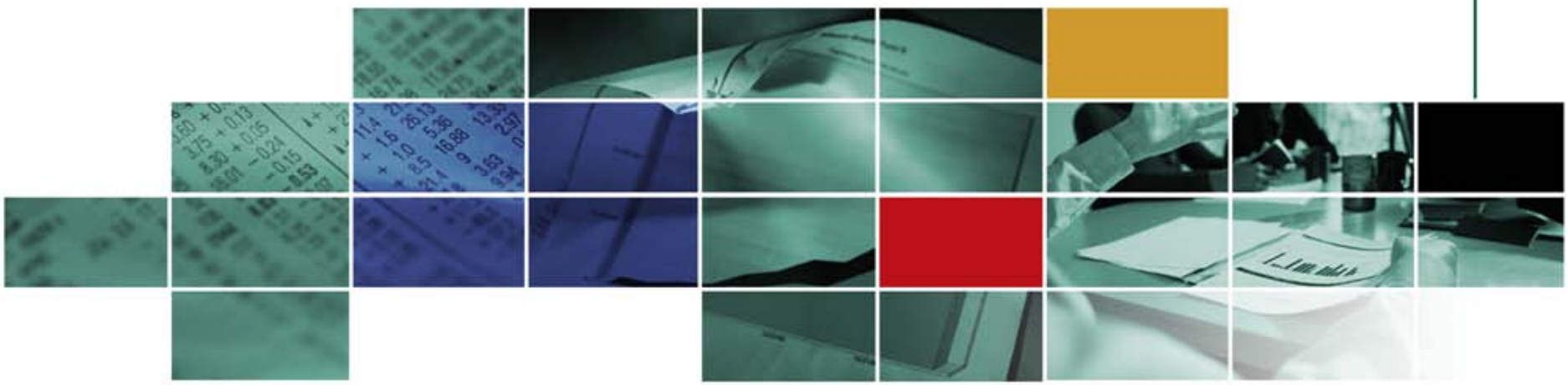
RVKuhns & ASSOCIATES, INC.

Investing Today for Tomorrow

Texas Municipal Retirement System

August 15, 2011



Presentation Agenda

I. **Modern Portfolio Theory:**

Why Do We Care About Portfolio Diversification?

I. **TMRS Chronology:**

Diversification in Progress

I. **Building a Portfolio for the Long-Term:**

Why Does it Make Sense to Continue Diversification?

Why Are We Focusing on New Asset Classes Now?

Modern Portfolio Theory:

Why Do We Care About Portfolio Diversification?

Modern Portfolio Theory

Risk Reduction and Return Enhancement

- **Diversification is a powerful way to reduce risk and is easy to execute**
  - Diversification is the tactic of spreading your investments across divergent opportunity sets (asset classes) in order to mitigate risk
    - An "asset class" is considered a group of investments with a distinctive profile from other groups (e.g., stocks vs. bonds vs. real estate)
- **How can some "riskier" asset classes lower the fund's long-term volatility?**
  - Any asset class whose risk (volatility) tends to follow patterns that are different than the other investments in the portfolio will tend to smooth the growth path of the overall portfolio
  - A portfolio following a smoother, *less volatile* path over time compounds value at a faster rate
- **There isn't a specific cost associated with diversification**
  - It does not cost anything as compared to other risk reducing strategies
    - Diversification benefits typically outweigh potential investment management fees and/or additional staffing needs required to implement multiple asset classes

Modern Portfolio Theory

Diversification

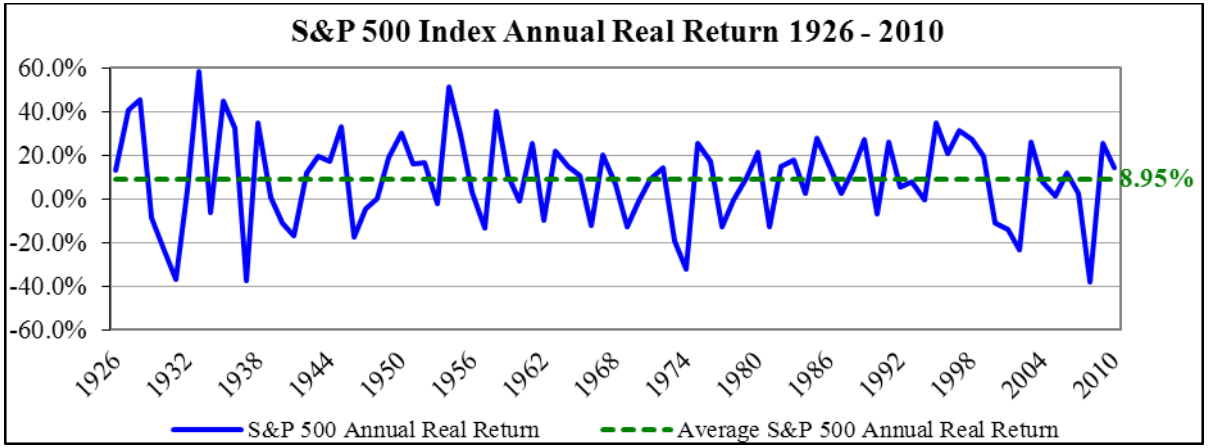
- **Investing in the combination of asset classes that tend to move in different directions at the same time provides a smoother return profile over time and allows for better compounding**
  - Asset classes with historical low correlations to equities performed well during the tech bubble
- **However, it is not a perfect solution – especially in periods of high correlation – but it is the best method for risk reduction**
  - Asset classes exhibited high levels of correlation in 2008 as all (except US Treasuries) moved downward in unison regardless of historical correlation relationships

US Equity	Russell 3000	16.9%	28.3%	-37.3%	5.1%	15.7%	6.1%	12.0%	31.1%	-21.5%	-11.5%	-7.5%
International Equity	MSCI AC World Ex US IMI	12.7%	43.6%	-46.0%	16.1%	26.4%	17.7%	21.9%	42.1%	-12.9%	-19.8%	-19.5%
Fixed Income	BC US Agg Bond	6.5%	5.9%	5.2%	7.0%	4.3%	2.4%	4.3%	4.1%	10.3%	8.4%	11.6%
TIPS	BC US Treasury: US TIPS	6.3%	11.4%	-2.4%	11.6%	0.4%	2.8%	8.5%	8.4%	16.6%	7.9%	13.2%
Real Return	Custom Real Return	15.0%	23.8%	-29.7%	6.9%	13.9%	13.3%	18.3%	24.1%	15.0%	-5.5%	19.9%
Core Real Estate	NCREIF ODCE	16.4%	-29.8%	-10.0%	16.0%	16.3%	21.4%	13.2%	9.3%	5.6%	5.6%	14.3%
Absolute Return	HFN FOF Multi-Strategy	4.8%	9.7%	-20.5%	9.9%	9.9%	6.8%	6.8%	11.9%	3.1%	6.6%	12.4%
Private Equity	Venture Economics All PE	17.0%	12.5%	-19.9%	17.6%	22.2%	22.9%	18.8%	19.2%	-12.8%	-19.1%	11.0%

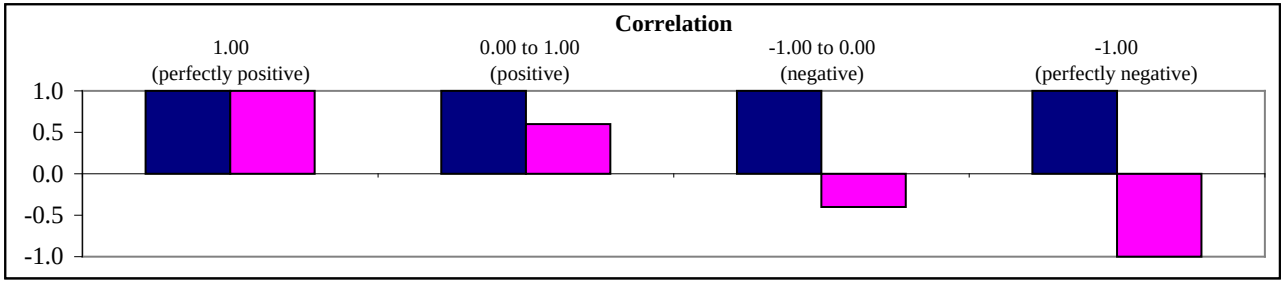
Modern Portfolio Theory

Investment Fundamentals

- **Return:** The total return of a security is based on a combination of income and price growth
  - **Total Return = (Dividend + Price Change) / Beginning Price**
- **Risk:** The risk of a security is typically defined as its standard deviation, or volatility, of the expected return stream



- **Correlation:** Indicates the direction and strength of a relationship between two return streams



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Modern Portfolio Theory

Basic Considerations

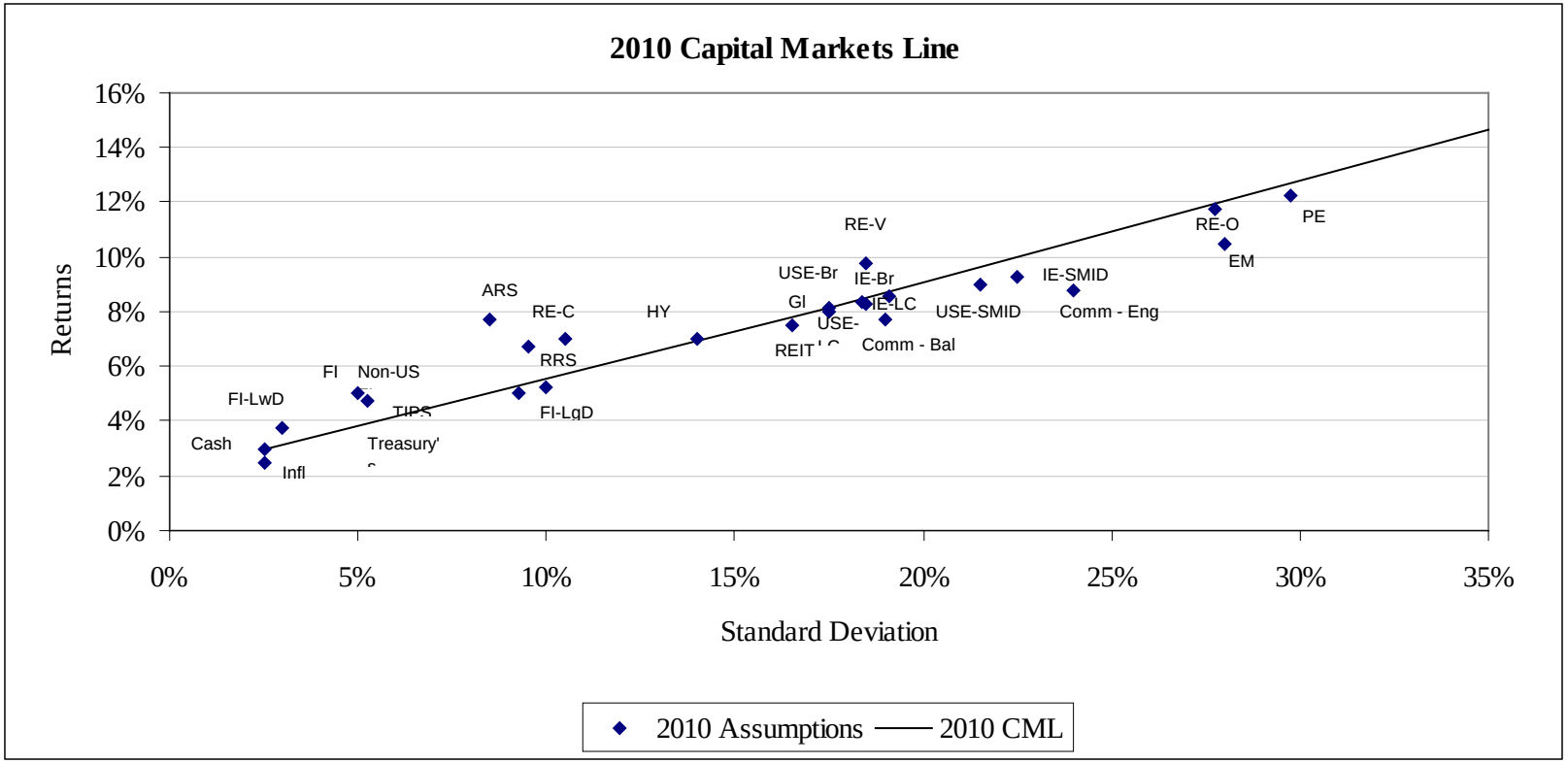
- **Asset Allocation is one of the most important investing decisions that a plan can make for their portfolio**
  - Major determinant of long-term rates of return and volatility

- **Two facets to the asset allocation decision:**
  - Identification of the asset classes to be considered
  - Selection of the portfolio that best meets the investment objectives

Modern Portfolio Theory

Return Requires Risk

- **There is a positive historical relationship between return and risk (RVK 2010 assumptions)**



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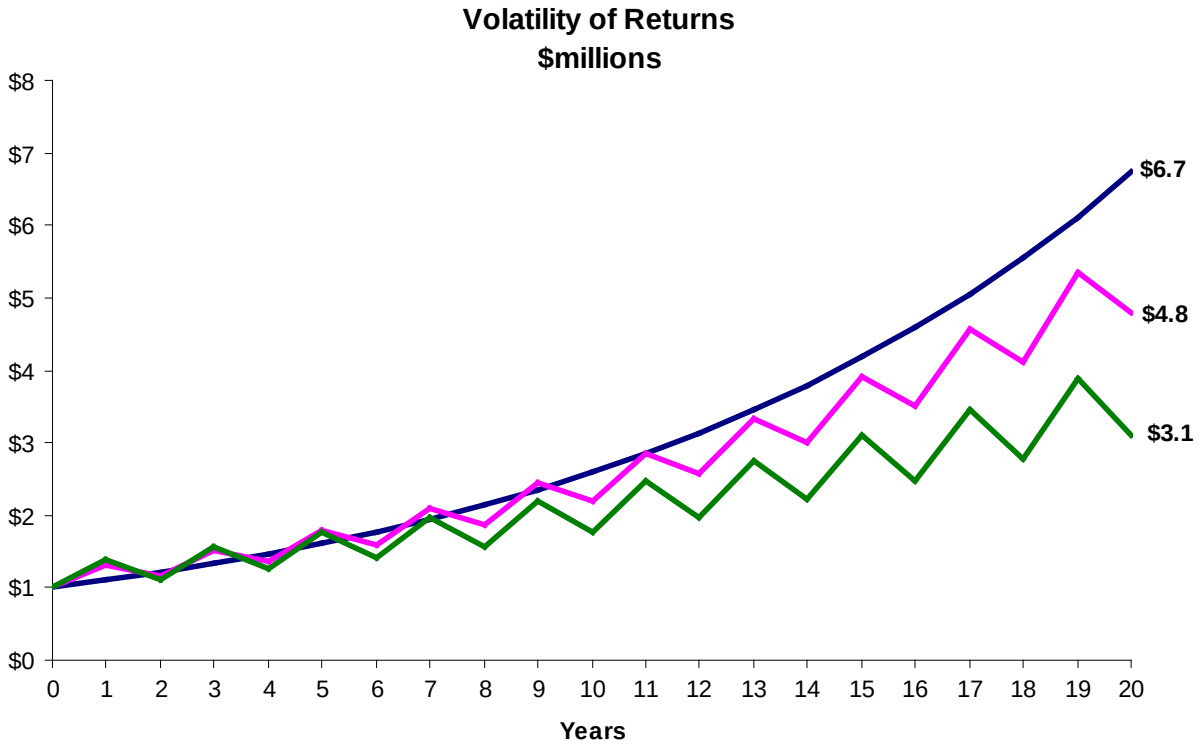
Modern Portfolio Theory

Why Do We Care About Risk Reduction?

- **Return Volatility Dampens Compound Returns**

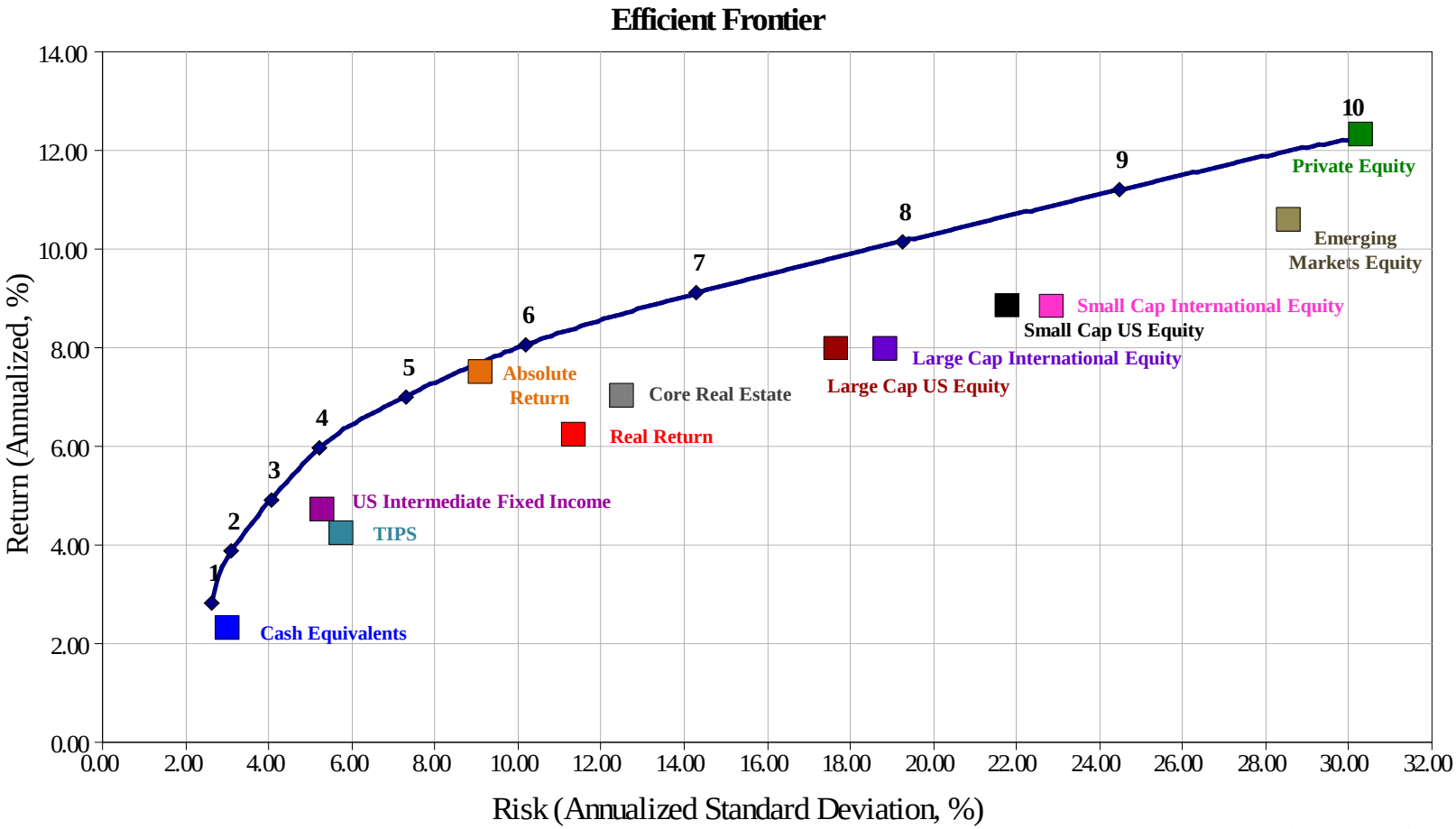
Years	1	2	3
1	10%	30%	40%
2	10%	-10%	-20%
3	10%	30%	40%
4	10%	-10%	-20%
5	10%	30%	40%
6	10%	-10%	-20%
7	10%	30%	40%
8	10%	-10%	-20%
9	10%	30%	40%
10	10%	-10%	-20%
11	10%	30%	40%
12	10%	-10%	-20%
13	10%	30%	40%
14	10%	-10%	-20%
15	10%	30%	40%
16	10%	-10%	-20%
17	10%	30%	40%
18	10%	-10%	-20%
19	10%	30%	40%
20	10%	-10%	-20%
Average	10.0%	10.0%	10.0%
Std. Deviation	**0%**	**21%**	**31%**



- **All portfolios start with $1 million**
- **After 20 years, the difference of 31% standard deviation is $3.6 million**

Modern Portfolio Theory

Correlations Matter



- **Notice that combinations of asset classes can create a set of portfolios (the efficient frontier) with better return/risk ratios than asset classes can provide individually**

Modern Portfolio Theory

Consider Two Portfolios

- **Introduce low correlated assets with similar returns**
  - Assets seen as “too volatile” for a stand alone investment may be worthy contributors to the overall portfolio
    - Risk is measured by standard deviation
  - Correlation measures to what degree the investments fluctuate over time in synchronicity, or in a less related fashion
    - Low correlated asset classes are subject to different influences and produce diverse return streams

	Portfolio I		Portfolio II	
Investment:	**A**	**B**	**X**	**Y**
Return:	9.0%	5.0%	9.0%	5.0%
Std. Dev:	12.0%	8.0%	12.0%	8.0%
Correlation:	0.9		0.1	
Allocation:	50%	50%	50%	50%
Expected Return:	7.0%		7.0%	
Std. Dev:	9.8%		7.9%	

Modern Portfolio Theory

Conclusions

- **Adding asset classes to a portfolio can enhance returns and reduce risk through diversification**
  - Education and proper implementation over time are critical
- **Using diverse asset classes can provide a smoother return profile over time and allows for better compounding**
- **Diversified, total return portfolios have been proven over time**

TMRS Chronology:

Diversification in Progress

TMRS Chronology

Portfolio Background

- **TMRS was invested in 100% bonds**
  - Lacked diversification
  - Potentially insufficient return given long-term market dynamics

- **Broad diversification and a long-term perspective can lead to higher returns without undue risk**
  - Methodical and incremental approach to change
  - Diversification initiated in early 2008

- **Total Return Orientation**
  - Legislative change from income only orientation occurred in June 2009
  - Allows for meeting plan objectives through broader diversification

TMRS Chronology

Initial Analysis

- **Board and staff correctly assessed the risks to the portfolio**
  - Risks to the portfolio included a lack of diversification as well as significant interest rate exposure
    - The portfolio was comprised of high quality bonds with a long term maturity date
    - The "longer" the bond, the greater the sensitivity to changes in interest rates (if rates rise, value of bond falls)
    - The impact of rising rates would be an erosion of the capital base for future investing and an end to surpluses that have been a source for benefit increases
  - It was a strategy that worked well for many years
  - However, market dynamics required a change

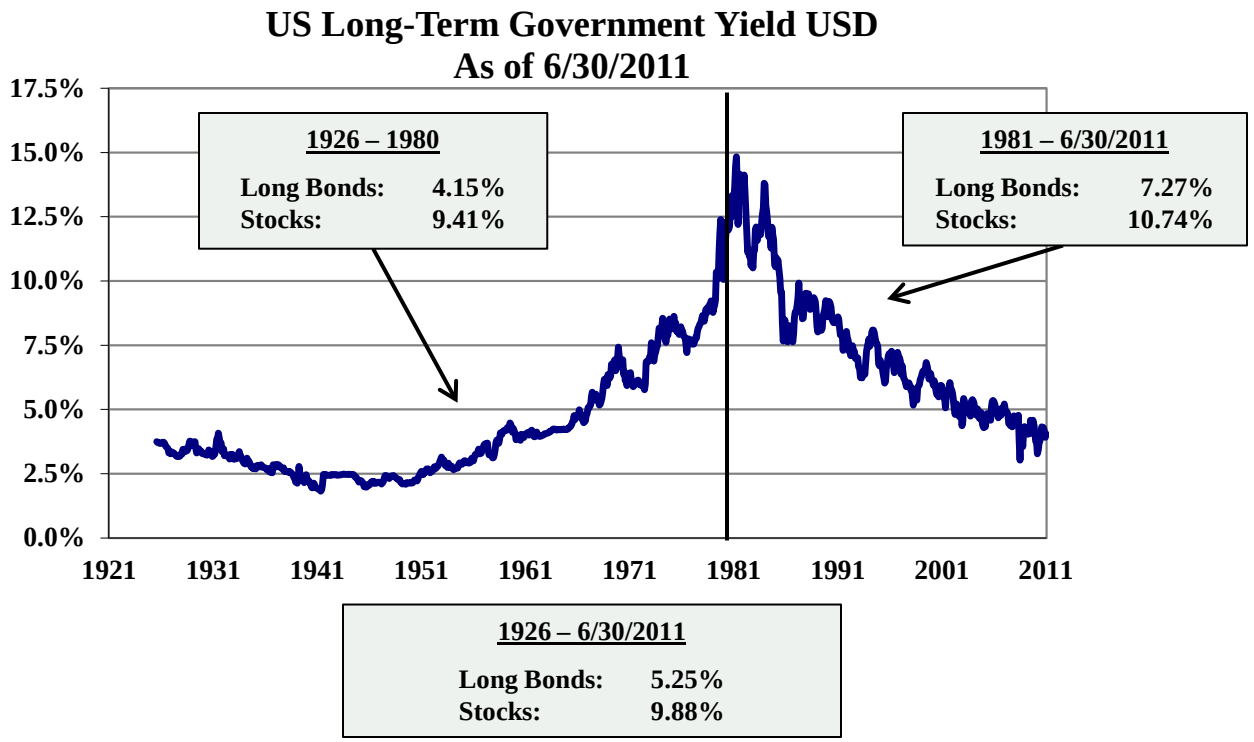
- **Historic period in capital markets**
  - TMRS original portfolio of high quality, long duration bonds were sold at an advantageous time
  - TMRS equity investments have been made in a period of high volatility and uncertainty, with relatively attractive valuations

- **TMRS has weathered the storm well through implementing methodical change**

TMRS Chronology

Bond Yields

- **The portfolio held long-term bonds in a period of high and declining interest rates**
  - This was an unusual environment
- **Bond Yields have been trending down**
  - When yields rise, prices, which are inversely related to yields, decline



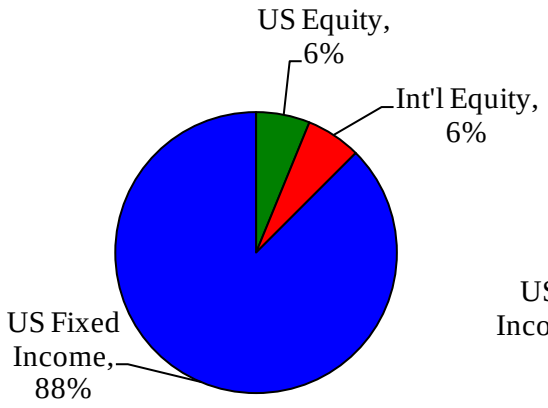
Source: MPI. Performance for Long Bonds is represented by the Ibbotson Long-Term Government Bond Index. Performance for Stocks is represented by the Ibbotson S&P 500 Index. Performance is annualized for periods greater than one year.

TMRS Chronology

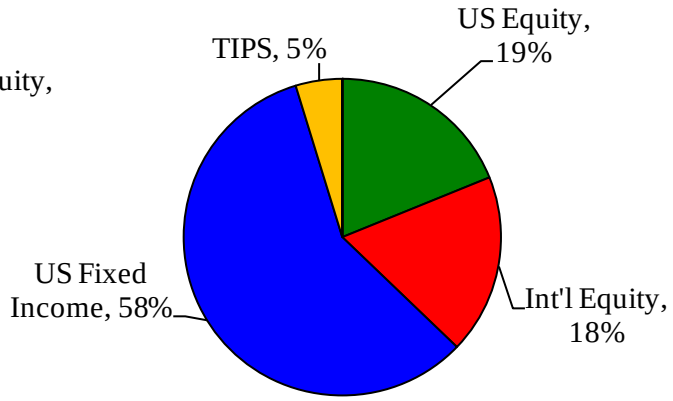
Total Fund Progress

- **Progression of the TMRS asset allocation as of June 30, 2009 to the current asset allocation (6/30/2011) compared to the TMRS final target allocation**
  - Further fixed income diversification
  - Increased exposure to U.S. and international equity
  - Addition of real return asset class (via global inflation-linked bond mandate)

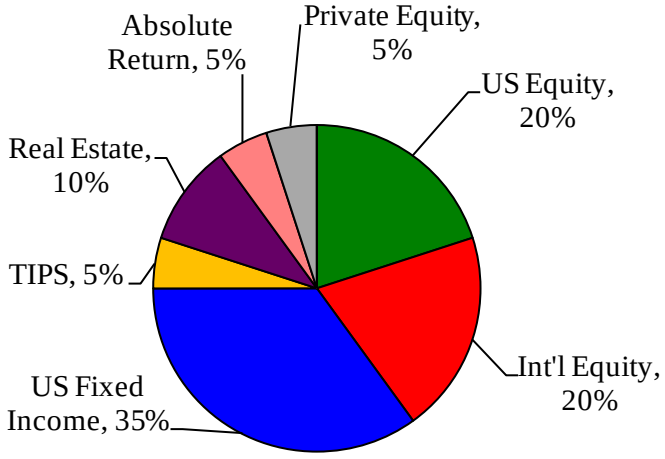
TMRS Allocation as of June 30, 2009



TMRS Current Allocation as of June 30, 2011



TMRS Final Target



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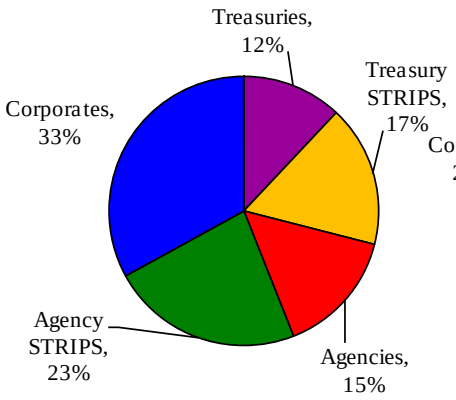
TMRS Chronology

Fixed Income Progress

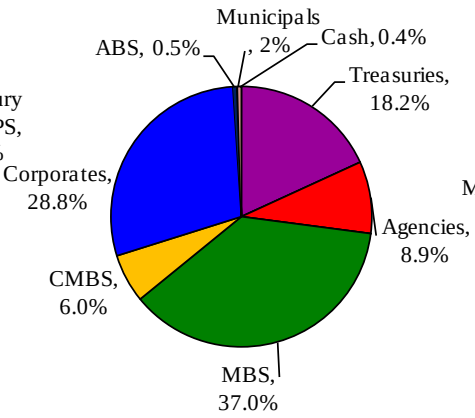
- **TMRS fixed income previous and current allocations**
  - Shortened duration to reduce interest rate risk
  - Additional sectors to diversify and enhance returns

TMRS May 2008



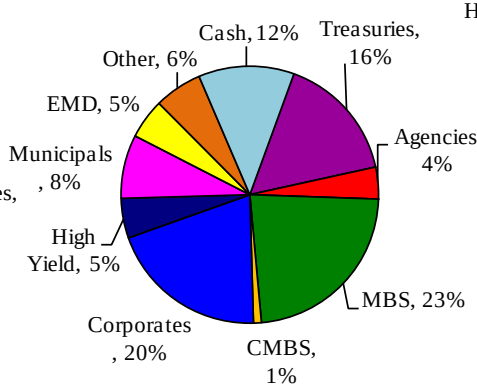
Duration
13.80

BlackRock June 2011



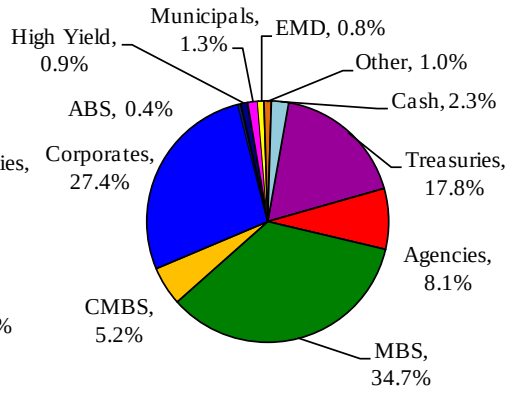
Duration
4.40

PIMCO June 2011



Duration
4.74

TMRS June 2011



Duration
4.46

Building a Portfolio for the Long Term:

Why Does it Make Sense to Continue Diversification?

Why Are We Focusing on New Asset Classes Now?

Building a Portfolio for the Long Term

Considerations

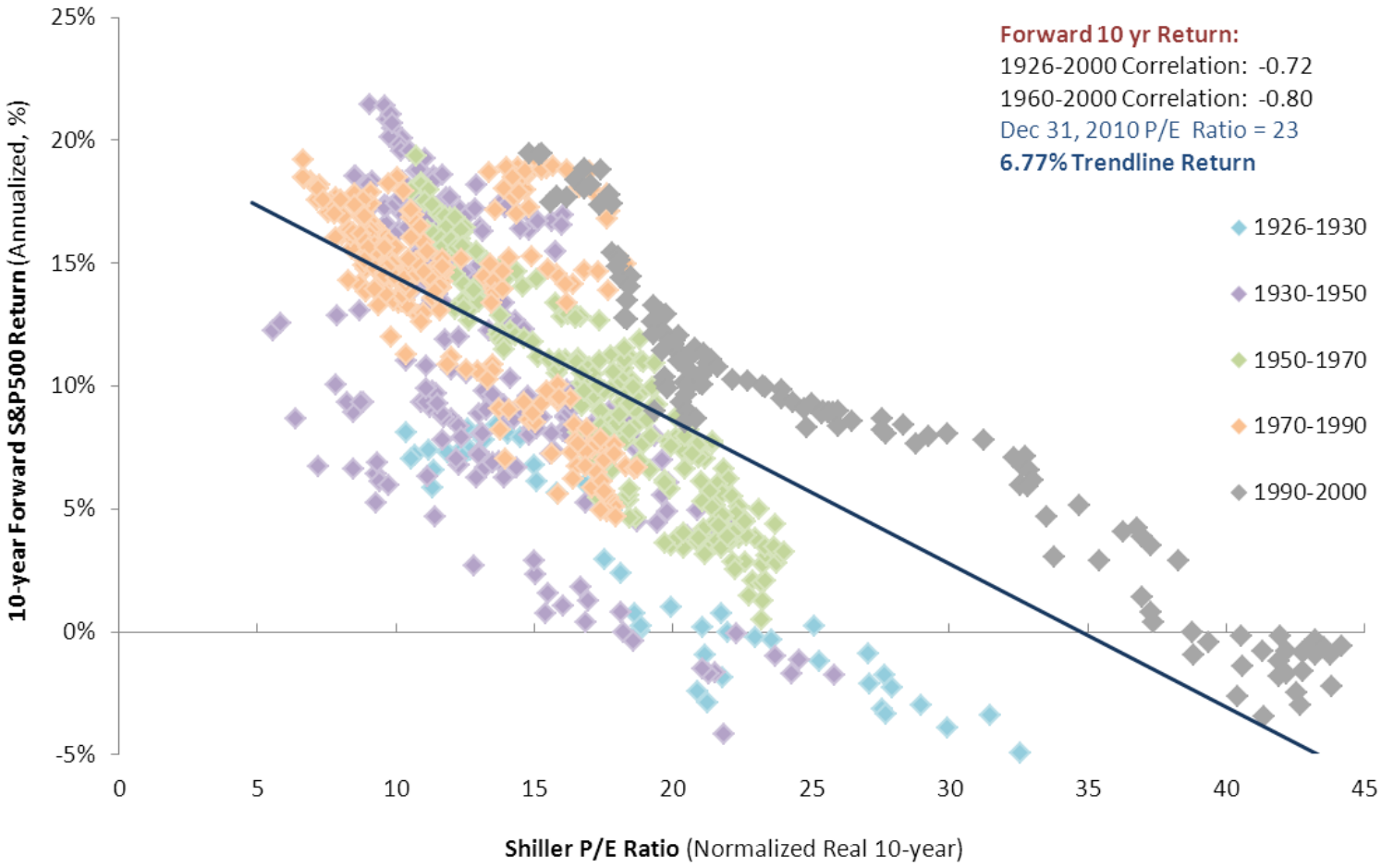
- **Your never know when a hurricane is coming, or from which direction, but you need to build a house for the next 40+ years and build it to withstand the hurricane regardless of its timing or direction**

- **TMRS is creating a portfolio that will better withstand different market environments (interest rate changes, inflation, etc.)**
  - A non-diversified portfolio is not optimal and increases risk by putting all your eggs in one basket
  - Long term historical results and forward-looking estimates for fixed income as a single asset class does not meet the TMRS actuarial return assumption
    - Or the assumption would have to be lowered
  - Equities tend to provide higher returns, but with an increase in volatility
  - "Traditional" and "alternative" asset classes can have important roles within a portfolio

Building a Portfolio for the Long Term

Valuations: Stocks

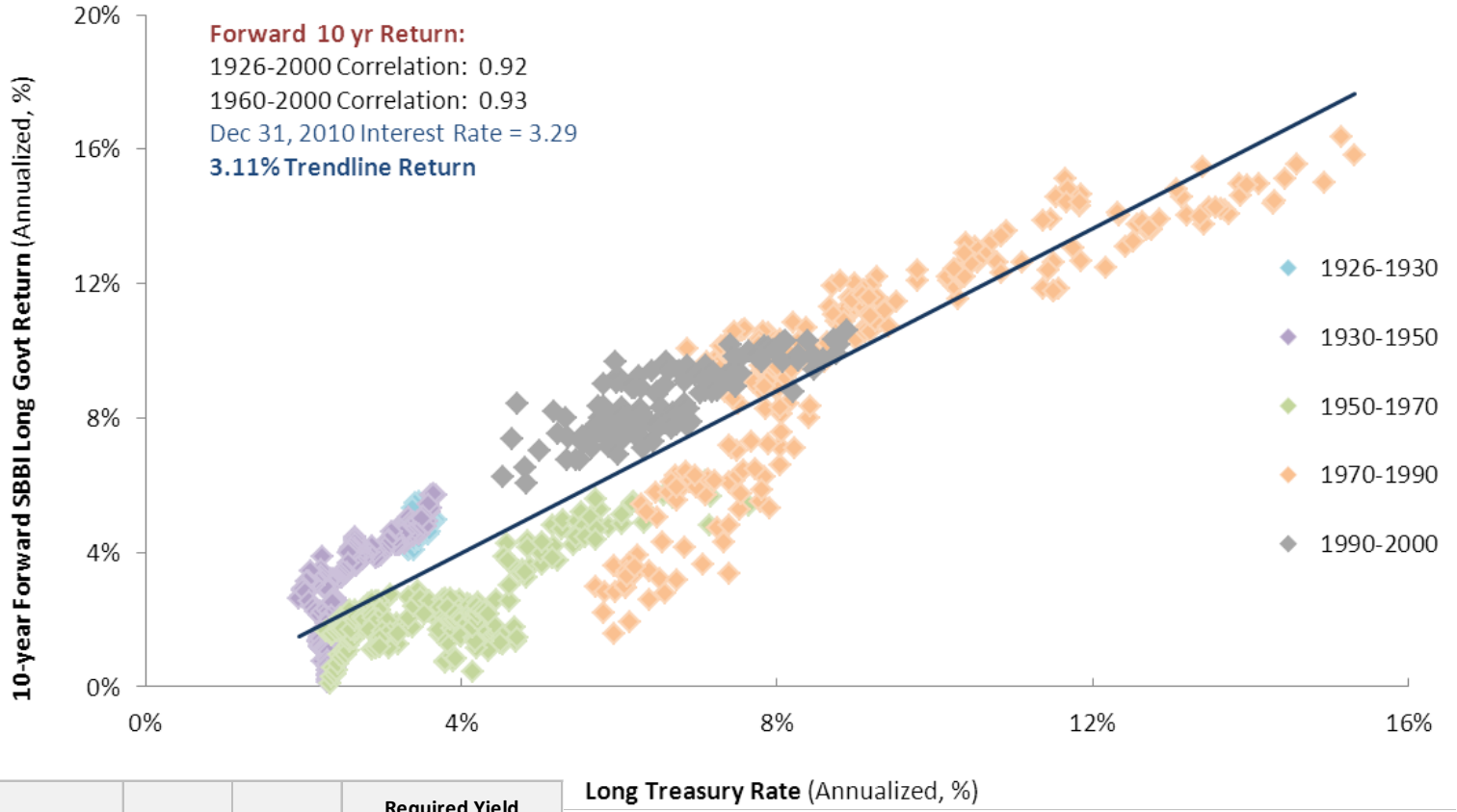
- **Stocks generally perform better when starting at lower P/E ratios**



Building a Portfolio for the Long Term

Valuations: Bonds

- **Bonds generally perform better when starting at greater yields**

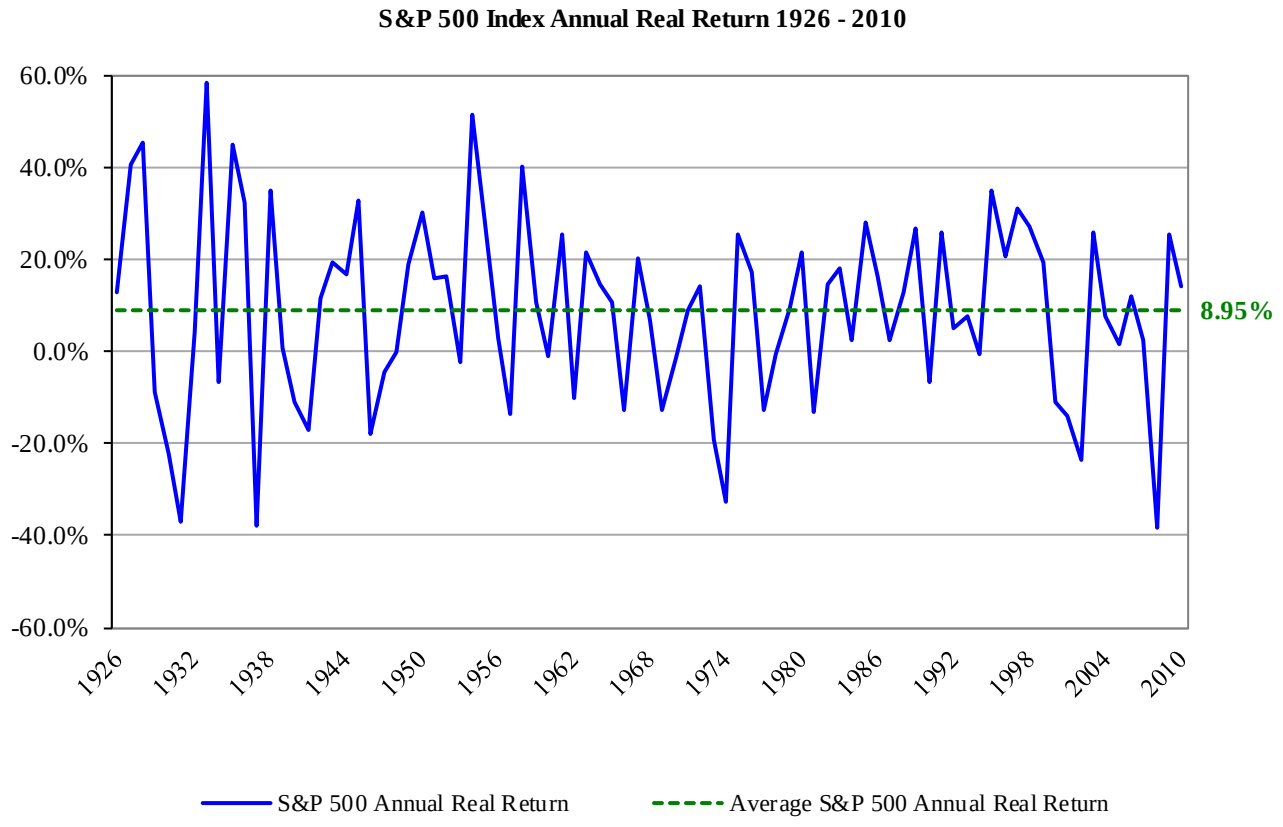


12/31/2010	Yield	Maturity	Required Yield (for 3-year period to achieve 5% return over 10 years)
BC Agg	2.97%	7.08	8.83%
BC Long Govt/Credit	5.07%	23.46	NA

Building a Portfolio for the Long Term

Equity Volatility

- **Historically good long term returns, but a bumpy road to get there**



Building a Portfolio for the Long Term

Implementation

- **Putting it all together:**
  - An asset allocation study utilizes an optimization model that incorporates capital market assumptions (return, risk, and correlation) to suggest optimal, or efficient, allocations
  - The assumptions and constraints used in the allocation model are a combination of quantitative analysis and qualitative judgment and are determined after considering the risk tolerances and asset classes available to the Plan
  - The analysis is intended to capture the expected return, risk and correlation with other asset classes over the long-term in order to select a target portfolio that best meets the needs of the Plan
  - Optimal allocations consist of portfolios that achieve the highest level of return for a given level of risk, or the lowest level of risk for a given level of return
  - Linking of each of the optimal, or efficient, portfolios creates the “Efficient Frontier”

Building a Portfolio for the Long Term

Review of Target Allocation

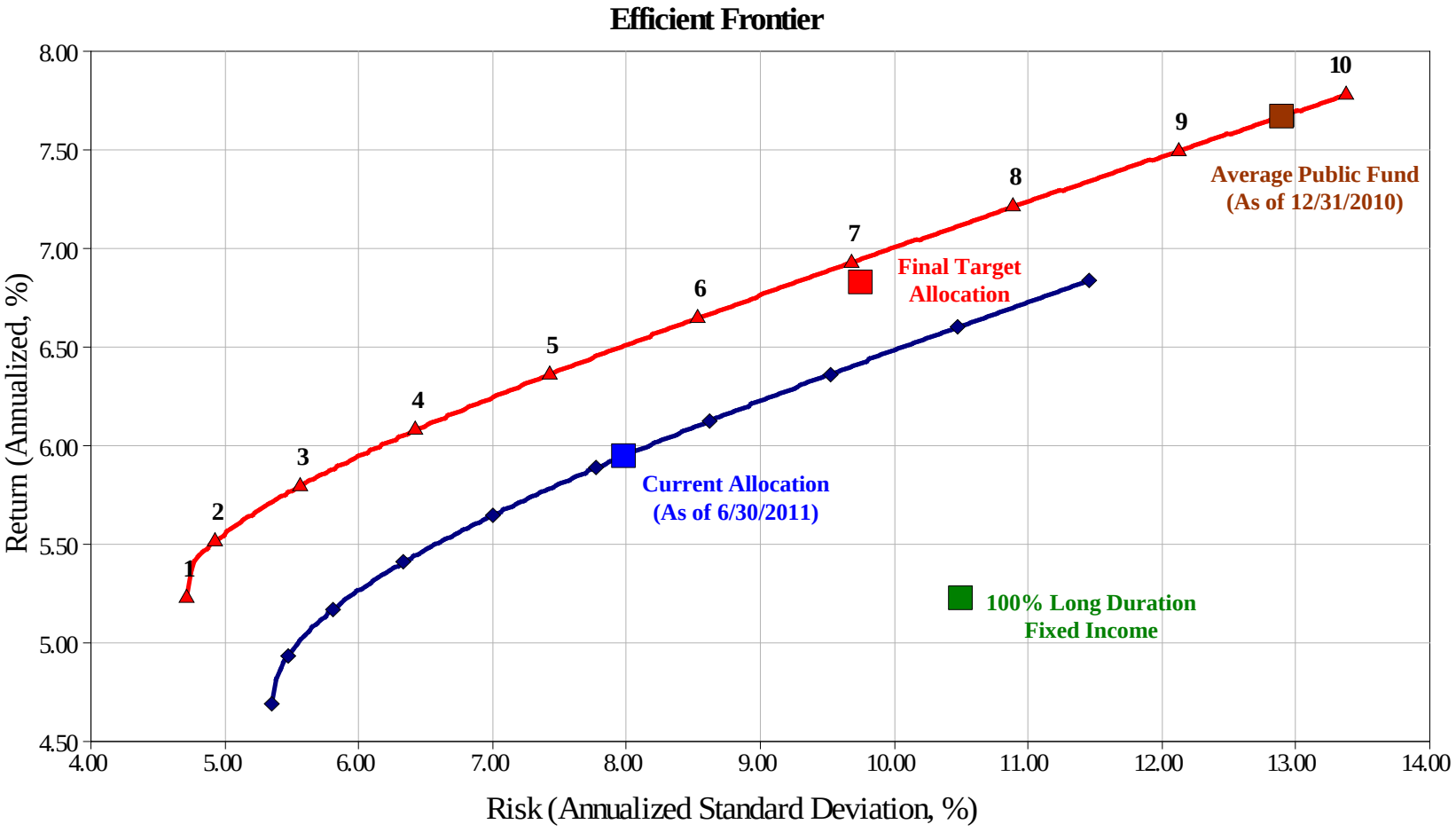
- **The long-term portfolio will be more diversified and similar to peers, yet unique to TMRS' risk tolerance and return objectives**
- **Many steps along the way, slow and methodical**

		Min	Max	100% Lng Dur Fixed Income	Current Allocation (As of 6/30/2011)	Final Target Allocation	Average Public Fund (As of 12/31/2010)
Asset Classes	Broad US Equity	0	30	0	19	20	29
	Broad International Equity	0	30	0	18	20	23
	Int. Duration Fixed Income	0	100	0	58	35	26
	TIPS	0	5	0	5	5	0
	Long Duration Fixed Income	0	0	100	0	0	0
	Real Return	0	0	0	0	0	1
	Core Real Estate	0	10	0	0	10	7
	Absolute Return	0	10	0	0	5	3
	Private Equity	0	5	0	0	5	11
	Total			0	100	100	100
Themes	Capital Appreciation			0	37	45	63
	Capital Preservation			100	58	35	26
	Alpha			0	0	5	3
	Inflation			0	5	15	8
Risk and Return	Expected Return			5.25	5.93	6.84	7.66
	Risk (Standard Deviation)			10.50	7.96	9.74	12.93
	Return (Compound)			4.73	5.63	6.40	6.89
	Return/Risk Ratio			0.50	0.74	0.70	0.59
	RVK Expected Eq Beta (LC US Eq = 1)			0.15	0.39	0.49	0.67
	RVK Liquidity Metric (T-Bills = 100)			85	88	76	74

Building a Portfolio for the Long Term

Review of Target Allocation

- **Efficient Frontiers**



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Building a Portfolio for the Long Term

TMRS Portfolio: Review 2010-2011

- **Asset Allocation Study Review – May 2010 and June 2011**
  - Extensive review of target expected return and risks and potential variations using RVK analytic templates with Senior Investment Staff and Executive Director
    - Thematic review
    - Beta review
    - Risk budgeting
    - Liquidity
    - Monte Carlo

- **Investment Policy Statement Revisions – June 2010 and March 2011**
  - Board adoption of new investment policy revisions
  - In-depth review and revisions of the TMRS investment policy are an ongoing process

- **Risk Management Program – October 2010**
  - Hired Director of Risk Management

Building a Portfolio for the Long Term

Asset Classes: Accomplishments 2010-2011

- **Fixed Income – January 2010**
  - Increased diversification from core only by addition of core plus strategy
    - "Core plus" is the addition of non-index security types to the portfolio
      - High yield
      - Non-U.S. fixed income
    - Adding the "plus" sectors introduces moderate risk yet enhances returns and provides diversification

- **Equities – August 2010**
  - Methodically increased U.S. and International equity exposure on a monthly basis
  - Non-U.S. allocation diversification – initiated move to expanded benchmark for exposure to small cap and emerging markets

Building a Portfolio for the Long Term

Asset Classes: Accomplishments 2010-2011

- **Real Estate**
  - Retained ORG as real estate consultant (May 2010)
  - Board adopted real estate policies and implementation strategies (Dec 2010)
  - First two real estate investments selected (Mar 2011)
    - Harrison Street and Stockbridge

- **Real Return – June 2010**
  - Decision made to implement allocation using global inflation-linked bonds
  - Investment policy guidelines for inflation-linked bond strategy were adopted
  - Selected external investment manager (Sep 2010)
    - Colchester

Building a Portfolio for the Long Term

TMRS Portfolio: Next Steps 2011-2012

- **Asset Liability Study – Fall 2011**
  - Analysis is currently underway
  - Results to be presented to Board in September
- **Asset Allocation – Spring 2012**
  - Comprehensive review and education regarding target allocation
  - Confirm or modify target as needed
- **Investment Policy – Ongoing**
  - Review and revise investment policy on a regular basis or as needed for new strategies or organizational changes
- **Risk Management Program – Fall 2011**
  - Re-evaluate policies and processes
  - Risk vendor search

Building a Portfolio for the Long Term

Asset Classes: Next Steps 2011-2012

- **Equities**
  - Consider further diversification of equity allocation
  - Research additional strategies
- **Fixed Income**
  - Review existing fixed income structure
  - Consider further diversification of fixed income strategies
- **Real Estate**
  - Investment manager searches
- **Real Return**
  - Research and consider additional sub-asset classes (i.e. commodities, etc.).
- **Absolute Return**
  - Staff to participate in research and education efforts
  - Identify appropriate strategies and implementation methods
- **Private Equity**
  - Staff to participate in research and education efforts

Building a Portfolio for the Long Term

Why Add Alternative Asset Classes

- **Real Estate**
  - Real estate-oriented investments have generated attractive long-term returns with low correlations to traditional asset classes and can provide an inflationary hedge
- **Absolute Return**
  - Absolute Return Strategies can have a significant impact on the expected risk/return profile of a portfolio, even with a relatively small allocation
    - Attractive correlations and risk adjusted returns over the long-term
    - Important piece of the total fund allocation (alpha)
    - Management fees and costs to be considered in selecting an implementation approach
      - Generally fees in this asset class are coming down
- **Private Equity**
  - Unique cash flow structure requiring paced cash funding and distributions
    - Investments are long-term, typically 10 years or more, with limited ability to liquidate before the termination of a partnership
    - Capital is called “as needed”, slowly over a period of years, and distributions occur irregularly as investments are sold
  - Additional costs, fees, and staffing needs to be considered

Conclusion

- **Diversification has continued in a methodical manner across divergent asset classes**
- **Timing and execution have been beneficial to performance and are keeping us on track**
- **Organizational improvements and additions have been made**
- **Significant work and change still ahead**

Questions?

Appendix

Modern Portfolio Theory

Recent Experiences

- **The market environment of 2008 raised concerns about Modern Portfolio Theory (MPT) and Mean Variance Optimization (MVO), which is the quantitative method through which MPT is implemented**

- **Asset classes and sub-asset classes experienced returns close to or outside historical norms and in certain cases went beyond a negative three standard deviation event (expected probability < 0.5%)**

- **Asset classes also exhibited high levels of correlation in 2008 as all (except US Treasuries) moved downward in unison regardless of historical correlation relationships**

- **Many investors perceived these events as a failure of MPT and diversification (although 2009 reversed much of the 2008 losses)**

Modern Portfolio Theory

Benefits and Limitations

- **Benefits of traditional MVO analysis**
  - Introduces the critical concept of diversification, which encourages investors to avoid concentrating risk in a small subset of assets or asset classes, especially highly correlated ones
  - Focuses portfolio management on asset allocation, an important driver of overall portfolio risk and return
  - Provides a quantitative tool to identify distinct asset allocation targets that have optimal risk/return trade offs
  - Enables better comprehension of diversification benefits resulting from the mixing of different asset classes under different constraints

- **Recognized shortcomings and limitations of traditional MVO**
  - Considers only standard deviation as the risk proxy
    - Liquidity, leverage and equity market sensitivity are additional risk considerations
  - Process requires correlation inputs to be treated as a constant rather than a variable
    - Correlations have shown a tendency to spike upward during short, non-normal market environments
  - Confined to normal return distributions and ignores non-normal attributes or return distributions

Modern Portfolio Theory

Conclusions

- **Events of 2008 exposed some of the weaknesses of MPT and MVO**
- **RVK has developed additional tools to enhance the usefulness of traditional MVO analysis and ongoing portfolio monitoring**
  - Equity beta sensitivity, risk contribution, thematic analysis, and liquidity metrics provide additional information regarding potential portfolio risks
  - Monte Carlo simulations provide a range of probable outcomes, including utilization of a non-normal (fat tail) distribution to better simulate adverse portfolios outcomes
  - Stress testing model inputs and their impact on expected outcomes by using extreme asset class standard deviations and spiking correlations
- **RVK believes that modern portfolio theory and mean variance optimization together remain the most proven tools available to aid in the construction of a diversified portfolio customized to a particular risk/return objective**