



INVESTMENT MANAGEMENT COMMITTEE



November 2015

**TEACHER RETIREMENT SYSTEM OF TEXAS MEETING
BOARD OF TRUSTEES
AND
INVESTMENT MANAGEMENT COMMITTEE**

*(Committee Chair and Members are Subject to Change at the November Board Meeting
Mr. Barth, Committee Chair; Mr. Colonna; Mr. Corpus; Mr. Kelly; & Ms. Sissney,
Committee Members)*

AGENDA

**November 19, 2015 – 12:30 p.m.
TRS East Building, 5th Floor, Boardroom**

1. Consider the approval of the proposed minutes of the September 24, 2015 committee meeting – Committee Chair.
2. Review Risk Management and Strategies – Jase Auby.
3. Review Asset Allocation –Mohan Balachandran.

NOTE: The Board of Trustees (Board) of the Teacher Retirement System of Texas will not consider or act upon any item before the Investment Management Committee (Committee) at this meeting of the Committee. This meeting is not a regular meeting of the Board. However, because the full Investment Management Committee constitutes a quorum of the Board, the meeting of the Committee is also being posted as a meeting of the Board out of an abundance of caution.

Minutes of the Investment Management Committee

September 24, 2015

The Investment Management Committee of the Board of Trustees of the Teacher Retirement System of Texas met on September 24, 2015 in the boardroom located on the fifth floor of the TRS East Building offices located at 1000 Red River Street, Austin, Texas. The following committee members were present:

Joe Colonna, Presiding Chair
Todd Barth
David Corpus
David Kelly
Nanette Sissney

Others present:

Christopher Moss, TRS Trustee	Dan Junell, TRS
Anita Palmer, TRS Trustee	Eric Lang, TRS
Karen Charleston, TRS Trustee	Lynn Lau, TRS
Dolores Ramirez, TRS Trustee	Mike Pia, TRS
Brian Guthrie, TRS	Sam Zell, Equity Group Investments
Ken Welch, TRS	Steve Huff, , Fiduciary Counsel, Reinhart Boerner Van Deuren s.c.
Jerry Albright, TRS	Dr. Keith Brown, Investment Advisor
Carolina de Onís, TRS	Mike Comstock, Aon Hewitt
Britt Harris, TRS	Steve Voss, Aon Hewitt
Dale West, TRS	Philip Mullins, Texas Retired Teachers Association
Jase Auby, TRS	Ann Fickel, Texas Classroom Teachers Association
Grant Birdwell, TRS	Ted Melina Raab, Texas American Federation of Teachers
Susanne Gealy, TRS	Tathata Lohachitkul, Albourne America
Brad Gilbert, TRS	James Walsh, Albourne America

Mr. Colonna called the meeting to order at 9:29 a.m. A quorum was present.

1. Consider the approval of the proposed minutes of the June 11, 2015 committee meeting – Committee Chair.

On a motion by Mr. Kelly, seconded by Mr. Barth, the committee unanimously voted to approve the proposed minutes of the June 11, 2015 meeting, as presented.

Mr. Colonna announced that the committee would take up agenda item 5.

5. Discuss TRS' long-term space planning project, including the establishment of a foreign satellite investment office and matters related to staffing and real property – Jerry Albright.

Mr. Albright provided an update on the establishment of the investment office in London. He stated that staff had acquired office space at 14 Curzon Street in the Mayfair District in London on August 30. He described the building environment and office layout, setup, and capacity. He said that the budget was not impacted by a recent rental cost increase because adjustments had been made to lower the budget for furniture, fixtures, and tenant improvements. He confirmed for Mr.



Kelly that the initial lease term was for 12 months with an option to extend for another 12 months. Mr. Albright stated that investments and information technology staff had traveled to London to set up the facility. He stated that staff planned to officially open the office in November.

2. Strategic Partnership Network Update – Michael Pia and Grant Birdwell

Mr. Pia and Mr. Birdwell provided an overview and update on the Strategic Partnership Network (SPN). He described the SPN's program history, current performance, major mandates, and benchmark. Responding to a question from Mr. Kelly regarding the lack of investment allocation in real estate investment trusts (REITs), Mr. Birdwell stated that there was a tradeoff between the utility of a headlight system and trying to maintain a risk and return profile in line with the Investment Policy Statement. He stated that REITs were designated as an opportunistic asset class and investments would be made in them should they become attractive.

Mr. Birdwell provided an overview of the performance of the public markets SPN for the period ending June 30. He stated that the alpha generated was slightly higher than in 2014, but was below the program target of 200 basis points. He stated that performance relative to the TUCS peer group (public plans with greater than \$1 billion) was not as high as before, because private equity and real estate (which had significantly outperformed global public equities in recent periods) were not in the trust's public SPN, but were in most of the peer groups' portfolios.

Mr. Birdwell described the public markets SPN's relative positioning in each asset class as of June 30, 2015. He stated that the partners in aggregate were overweight global equity by 5.3 percent with a focus on the international developed market and were underweight stable value by roughly 3.6 percent with a focus on the international fixed income and credit over U.S. treasuries markets. He said that in real return they were overweight by 1 percent with a focus on inflation-linked securities. He stated for Mr. Barth that there was consensus around positioning development among the partners, but that there were also wide disparities.

Mr. Birdwell provided an overview of the July 2015 Joint SPN Summit in New York. He highlighted a detailed discussion that occurred with Dr. Henry Kissinger about geopolitical events.

Mr. Birdwell provided a summary of the research projects produced by the partners.

Mr. Pia presented the accomplishments and priorities of the SPN program. He stated that the public SPN brought in value in six of seven years and added \$2.6 billion to the trust.

3. Aon Hewitt Hedge Fund Discussion – Steve Voss and Mike Comstock.

Mr. Voss and Mr. Comstock provided a presentation on hedge funds and described the definition of a hedge fund, reasons for investing in hedge funds, pros and cons associated with investing in hedge funds, and TRS' hedge fund exposure over the past few years compared with that of TRS' peer groups. Responding to a question from Mr. Barth concerning mitigating key man risk, Mr. Harris stated that it would probably be best to divest from a fund if a key man leaves the fund.

Mr. Comstock discussed the historical performance of hedge funds over the past 25 years and the benefits of hedge fund exposure over the years in terms of diversification effect. Mr. Voss further



discussed effects hedge funds had in reducing risk and improving Sharpe ratios. Mr. Voss, Mr. Harris, and Mr. West responded to questions from Ms. Sissney, Mr. Colonna, and Dr. Brown regarding the significant disparity between the utilization of hedge funds by the institutional and private high-net worth markets.

4. Receive a review of the External Public Markets Portfolio – Dale West, Susanne Gealy, and Brad Gilbert.

Mr. West provided an annual summary of the External Public Markets Portfolio, including its performance, asset allocation, investment highlights, priorities, team structure, and applicable legislative and policy parameters. Mr. Guthrie noted that legislative constraints and other matters related to hedge funds would be open for discussion during the sunset review process. He stated that it would be an opportunity for staff to propose changes. He stated for Mr. Kelly that the sunset review is conducted every twelve years.

Ms. Gealy described the external public critical process developed in collaboration with TRS consultants, also known as the “Texas Way.” She highlighted the Texas Way processes for manager due diligence, portfolio construction, risk oversight, transparency, and communications. She also provided an update on the performance of the long-oriented Global Equity Portfolio. In response to a question from Dr. Brown regarding the connection between the negative alpha in the U.S. market portfolio and the overall high absolute return of the asset class, Ms. Gealy stated that the negative 2.9 percent alpha in the U.S. portfolio was partly due to poor large cap stock picking over the last year by individual managers. She noted that small cap manager allocations had been successful. Ms. Gealy detailed the performance of the non-US developed, emerging markets, and world equity portfolios. She stated that performance results, due diligence, and portfolio construction had resulted in about 10 percent manager turnover, consisting of about four terminations and four hires. Responding to a question from Mr. Kelly, Ms. Gealy stated that termination decisions were based on negative outlook for future alpha, instead of alpha achieved. Ms. Gealy also noted the importance of patience in achieving a successful long-term investment strategy.

Mr. Gilbert provided an update on the directional and stable value Hedge Fund Portfolios and presented each of their performance results. In response to a question from Dr. Brown, Mr. West clarified that the 2 percent of trust risk that hedge funds represented included 1.8 percent from directional hedge funds and -0.1 percent for stable value hedge funds.

Mr. West concluded the presentation with a summary of the highest priorities for 2016.

After a brief recess at 10:45 a.m., the committee reconvened at 10:56 a.m.

6. Interview with Sam Zell, founder and Chairman of Equity Group Investments, covering lessons learned in investing and life, as well as the investment opportunities that he sees today – Eric Lang.

Mr. Lang introduced Mr. Sam Zell, highlighted his accomplishments in the investment world, and conducted an interview with him. During the interview, Mr. Zell shared his thoughts on a wide



spectrum of topics, including his life experience, investment insights, and projections on future investment opportunities and risks.

The meeting adjourned at 12:00 p.m.

APPROVED BY THE **INVESTMENT MANAGEMENT COMMITTEE** OF THE BOARD OF TRUSTEES OF THE TEACHER RETIREMENT SYSTEM OF TEXAS ON THE 19TH DAY OF NOVEMBER, 2015.

ATTESTED BY:

Dan Junell
Secretary to the TRS Board of Trustees

Date





Risk

Jase Auby
Chief Risk Officer
November 2015

Agenda

- I. Executive Summary
- II. Risk Group Personnel and Risk Mandate
- III. Key Risk Signals
 - Enhanced Risk Signals
 - Bubbles
 - Environmental
 - CUSUM
 - Bear Market Indicators
- IV. 2015 Priorities
 - Risk Parity
 - Low Volatility
 - Dynamic Currency
- V. 2016 Priorities (Preliminary)

Executive Summary

As of September 30, 2015

In 2015, the Risk Group:

- Executed our mandate to enable efficient risk taking

Manage Risk	Monitor Risk
Signals	Reporting
Budgeting	Certification
Strategies	Compliance

- Contributed to the Trust's alpha

RISK GROUP											
Portfolio	Total Assets		Return		Alpha (bp)		Tracking Err (bp)		Info Ratio		Incept Date
	\$, mill	% Trust	1-Year	Incept	1-Year	Incept	1-Year	Incept	1-Year	Incept	
External Risk Parity	\$2,033	1.6%	-7.4%	2.2%	-27	39	28	628	-0.95	0.06	Feb-12
Internal Risk Parity	1,392	1.1	-2.8	6.6	429	648	319	655	1.34	0.99	Jul-13
Low Vol with Overlay	479	0.4	6.1	17.4	663	359	414	369	1.60	0.97	Jan-13
Directional Hedge Funds	241	0.2	-3.7	-3.7	-261	-261	370	459	-0.70	-0.57	Feb-15
Reinsurance	291	0.2	12.4	14.5	1179	1142	369	327	3.19	3.49	Oct-13
Dynamic Currency*	0	0.0	-0.1	-0.1	-15	-15	35	35	-0.42	-0.42	Mar-15
Total Risk Group	\$4,436	3.5%	-3.5%	5.1%	178	183	125	547**	1.42	0.33**	Feb-12

Periods longer than 12 months are annualized

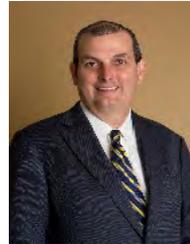
- Completed five priority projects – (1) Risk Parity funding, (2) Low Volatility portfolio development, (3) Currency Hedging implementation, (4) ENR benchmark review and (5) internal Risk Group monitoring enhancements



* Dynamic Currency is shown as a contribution to Total Risk Group

** Using the new Risk Parity benchmark (adopted Oct-14) for the since inception period (since Feb-12) tracking error and info ratio improve from 547 bp to 119 bp and from 0.33 to 2.12.

Risk Group Personnel



Jase Auby, CFA
**Chief Risk Officer, Senior
Managing Director**
*BS, Electrical Engineering,
Harvard College*

Risk Group Highlights

Four Masters Degrees
Three CFAs



James Nield, CFA
**Deputy Chief Risk Officer
Senior Director**
*MBA, Finance,
New York University
BS, Finance
Pennsylvania State University*



Mark Telschow, CFA
Investment Manager
*BS, Civil Engineering,
University of Texas*



Mike Simmons
Associate
*MPA, Accounting,
University of Texas
BBA, Finance
Texas A&M University*



Steven Lambert
Associate
*BS, Business Management,
Saint Joseph's College
(Maine)*



Stephen Kim
State Street Employee
*MBA, Finance,
University of Texas
BS, Computer Science
Dartmouth College*



Josiah Stevenson
Analyst
*MS, Economics,
University of Texas
BS, Economics
Texas A&M University*



Paul Waclawsky
Administrative
*BS, Accounting
University of Maryland*

Risk Mandate

Enable efficient risk taking

Manage

Signals

- Identify and monitor key statistical thresholds, which when crossed, will cause specific investigation and action
- **Bubble Signals** and **CUSUM Signals** are important types of Risk Signals

Budgeting

- Manage how Trust allocations and correlations combine to either overweight or underweight the risk of the Trust
- Focus upon **Tracking Error** and **Value-at-Risk**

Strategies

- Investment strategies to **improve the return and risk profile** of the Trust
- **Risk Parity, Reinsurance, Low Volatility with Overlay, Currency Hedging**
- Additionally, contribute signals to TAA (**Bubbles, Environmental, Valuation**)

Monitor

Reporting

- Prepare useful **Risk Reports**
- Monitor Trust risks which include Market, Leverage, Liquidity, Concentration, Currency, Counterparty and other risks

Certification

- **Certify all new External Public investments** with respect to Market Factors, Leverage, Drawdown History, Liquidity, Risk Management Systems and Audit History
- Review new strategies within External Private investments

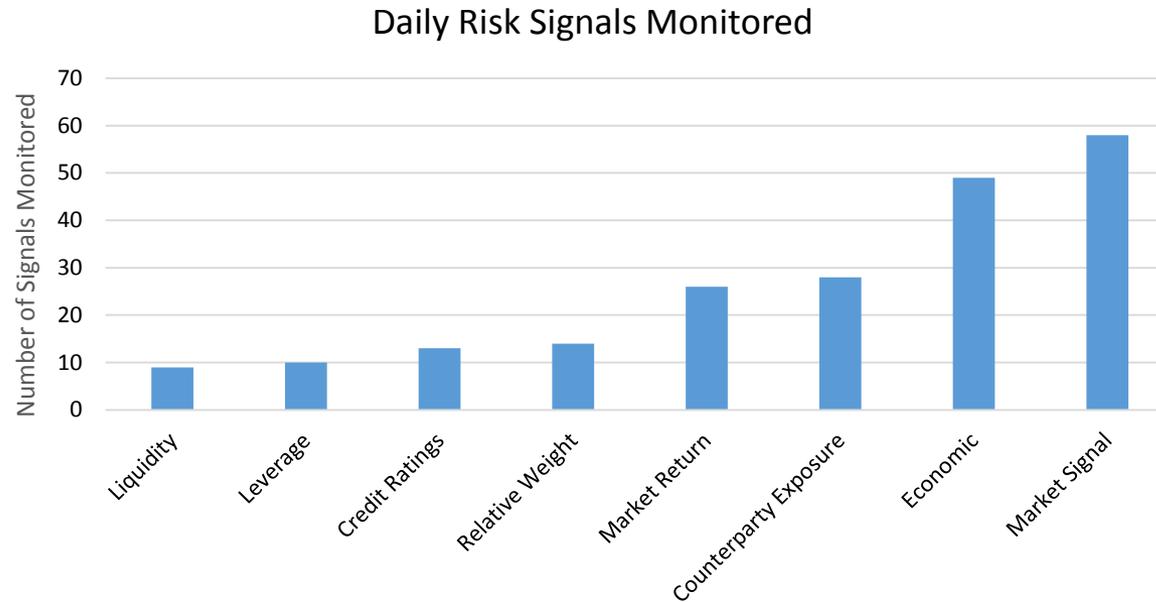
Compliance

- Monitor and resolve **Compliance Issues** raised by the Investment Compliance group

Key Risk Signals

Enhanced Risk Signals

- The Risk Group is monitoring over 200 risk signals on a daily basis:

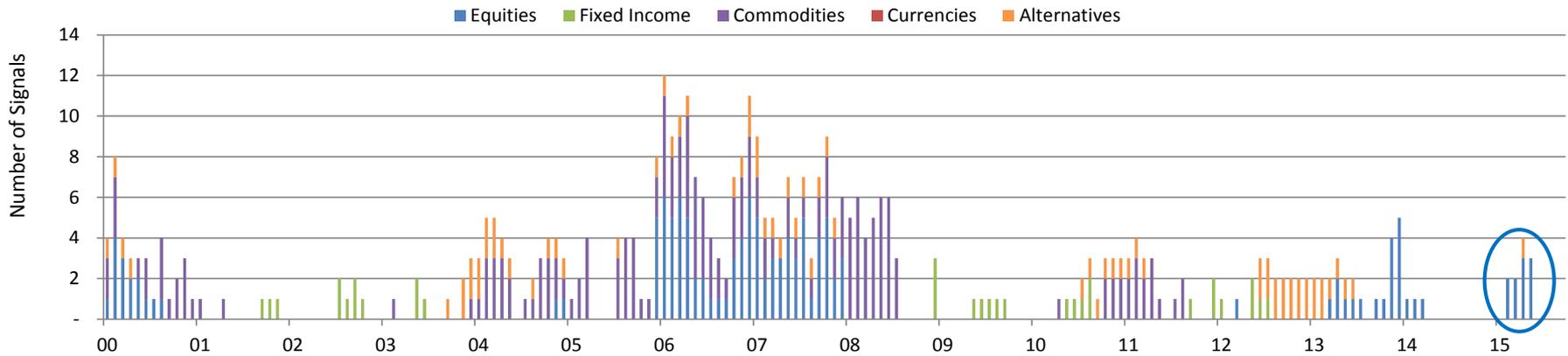


- As a 2015 priority, we automated the monitoring of daily signals into one report
- The signals are purposely “noisy” in that they are triggered frequently with many false alarms
- The most relevant signals are communicated to management

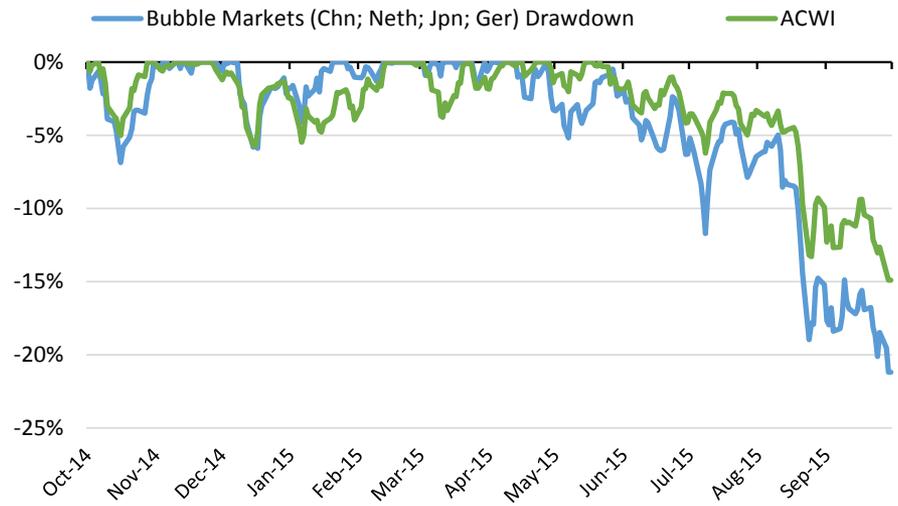
Key Risk Signals

Bubbles

Monthly Bubble Signals by Asset Class



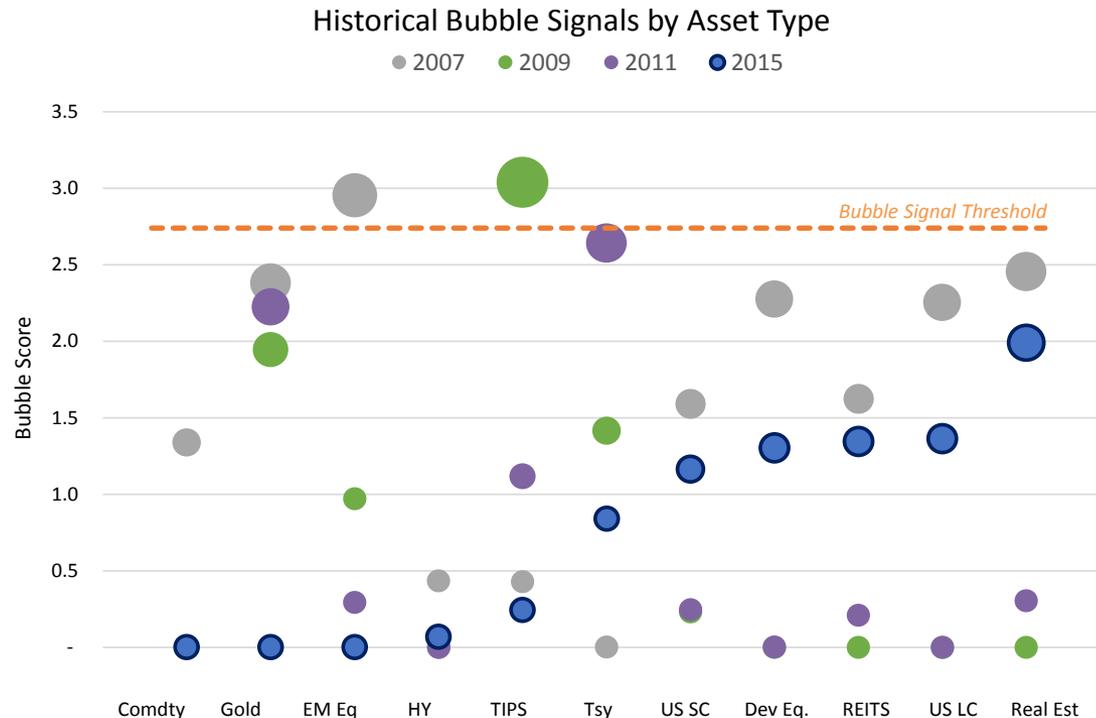
- Bubble signals have primarily occurred in equity markets this year
 - China, Netherlands, Japan, and Germany
 - These markets have suffered large drawdowns (as shown to the right)
- Today's environment differs from the mid-2000s when we saw more signals across more asset classes
- As of September 30, 2015 there were no active bubble signals



Key Risk Signals

Bubbles

- Shown below are the bubble signals for eleven major asset classes that are important to the Trust. In total we track over 100 individual assets for bubble signals.



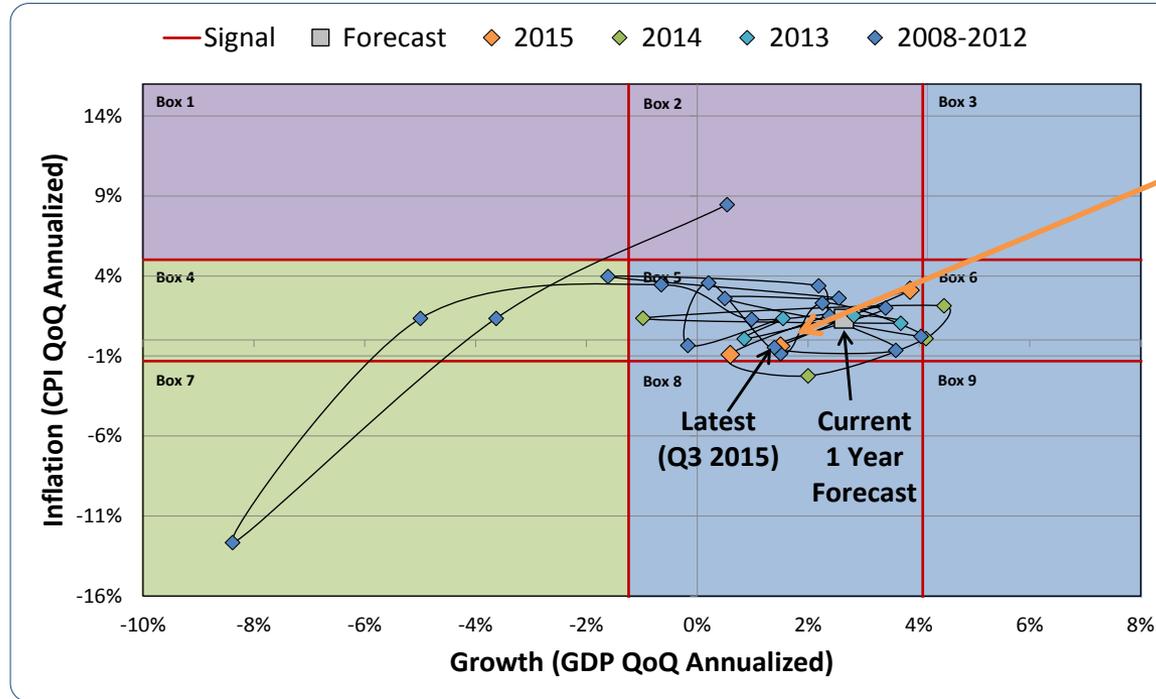
- Real Estate and Equities are the major asset classes today that are closest to generating a signal, however, both major asset class signals are below 2007 levels
- Commodities, Gold and Emerging Market Equities are furthest from generating a signal

Key Risk Signals

Environmental

Real Return	Global Equity
Stable Value	Equity

US Macro Environment



US is currently in Box 5 and is projected to stay there

Global Macro Environment

Region	Q3 2015	Q2 2015	Q1 2015	Q4 2014
US	Box 5	Box 5	Box 5	Box 8
Europe	Box 5*	Box 5	Box 5	Box 8
Japan	Box 5*	Box 5	Box 5	Box 5
EM ex-China	Box 5*	Box 5	Box 2	Box 5
China	Box 5	Box 8	Box 4	Box 5

The world has been predominantly in a Global Equity regime throughout the year

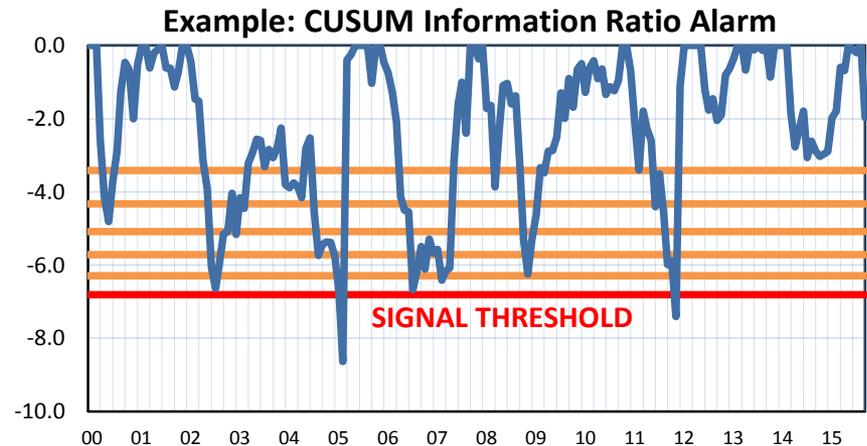
* Not yet reported – boxes shown are forecasts



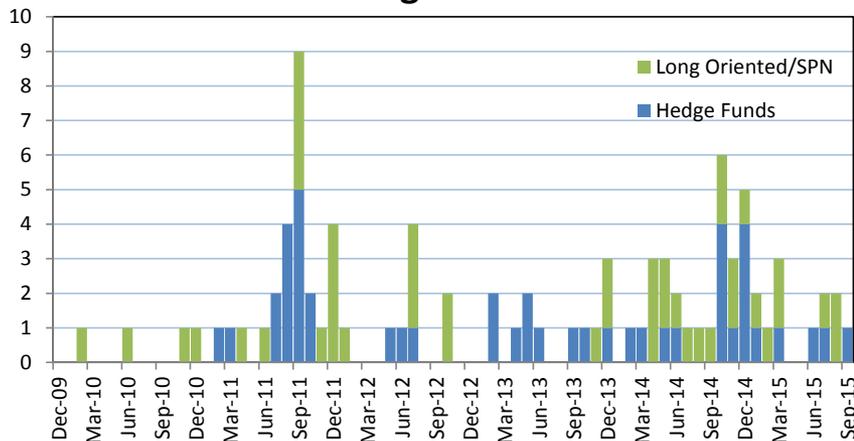
Key Risk Signals

CUSUM: TRS Public Portfolios

- **CUSUM Signal:** a tool designed to identify patterns of persistent underperformance within portfolios; signal initiates a buy/sell decision
- CUSUM Signals program launched in January 2010



CUSUM Signals to Date



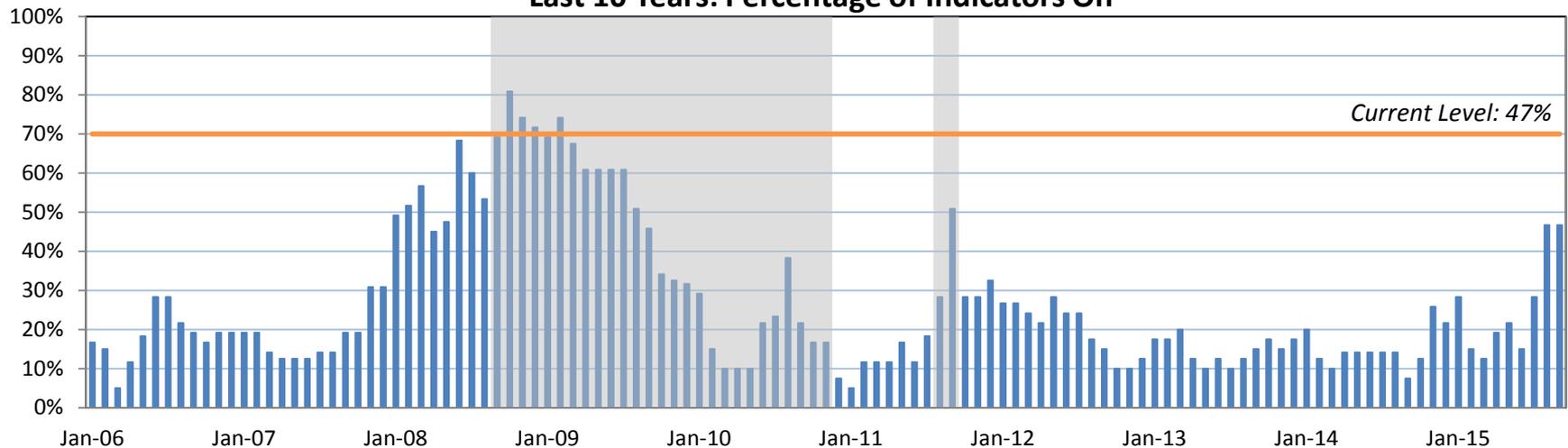
- 89 Portfolio CUSUM Signals to date:
 - 66 buys, 19 sells, 4 pending
- **Results are encouraging:**
 - Managers that received a “Buy” rating outperformed the benchmark by **+1.1%** on average over the next 12 months
 - Managers that received a “Sell” rating outperformed the benchmark by **+0.3%** on average over the next 12 months

Key Risk Signals

Bear Market Indicators

- The TRS Bear Market Indicators consists of 22 macroeconomic and market signals
 - Example: Inflation, Employment, Growth, Credit and Market
- Since 1967, when 70% or more indicators are “on,” the market has entered a bear market within the next six months 63% of the time.

Last 10 Years: Percentage of Indicators On



- Currently, 47% of indicators are on indicating a heightened risk of a bear market.

2015 Priorities

	Priority	Description
Strategies	1 Risk Parity	Increased allocations to External Managers and to Internal Portfolio. Funding approved for two additional managers.
	2 Low Volatility with Overlay	Increased allocation to USA portfolio, launched paper portfolios for Non-US Developed and Emerging Markets
	3 Currency Hedging	Investigated Trust currency hedging, researched and launched small currency hedging overlay
Budgeting	4 ENR Risk Model	Reviewed best practices and updated the Energy and Natural Resources risk model
Monitor / Manage	5 Risk Signals	Expanded Risk Group monitoring processes to incorporate additional performance data, trust holdings data, macro indicators and risk indicators

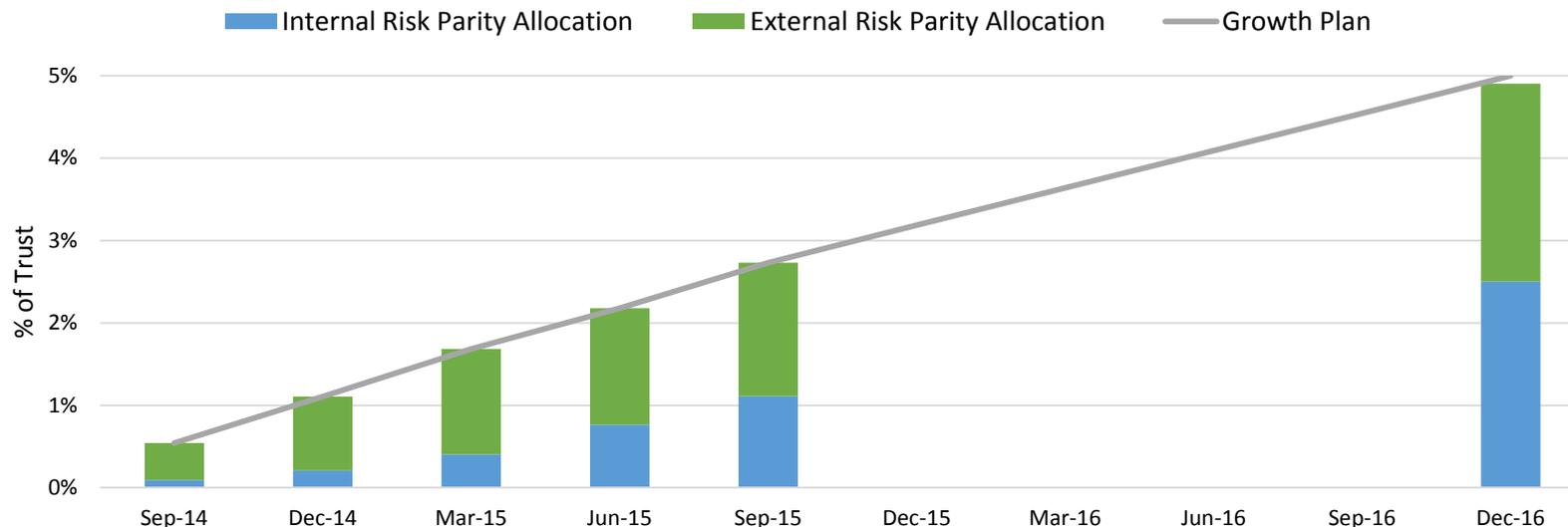
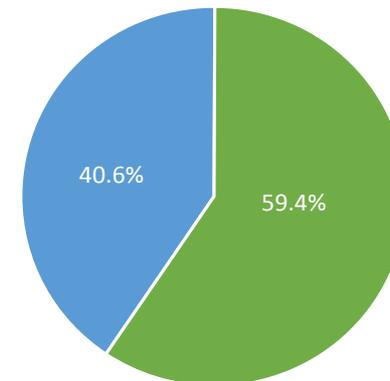
Risk Parity

SAA Implementation Update

- Risk Parity funding plan on track
- Total Risk Parity represents 2.7% of Trust assets as of September 30, 2015
 - Plan is to reach a 5% Trust allocation by September 30, 2016
- Internal Risk Parity represents 40.6% of the Total Risk Parity allocation
 - Plan is to reach a 50% allocation to internal strategy

Current Risk Parity Dollar Allocation

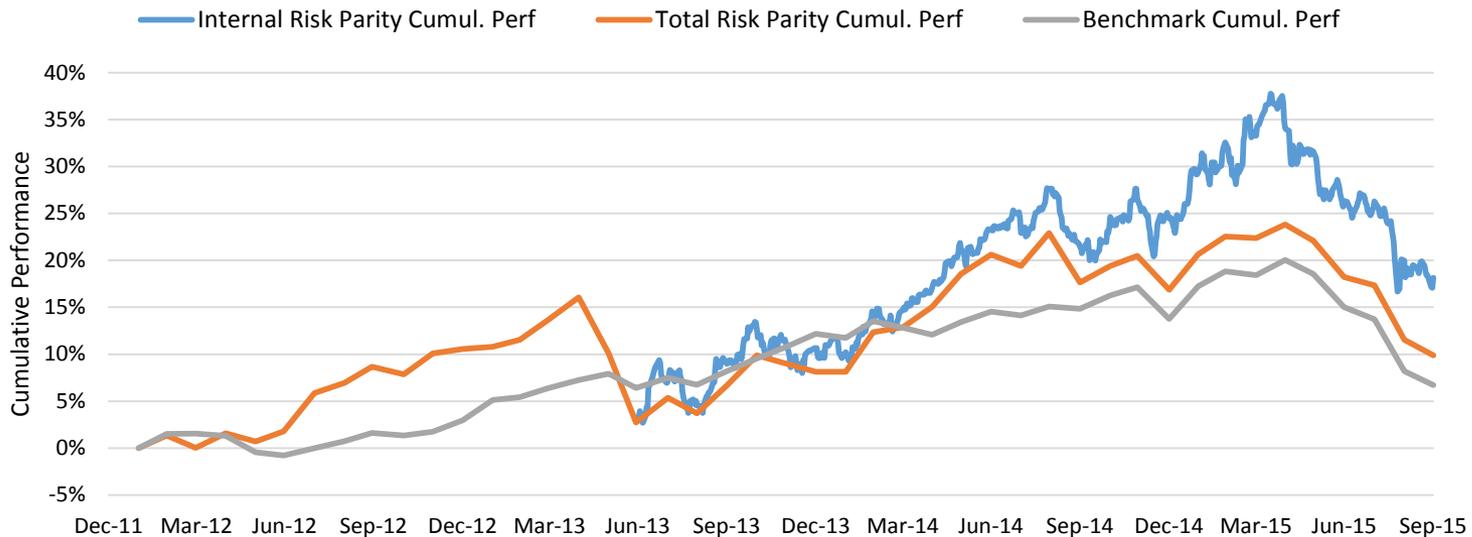
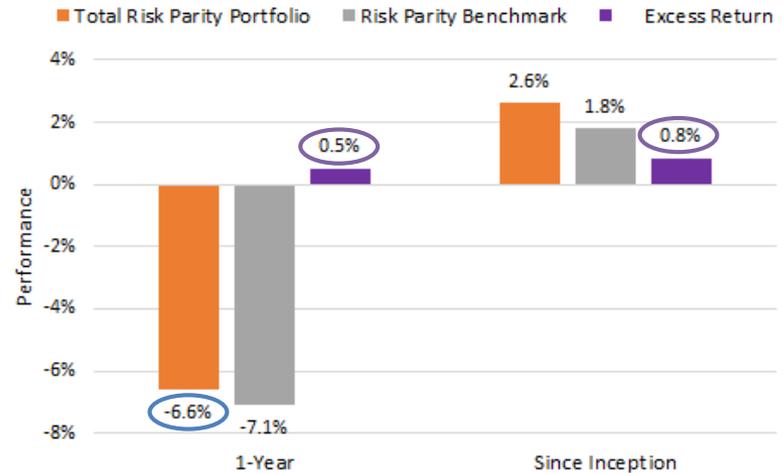
■ Internal Risk Parity ■ External Risk Parity



Risk Parity

Performance

- Total Risk Parity declined **-6.6%** over the past year primarily due to a poor 3rd quarter in 2015
- Total Risk Parity portfolio has outperformed the benchmark for **the past year and since inception**



Note: Cumulative Total Risk Parity performance shown since inception (February 2012). Internal Risk Parity was first funded in July 2013. Current benchmark approved October 2014

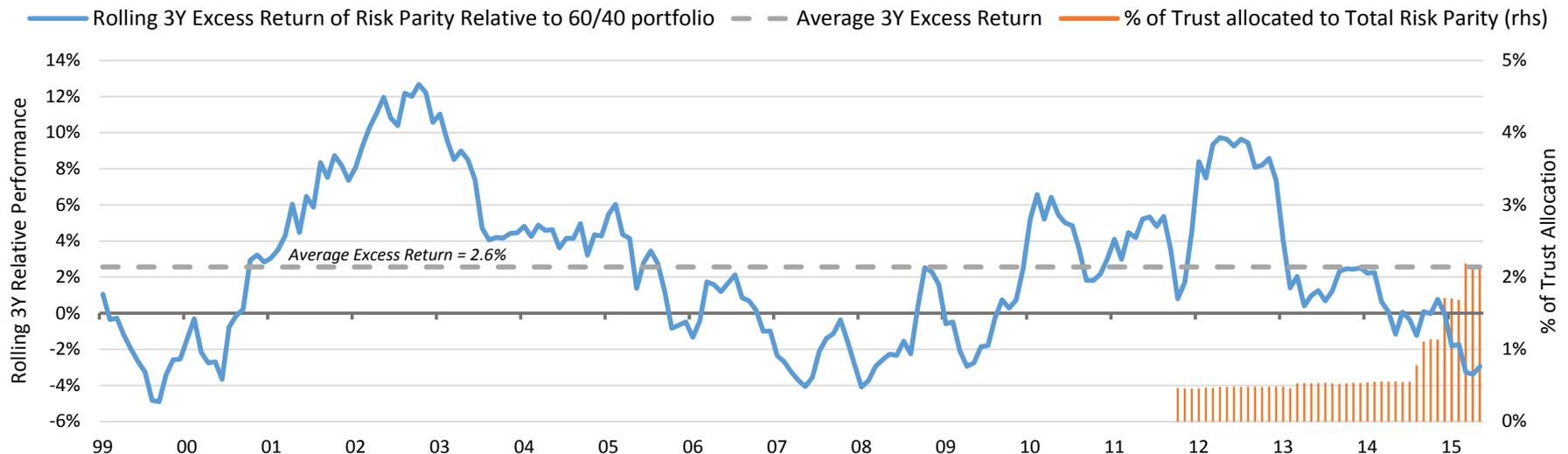
Risk Parity

Relative Returns

- It is not uncommon for a Risk Parity strategy to underperform a 60/40 strategy, sometimes even for prolonged periods
 - However, we remain confident that Risk Parity will outperform a 60/40 portfolio construction in the long run
- Risk Parity has recently underperformed a global 60/40 portfolio on a rolling three year basis. In the past this has provided a good entry point

% of Periods Since 1925 that Risk Parity Outperformed a Global 60/40 Portfolio

Rolling 1-Year Returns	58%
Rolling 3-Year Returns	62%
Rolling 5-Year Returns	65%
Rolling 10-Year Returns	72%
Rolling 20-Year Returns	80%



Source: Bridgewater (upper right table) and TRS (lower chart)

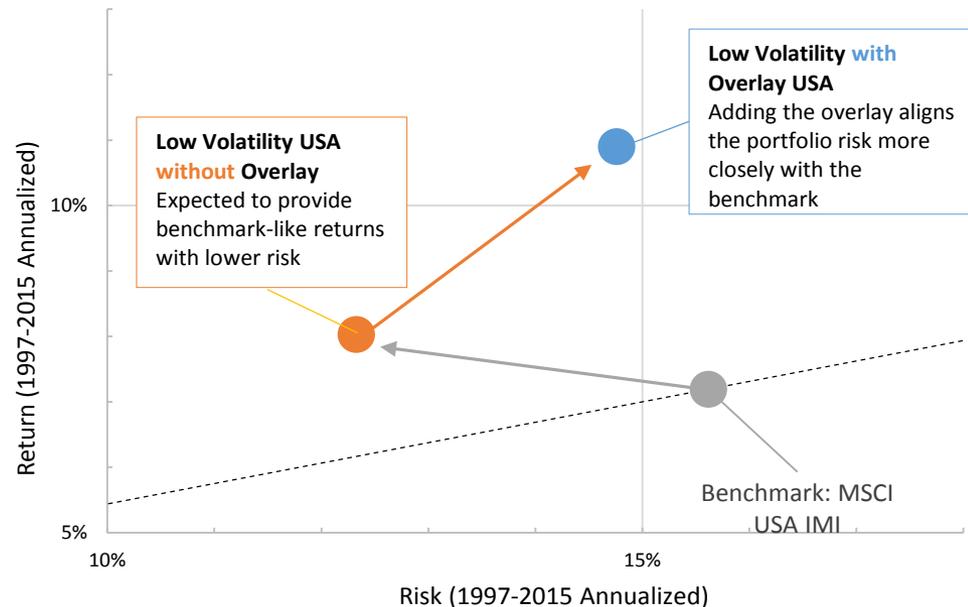
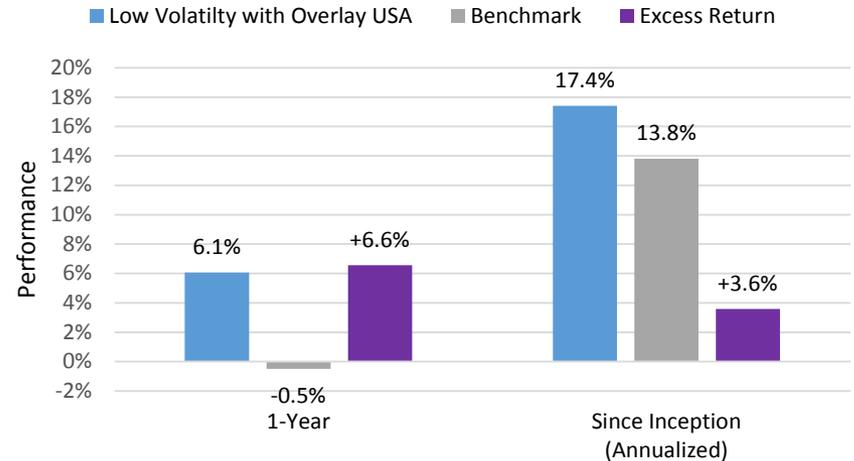
Note: Risk Parity rolling 3 year returns based on a blend of external manager returns, 60/40 portfolio based on MSCI ACWI unhedged and Barclays Global Major Bond Index unhedged. In addition, results provided by Bridgewater are not necessarily indicative of future results and given that they are simulated results they do not reflect actual results that would have been realized.

Low Volatility with Overlay

As of September 30, 2015

Low Volatility with Overlay USA (\$479 million)

- Funded Inception Date: January 2013
- 1 Year Outperformance: +6.6%
- Since Inception Outperformance: +3.6% (Ann)

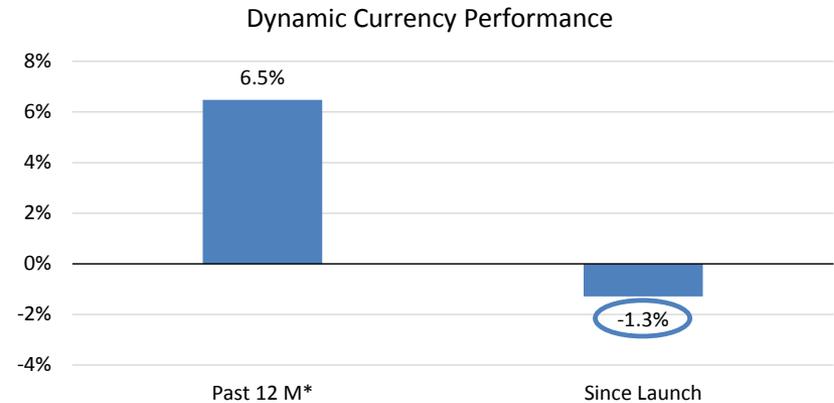


Note: Performance period for scatter plot includes backtest (Jan-97 to Jun-12), paper portfolio performance (Jul-12 to Dec-12), and live performance (Jan-13 to Sep-15). Benchmark is MSCI USA prior to October 1, 2014 and MSCI USA IMI thereafter (policy benchmark).

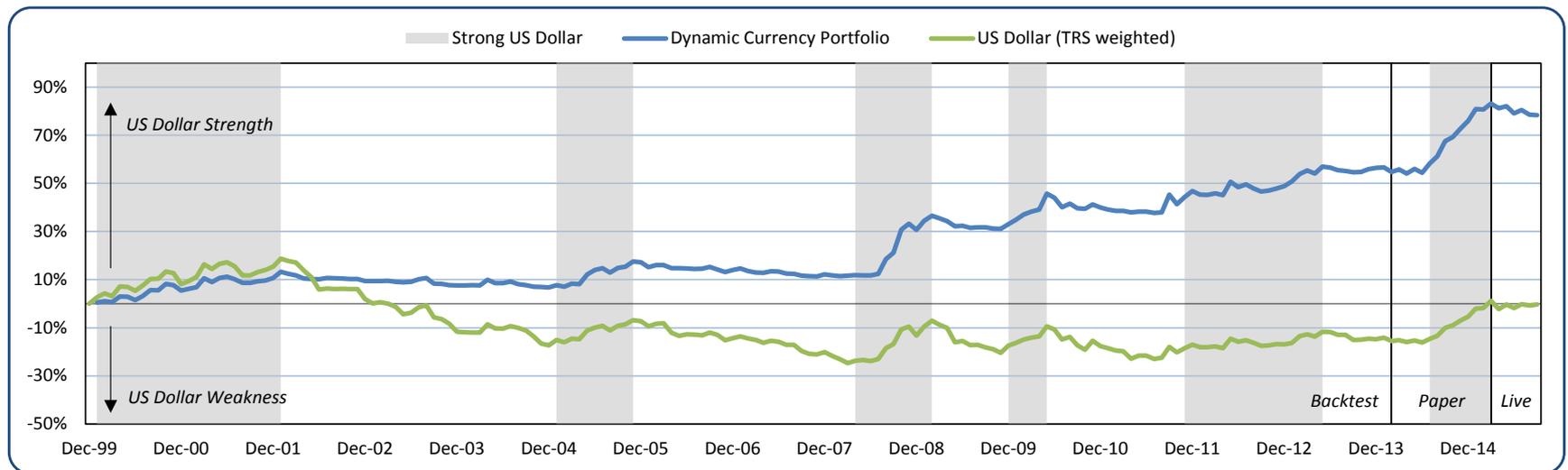
Dynamic Currency

As of September 30, 2015

- \$38.3 billion (30%) of the Trust is invested in non-US Dollar assets
- The \$500 million notional (0.4% of the Trust) Dynamic Currency portfolio seeks to hedge non-US Dollar exposure during episodes of US dollar strength while limiting downside when the US Dollar is weak.
- Performance since inception is **-1.3%**



* Includes paper performance before launch on March 1, 2015



2016 Priorities

Preliminary

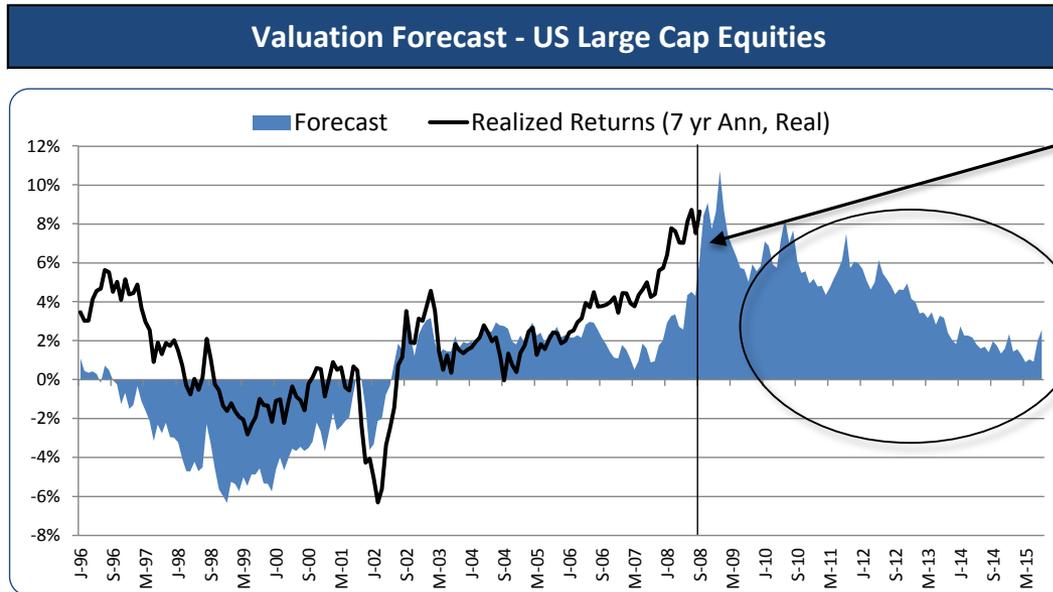
	Priority	Description
Strategies	1 Risk Parity	Continue to increase Risk Parity allocation, research portfolio enhancements
	2 Risk Parity	Enhance robustness of Risk Parity technology infrastructure
	3 Low Volatility with Overlay	Research Non-US Developed and EM portfolios
Monitor / Manage	4 Regime Signals	Investigate asset allocation regime signals from external partners and consider applicability to bubble and other processes
	5 Budgeting	Partner with other groups to review internal portfolio construction
General	6 Continuous Improvement	Host June conference at TRS for pension risk management peer group

APPENDIX

Key Risk Signals

Valuation Signals

- Long-term asset class valuation models are used to monitor asset class risk premiums across country equity and bond markets



Example: On September 30, 2008 the forecast for the next seven years was 6.2%. Subsequently, the seven year realized real return was 8.7%.

Forecasted seven-year returns for equities have been trending lower over recent history

5 Highest Value Forecasts	7Y Forecast (Real)	1Y Change in Forecast
China (Equity)	14.4%	+0.3%
Hong Kong (Equity)	12.5%	+0.8%
Spain (Equity)	11.5%	+4.3%
Italy (Equity)	8.0%	-0.7%
UK (Equity)	7.8%	-0.3%

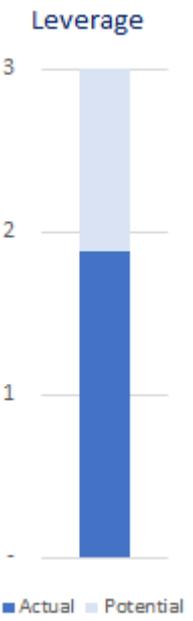
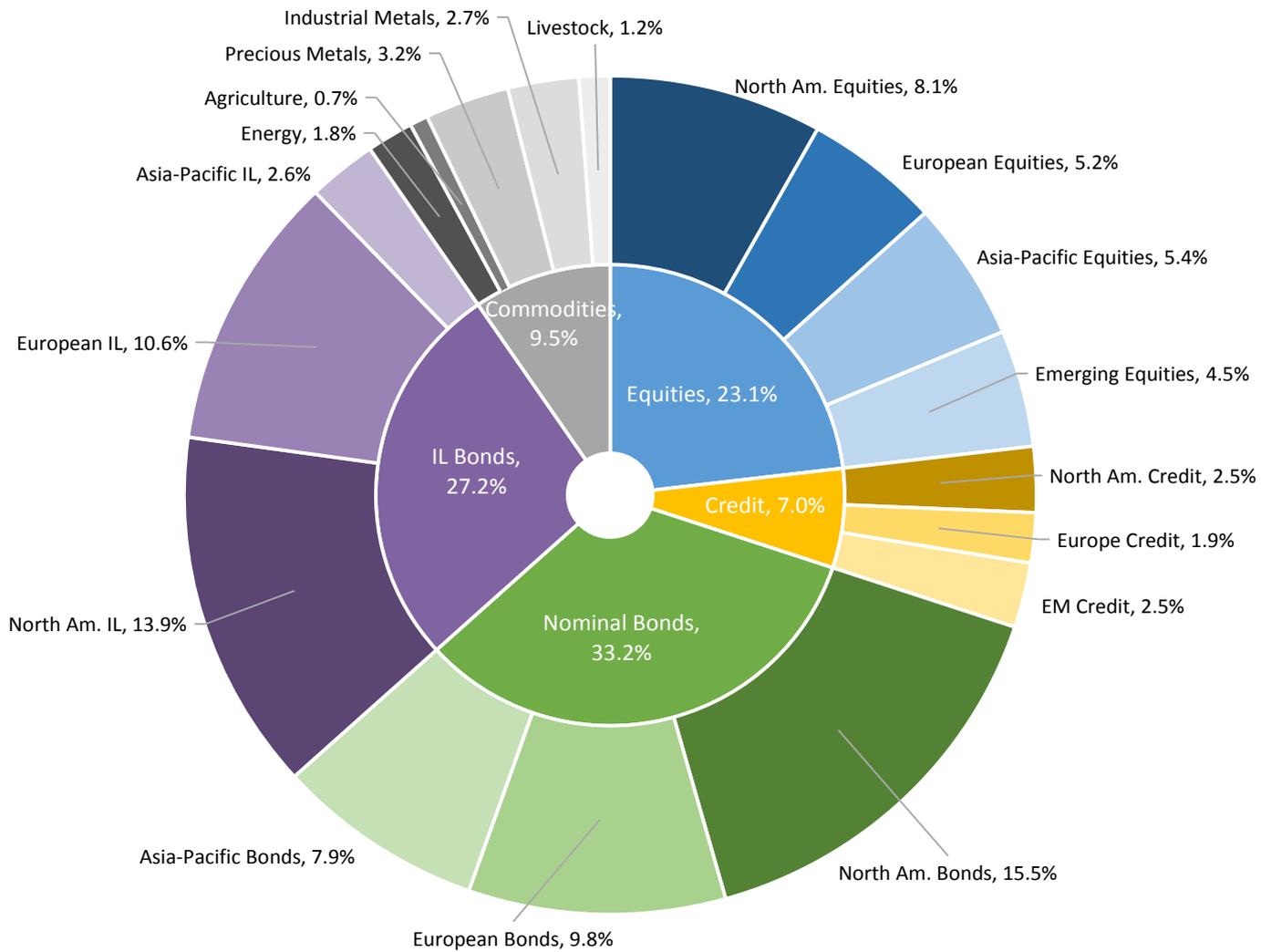
5 Lowest Value Forecasts	7Y Forecast (Real)	1Y Change in Forecast
South Africa (Equity)	-1.4%	-0.9%
Germany (Bonds)	-0.9%	+0.1%
Japan (Bonds)	-0.7%	+1.2%
Canada (Bonds)	-0.6%	-0.5%
UK (Bonds)	-0.4%	+0.2%



Note: Returns through September 30, 2015

Risk Parity

Portfolio Weights as of September 30, 2015



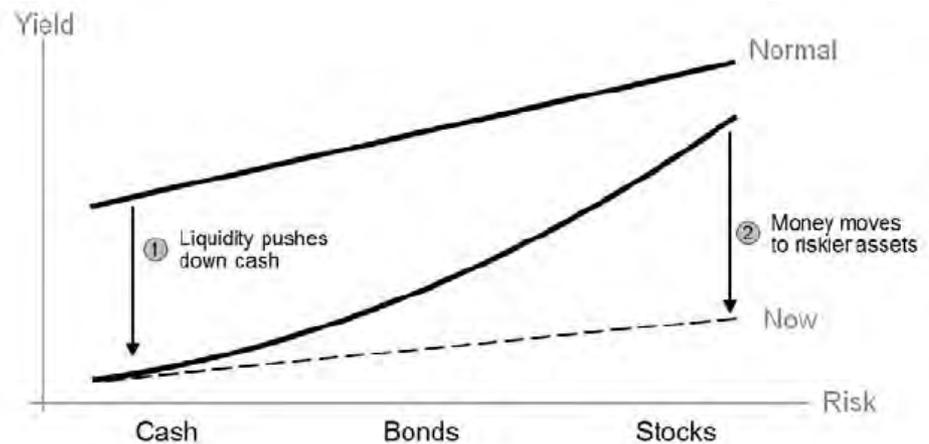
Risk Parity

What's Driving Performance?

- Risk Parity as a strategy has underperformed a 60% equity, 40% bond (60/40) portfolio over the past three years

Asset Class	Weight		3 yr. Return	Contribution to Performance		RP O/(U)
	60/40	RP		60/40	RP	60/40
ACWI	60%	40%	7.0%	4.2%	2.8%	-1.4%
Global Bonds	40%	60%	-3.2%	-1.3%	-1.9%	-0.6%
Global Linkers	0%	55%	-0.5%	0.0%	-0.3%	-0.3%
Credit	0%	25%	3.5%	0.0%	0.9%	0.9%
Commodities	0%	20%	-16.1%	0.0%	-3.2%	-3.2%
Sub-Total	100%	200%		2.9%	-1.7%	-4.6%

- Underperformance primarily driven by an **underweight to equities** and an **overweight to commodities**
- Why?* Quantitative easing has pushed investors to purchase all asset types across the risk spectrum. The relatively higher risk asset types such as equities experienced yield compression more recently (see "step 2" of chart at right) and therefore higher recent performance gains



Risk Parity

Market Impact

- One recently voiced concern in the press is that reducing leverage in a down market could further negatively impact markets
 - However, our analysis suggests that Risk Parity strategies are not big enough to materially impact markets given the current size of strategies
- For example:
 - Our internal strategy had sales in August 2015 equivalent to 23% of the US equity allocation within Internal Risk Parity
 - If we conservatively estimate that other Risk Parity strategies did the same, we estimate that **Risk Parity strategies accounted for less than a percent of US equity trading volume** in the last week of August

(a) Total RP AUM (\$ bln)	\$ 150.0
(b) RP Equity Sales	23.0%
(c) Equity Allocation	25.0%
(d) Average Portfolio Leverage	2.0
(a*b*c*d) RP US Equity sells (\$ bln)	\$ 17.3
Weekly S&P Futures Volume (\$ bln)	\$ 1,900
RP as % of weekly volume	0.9%

2015 Priority – ENR Risk Model

- ENR was established as a separate portfolio on September 30, 2013 and is currently 1.8% of the trust
- This project reviewed and refined our risk model of these assets
- ENR investments are aggregated by zone and by industry versus the ENR benchmark
- Each ENR investment is risk proxied using its Zone, Industry, Country and Currency

Portfolio Weights	TRS	Benchmark
Resources	84.7%	67.8%
Core	40.8	5.1
Value-Add	13.3	25.7
Opportunistic	30.6	36.9
Energy Infrastructure	15.3	7.2
Value-Add	13.5	5.7
Opportunistic	1.8	1.5
CPI	0.0	25.0
Total	100.0%	100.0%

Attribute	Examples	Public Markets Proxy
Zone	Resources/Energy Infrastructure; Core/Value-Add/Opportunistic	Applying an appropriate “beta” to the proxy
Industry	E&P, Midstream, Agriculture	S&P Oil & Gas E&P, Alerian MLP, NAREIT Timber
Country	USA, Canada	MSCI Canada
Currency	US Dollar, Canadian Dollar	Currency exchange rate data

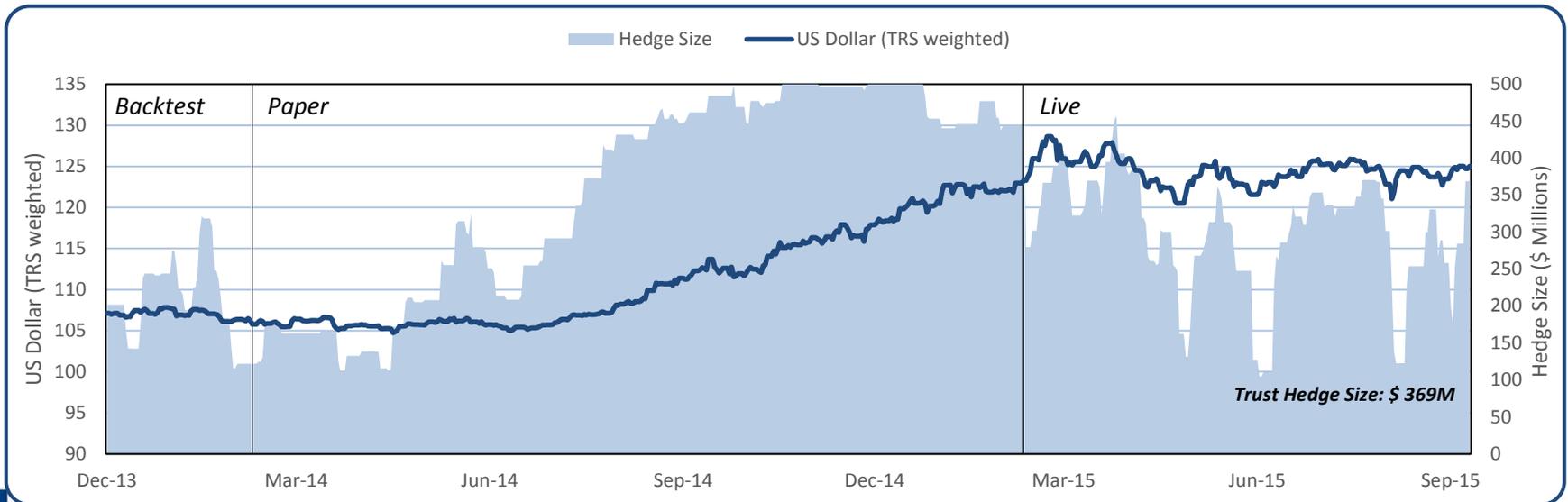
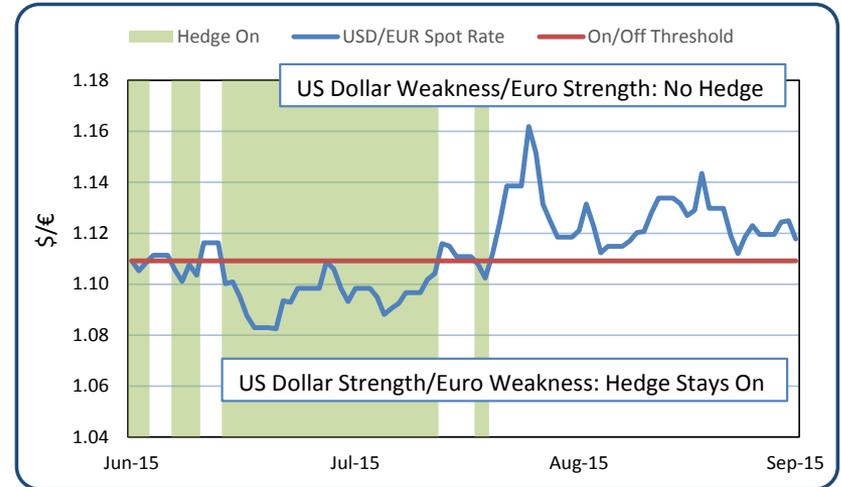
$$\text{Return}_{\text{proxy}} = \text{Beta}_{\text{zone}} * [\text{Return}_{\text{industry index}} + (\text{Return}_{\text{country}} - \text{Return}_{\text{USA}})] + \text{Return}_{\text{currency}}$$

Dynamic Currency

Portfolio Construction

- The Dynamic Currency portfolio seeks to profit when the US Dollar is strong and limit loss when the US Dollar is weak
- As shown below, the portfolio hedge size held constant around \$200 million for the first half of 2014 and increased to \$500 million in the third quarter as the US Dollar strengthened
- As the US Dollar flattened out, the hedge size has become choppy, waiting for a trend to emerge

Hedging Example





Asset Allocation

Mohan Balachandran
Senior Managing Director
November 2015

Agenda

- I. Performance
- II. Organization
- III. 2015 Accomplishments
- IV. Treasury Team
- V. Quantitative Equity Strategies
- VI. Special Opportunities
- VII. Tactical Asset Allocation
- VIII. 2016 Goals
- IX. Appendix

Performance Executive Summary

As of September 30, 2015

Impact Assessment		Returns			Alpha			Tracking Error
Strategy	Assets (\$MM)	1Y	3Y	5Y	1Y	3Y	5Y	1Y
Stand-Alone Strategies								
Long Treasuries	13,235	8.9%	2.9%	6.5%	0.1%	0.2%	0.2%	0.1%
Treasury Inflation-Protected Securities (TIPS)	5,026	-0.6%	-1.6%	2.8%	0.3%	0.2%	0.2%	0.1%
Quantitative Equity Strategies	2,932	-4.0%	11.0%	9.2%	1.6%	3.1%	1.9%	1.6%
Special Opportunities	219	3.8%			NA			NA
TOTAL	21,413							
Overlay Strategies (performance in basis points on total Trust)								
Integrated Tactical Asset Allocation (ITAA)		-31.3			-31.3			48.8

Benchmarks:

Long Treasuries: Barclays Long Treasuries Index

TIPS: Barclays TIPS Index

QES: Blend of MSCI All Country World (GBI Quant), MSCI USA Standard (Low Vol with Overlay)

Tracking error is calculated using monthly excess returns over the prior 1Y



Asset Allocation Group

Asset Allocation Group Highlights
Four PhDs
Ten Masters Degrees
Four CFAs



Mohan Balachandran, PhD
Sr. Managing Director
PhD, Physics, Brown University



Mark Albert, CFA
Sr. Director
*MBA, University of Michigan
 BA, Brandeis University*



Ashley Baum, CFA, CPA
Sr. Investment Manager
MPA and BBA, UT Austin



Jean-Benoit Daumerie
Investment Manager
*MBA, Rice University
 BS, Engineering, University of Pennsylvania*



Matt Talbert, PhD
Investment Manager
PhD, Economics, University of Texas, Austin



Komson Silapachai, CFA
Investment Manager
BA, Finance, Texas A&M University

ANALYTICS/ RESEARCH



Wayne Speer, CFA
Sr. Investment Manager
*MBA, SMU
 BA, University of New Mexico*



Jingshan Fu, PhD
Investment Manager
PhD, Demography, MA/MS, Public Health, Harvard University



Kyle Schmidt
Associate
*MBA, SMU
 BS, Engineering, University of Oklahoma*



Solomon Gold
Sr. Associate
*MS, Economics, University of Texas, Austin
 BA & BS, UC San Diego*



Teresa Lwin, PhD
Sr. Associate
*PhD, Finance
 MBA, Chicago Booth School of Business*



Ryan Leary
Associate
*MBA, Rice University
 MS, Engineering Georgia Tech*



Patrick Zerda
Associate
MPA and BBA, University of Texas, Austin



Don Stanley
Sr. Analyst
*BA, Finance
 University of Texas, Austin*



Hasim Mardin
Contractor
MS, Economics, University of Texas, Austin



Sibel Wen
Contractor
*MS, Statistics
 University of Texas, Austin*



Paul Waclawsky
Administrative
*BS, Accounting
 University of Maryland*

2015 Accomplishments

2015 Goal	Explanation
<i>Strategic Asset Allocation (SAA) Implementation</i>	On track with transition to new Risk Parity and Private Markets allocations
<i>Preferred Destination</i>	Approved full premier list and funded four new investments through the Special Opportunities program
<i>Advanced Technology Solutions</i>	Developed a standardized process for TAA for model development, model validation, daily reporting and infrastructure support
<i>Quantitative Equity Strategies</i>	Increased Global QES allocation to 2% of Trust and Low Vol with Overlay to 0.4% of Trust
<i>Alpha Generation</i>	Achieved alpha target in four of five portfolios

Treasury Team



Komson Silapachai, CFA
Investment Manager
BBA, Finance, Texas A&M

Team members:

Patrick Zerda
Hasim Mardin

In collaboration with:

Operations

Trading

Accountability:

- Manage Long Treasuries and TIPS portfolios
 - \$18.2 billion, 14.4% of Trust
- Oversee trust liquidity and strategic transitions
- Support TAA and Risk Parity efforts

2015 in Review:

- Performance Review:
 - 1Y Return of 8.9% in the Long Treasuries and -0.6% in the TIPS portfolios
 - 3Y Return of 2.9% in the Long Treasuries and -1.6% in the TIPS portfolios
- Delivered beta results as expected with some residual alpha
- Completed Q1 - Q3 transition to board-adopted SAA

2016 Goals:

- Continue management of internal Treasuries and TIPS portfolios
- Continue managing transition to new SAA
- Ongoing process and reporting improvement

Quantitative Equity Strategies (QES)



Mark Albert, CFA
Sr. Director
MBA, U. Michigan
BA, Brandeis University

Team members:

Wayne Speer
Jingshan Fu
Solomon Gold
Teresa Lwin
Kyle Schmidt
Ryan Leary

In collaboration with:

Risk Group

Accountability:

- Manage internal QES strategies totaling \$2.9 billion or 2.3% of the Trust
- Generate 100 bps in alpha over benchmarks

2015 in Review:

- Performance Review:
 - 1Y return: -4.0%, 1Y alpha 1.6%
 - 3Y return 11.0%, 3Y alpha 3.1%
- Collaborated with Risk Group on Low Vol with Overlay (LVWO) portfolio
 - Increased LVWO to \$500 million (0.4% of Trust)

2016 Goals:

- Alpha of 100 basis points
- Continue to increase positive impact via larger allocation
- Research additional applications: Regional Quant Portfolios

Special Opportunities and SAA



Team member:

Don Stanley

In collaboration with:

SPN

External Public

Private Markets

Accountability:

- Generate an absolute return of 10% over a 3-year period
- Access unique investments that are accretive to the overall Trust with acceptable risk and liquidity
- Strategic Asset Allocation Study and Investment Policy

2015 in Review:

- Performance Review
 - 1Y Return: 3.8%
- Developed premier list of 24 firms to source transactions
- Added 4 new investments totaling \$138 million of invested capital
- Expanded cross-trust opportunity identification process
 - Preferred Destination Initiative
 - Texas Way Valuation Task Force
 - Energy Task Force

2016 Goals:

- Invest in \$300-\$500 million of high reward/risk investments
- Explore best practices
- Continue to enhance cross-Trust collaboration

Tactical Asset Allocation (TAA)



Matt Talbert, PhD
Investment Manager
PhD, Economics, U. Texas



Jean-Benoit Daumerie
Investment Manager
MBA, Rice
BA, Engineering, U. Penn

Team members:

Jingshan Fu
Solomon Gold
Teresa Lwin
Kyle Schmidt
Ryan Leary

In collaboration with:

SPN

Risk Group

Accountability:

- Generate 25 bps of trust level alpha per year with a long term tracking error target of 50 bps

2015 in Review:

- Performance Review:
 - 1Y Return: -31.3 bps
- Strategic Partnership Network (SPN) Common Language completion and implementation
- Alternative Risk Premia (ARP) strategy prepared for launch
- Developed process for model development, daily activity, and infrastructure support

2016 Goals:

- Achieve alpha target
- Increase TAA allocation to ARP strategy
- Evaluate risk signals to enhance model diversification

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Tactical Asset Allocation

2016 Planned Enhancements

SPN Common Language

- SPN Alpha Contribution
 - 1-Year: -0.5%
 - 3-Year: +1.1%
 - Since inception: +1.0%
- Increase asset class breadth and improve mapping
- Formalize data storage to improve tracking accuracy and performance attribution across partners
- Increased dialogue with SPN on positioning during stress events

Alternative Risk Premia

- Well known, empirically tested, uncorrelated sources of return, harvested through long/short strategies
- Market neutral expressions of Value, Momentum, Carry, and Defensive/Quality
- Multi-asset framework: equities, bonds, commodities, currencies

Diversification

- Research risk signals for consideration as part of TAA risk budgeting framework
- Increase diversification through inclusion of uncorrelated models (ARP)

Model Revisions

- Re-evaluate existing models and consider optimal weights
- Continue research and development of new models
- Ongoing discussions with external managers and SPN on TAA best practices

Asset Allocation Group 2016 Goals

- **Alpha:** Deliver target alpha in all portfolios
- **SAA Implementation :** Effectively implement Strategic Asset Allocation and transition plan within approved risk parameters
- **Special Opportunities / Preferred Destination:** Identify unique opportunities to achieve 8-12% return over 3 years
- **Tactical Asset Allocation:** Deliver positive contribution from Alternative Risk Premia strategies and develop additional uses for risk signals
- **Quant Equity Strategies:** Research regional applications of QES process

APPENDIX

Treasury Meeting Framework

Daily Morning Meeting

Daily Report Review: *Managing Total Trust Asset Allocation*

- Ensure TAA drives Trust positioning
- Review impact of non-benchmark asset exposures, flows and market conditions

Liquidity Report Review: *Cash/Liquidity Management*

- Ensure Trust has sufficient liquidity to manage a stress event
- Plan for and manage to upcoming expected liquidity events (capital calls, redemptions and benefit payments)

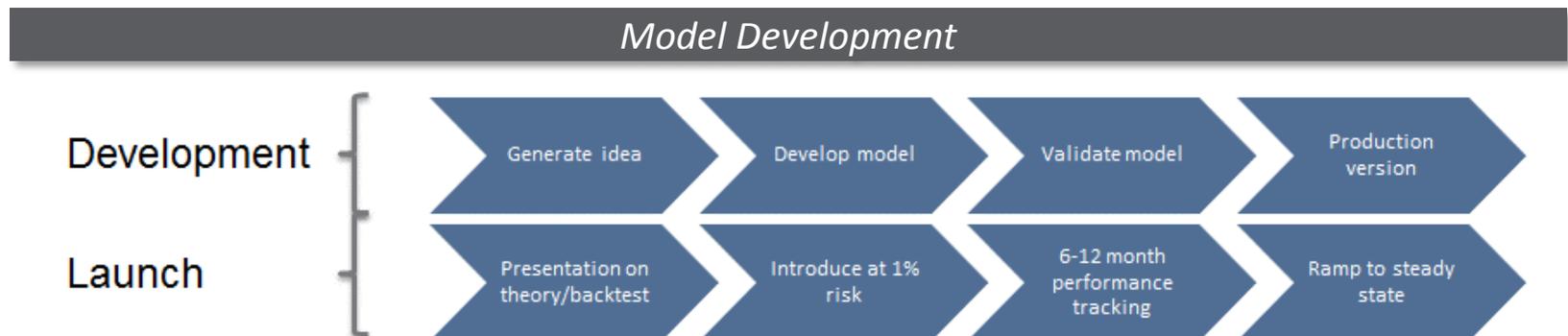
Portfolio Rebalancing: *Efficient Trust Management*

- Identify most efficient trades to bring Trust back on target
- Consider implications of pending benchmark changes and capital activity
- Identify optimal “lever” to rebalance Trust weights

Tactical Asset Allocation

Improved, Repeatable, Disciplined Process

- Tools developed to minimize repetitive steps, and allow more time for research
- Robust process to support TAA functions big or small
- Automated, dynamic daily reports and review
- Checklist of requirements for new models



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