INVESTMENT MANAGEMENT COMMITTEE

September 2017

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

(Committee Chair and Members: Mr. Colonnetta, Chair; Mr. Corpus, Mr. Kelly, Mr. Moss, and Ms. Ramirez,)

All or part of the September 21, 2017, meeting of the TRS Investment Management Committee and Board of Trustees may be held by telephone or video conference call as authorized under Sections 551.130 and 551.127 of the Texas Government Code. The Board intends to have a quorum and the presiding officer of the meeting physically present at the following location, which will be open to the public during the open portions of the meeting: ***1000 Red River, Austin, Texas 78701 in the TRS East Building, 5th Floor, Boardroom.***

AGENDA

September 21, 2017 – 1:00 p.m.
TRS East Building, 5th Floor, Boardroom

1. Call roll of the Committee Members.

2. Consider the approval of the proposed minutes of the June 1, 2017, committee meeting – Chair Joe Colonnetta.

3. Review the External Public Markets Portfolio – Dale West, Susanne Gealy, and Brad Gilbert.

4. Review the Public Strategic Partnership Network – Michael Pia and J.B. Daumerie.

5. Global Equity Best Practices Update – Jase Auby and Dale West.

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

June 1, 2017

The Investment Management Committee of the Board of Trustees of the Teacher Retirement System of Texas met on June 1, 2017, in the boardroom located on the fifth floor of the TRS East Building offices at 1000 Red River Street, Austin, Texas.

Committee members present:
Mr. Joe Colonnetta, Chair
Mr. David Corpus
Mr. David Kelly
Mr. Chris Moss

Other TRS Board members present:
Ms. Karen Charleston
Mr. John Elliot
Dr. Greg Gibson

Others present:
Brian Guthrie, TRS
Ken Welch, TRS
Britt Harris, TRS
Jerry Albright, TRS
Carolina de Onis, TRS
Mike Pia, TRS
Courtney Villalta, TRS
Eric Lang, TRS
Neil Randall, TRS
Grant Walker, TRS
Carolyn Hansard, TRS
Katherine Farrell, TRS
Steve Huff, Reinhart Boerner Van Deuren
Steve Voss, Aon Hewitt
Mike Comstock, Aon Hewitt
Dr. Keith Brown, Investment Advisor
Ann Fickel, TRTA
Philip Mullins, TRTA

Investment Management Committee Chair Mr. Joe Colonnetta called the meeting to order at 1:04 p.m.

1. Call roll of Committee members.

Ms. Farrell called the roll. A quorum was present.

2. Consider the approval of the proposed minutes of the April 6, 2017 committee meeting – Joe Colonnetta.

On a motion by Mr. Corpus, seconded by Mr. Moss, the proposed minutes for the April 6, 2017, Investment Management Committee meeting were approved as presented.

3. Receive an update on and review External Private Markets, including – Eric Lang:

A. A review of private equity – Neil Randall.

B. A review of real assets – Grant Walker.

C. A review of Energy, Natural Resources and Infrastructure –Carolyn Hansard.

Mr. Eric Lang summarized that the private markets at TRS have a current market value $40 billion, making up around 29% of the trust. Mr. Lang stated that the five-year return generated a 12.6% IRR. Mr. Lang noted that the private markets group has contributed $18 billion in investment returns to the trust over the past five years. Mr. Lang stated that there is currently $11 billion in principal investments, accounting for 28% of the private markets portfolio. The five-year return for principal investments is 16%. Mr. Lang said that 45 investments that went to the investment committee were approved, equating to about four investments per month. He noted that both the private equity and real assets portfolios are both valued at $17 billion. Mr. Lang stated that the Energy, Natural Resources and Infrastructure (ENRI) portfolio is valued at $5 billion.

Mr. Lang provided a brief overview of the private market environment. He noted that cap rates are at all-time lows indicating that real estate is fully valued, and that interest rates are still extremely low. He noted that the only market that is not fully valued is energy.

Mr. Randall provided more detail regarding private equity. Mr. Randall reported that private equity has achieved five-year IRRs and time-weighted returns in the 14-14.5% range. He noted that the portfolio five-year returns outperformed the benchmark by 300 basis points, exceeding the set target. Mr. Randall stated that the asset value of the portfolio is $17 billion, up 50% from five years prior.

Mr. Randall presented the capital plan, and noted that the investment pace is set with the goal of targeting 13% of the total trust. Mr. Randall briefly discussed TRS's collaboration with Hamilton Lane.

Mr. Randall provided a summary of 2016 accomplishments and 2017 priorities.

Mr. Grant Walker provided a summary of the real assets portfolio. He stated that the portfolio has had a strong performance on the one-, three-, and five- year basis, and has exceeded the benchmark in all three periods. With an alpha of 170 basis points, the real assets portfolio is well above the target on a one-year basis. Mr. Walker stated that the portfolio has a current value of $17.2 billion. Mr. Walker highlighted the target portfolio weights and expected market returns. He noted the change in these values from the previous

year due to the removal of infrastructure over to the ENRI portfolio. Mr. Walker noted that real assets has a target allocation of 14% of the overall trust.

Mr. Walker discussed the capital plan. Mr. Walker stated that 66% of the portfolio is committed to funds and 34% of the portfolio is committed to principal investments.

Mr. Walker discussed a summary update to the fiduciary audit. He noted that the 16 recommendations presented in February by Funston had been broken down into three categories: implemented, in process with target completion dates, and no further action recommended.

Mr. Walker provided a summary of 2016 accomplishments and 2017 priorities.

Ms. Carolyn Hansard provided the ENRI portfolio update. She noted that the portfolio is relatively new, established in September 2013. Ms. Hansard reported that the portfolio generated 8.6% excess return above the benchmark on a one-year basis. Ms. Hansard stated that the portfolio is currently valued at $5.3 billion, or approximately 3.8% of the trust. This valuation is just shy of the 5% target. Ms. Hansard announced that a new associate would be joining the team in July.

Ms. Hansard referenced the capital plan and noted that the portfolio is on track to reach its 5% allocation by the early next year. Ms. Hansard gave an overview of the oil and gas markets and noted that there would be increased volatility.

Ms. Hansard provided a review of 2016 accomplishments and 2017 priorities

Ms. Hansard briefed the committee on observations gained from a roundtable discussion centered on the last SPN meeting about energy.

4. Receive a Private SPN Update – Mike Pia and Courtney Villalta.

Mr. Mike Pia provided a review of the private SPN concept. He reported the private markets SPN is $10 billion allocated to two firms across two portfolios. The Strategic portfolio is $8 billion and invests in traditional private asset classes across global equity and real return sleeves. The Tactical Value portfolio is $2 billion. Mr. Pia said this portfolio has a flexible mandate to pursue attractive risk-adjusted strategies that are below the standard private return thresholds but accretive to the trust actuarial return. The focus of the Tactical Value portfolio is in stable value-like credit.

Mr. Pia gave a top-level view of the portfolios. Of the $8 billion allocated to the Strategic portfolio strategy, $7.3 billion has been committed as of the end of the first quarter, $3.9 billion of which is currently invested. As for the Tactical Value portfolio, $2 billion is fully committed and invested capital has risen to $1.3 billion. The private lending strategy has been the most active in this portfolio. Mr. Pia noted that the tactical value portfolio is experiencing a 23% return, but this is expected to drop and gravitate towards the target of 10-12% returns in the long-term.

Ms. Courtney Villalta reported the details of the portfolios. She stated that the Strategic portfolio has increased by 221 basis points over the course of 2016. Ms. Villalta highlighted that just under 50% of the portfolio has been invested.

Ms. Villalta reported at a high level that 85% of the invested dollars to-date in the existing portfolio are performing on or ahead of plan or simply too soon to tell.

Ms. Villalta stated that due to the nearly full commitment of the funds in the Strategic portfolio, future commitments, especially in 2018 and beyond, will need to be supported by the concept of recycling growth.

Ms. Villalta reported that the funds in the Tactical Value portfolio are expected to be fully invested throughout 2017.

Ms. Villalta provided a review of 2016 accomplishments and 2017 priorities.

5. Receive a report on Private Markets Super 5 Priority – Eric Lang.

Mr. Lang provided an overview of Private Markets Super 5 Priority. Mr. Lang noted a key priority was increasing investments in private markets. Mr. Lang highlighted ways this priority could be aptly pursued taking into account conservative baselines, improved access to deal flow, better fee structures, and increased energy exposure given the reflationary environment ahead.

Mr. Lang reviewed the Blank Canvas project. Mr. Lang stated that the project involved polling strategic partners on market returns, alpha, and recommended allocations. Mr. Pia gave broad conclusions for the poll results. He noted that certain asset classes in a lower returning environment were more attractive, reflationary-type investments were higher returning, and items of lower return is where active risk should be taken. Mr. Pia stated that these conclusions were being explored through the Super 5 analysis.

Mr. Lang detailed the ways investments in private markets could increase taken into the four overriding controls. He concluded that the focus of the trust would remain on private markets.

The Investment Management Committee adjourned at 3:17 p.m.

Approved by the Investment Management Committee of the Board of Trustees of the Teacher Retirement System of Texas on September 21, 2017.

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Katherine H. Farrell Date
Secretary of the TRS Board of Trustees

External Public Markets

Dale West, Senior Managing Director
Brad Gilbert, Senior Director
Susanne Gealy, Director

September 2017

TRS
TEACHER RETIREMENT SYSTEM OF TEXAS
INVESTMENT
MANAGEMENT DIVISION

Agenda

I. Executive Summary

II. External Public Markets Team

III. Long-Oriented Update

IV. Hedge Fund Update

Executive Summary

- External Public Markets delivered strong absolute and relative returns over the past 12 months
- Total Global Equity Portfolios were up 22.3% with 160 bp of alpha
- Total Hedge Funds were up 9.3% with 340 bp of alpha
- Long-oriented external strategies will play a key role in the combined Global Equity portfolio
- Hedge Funds diversify the Trust
- TRS initiatives to improve hedge fund terms continue to gain traction

Executive Summary

As of June 30, 2017

Portfolios with Positive Alpha:
- 6 out of 6 over 1 year
- 5 out of 6 over 5 years

EXTERNAL PUBLIC MARKETS							
Total Assets ($, millions)	Percent of Trust	Return (%)			Alpha (bp)		
		1-Year	3-Year	5-Year	1-Year	3-Year	5-Year
$39,528	27.8%[1]	18.3%	4.0%	9.0%	+227	+42	+89

PERFORMANCE									
Program	Return (%)			Alpha (bp)			TUCS Peer Quartile		
	1-Year	3-Year	5-Year	1-Year	3-Year	5-Year	1-Year	3-Year	5-Year
US Equity	18.6	6.8	13.0	+13	-235	-162	2nd	4th	4th
Non-US Developed Equity	22.6	3.6	10.4	+313	+292	+220	2nd	2nd	2nd
Emerging Markets Equity	24.7	1.7	5.0	+90	+67	+99	2nd	3rd	2nd
World Equity	22.1	4.8	11.5	+290	-35	+74	2nd	3rd	2nd
Directional Hedge Funds	11.7	0.9	5.5	+538	-57	+162			
Stable Value Hedge Funds	7.0	4.9	5.0	+168	+337	+138			

ASSETS				
Program	June 2016 Assets ($, millions)	June 2016 % of Trust	June 2017 Assets ($, millions)	June 2017 % of Trust
External Managers	***$24,348***	***18.8%***	***$27,817***	***19.6%***
US Equity (16 portfolios)	5,801	4.5	6,694	4.7
Non-US Developed Equity (8 portfolios)	5,217	4.0	6,126	4.3
Emerging Markets Equity(9 portfolios)	8,113	6.3	8,312	5.9
World Equity (5 portfolios)	5,217	4.0	6,686	4.7
Hedge Funds	***$10,756***	***8.3%***	***$11,294***	***8.0%***
Directional (23 portfolios)	5,260	4.1	5,803	4.1
Stable Value (23 portfolios)	5,496	4.3	5,492	3.9

Source: Wilshire TUCS, State Street Bank - Performance is annualized and net of fees.
[1]Fund-based investments, including hedge funds, are part of the 27.8% EPU total. 25% of the 30% Agency Agreement authority is currently utilized (see Appendix).
Absolute Return, representing 1% of EPU, is included in the EPU totals, but not broken out below.

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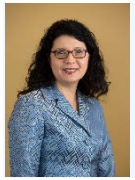
External Public Markets

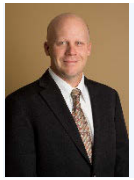
Dale West, CFA
Sr. Managing Director
MBA, Stanford

INVESTMENTS TEAM

Brad Gilbert, CFA, CAIA
Sr. Director, Hedge Funds
BBA, UT Austin



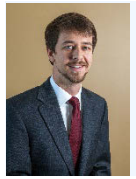
Susanne Gealy, CAIA
Director, Global Equity
MBA, University of Chicago



Joel Hinkhouse, CFA
Sr. Investment Manager
MBA, University of Chicago

Lulu Llano, CFA
Investment Manager
BBA, UT Austin

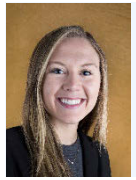
Steven Wilson, CAIA
Investment Manager
MBA, Rice University



Scott Gonsoulin, CFA
Sr. Associate
MS, Texas A&M

Mikhael Rawls
Associate
AB, Harvard

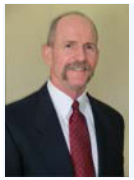
Michael Ijeh
Sr. Analyst
BBA, Texas Tech



Jordyn Beaty
Analyst, Contractor
BBA, University of Georgia

Joseph Kim
Analyst, Contractor
BS, NYU

ANALYTICS



Joe Tannehill, CFA
Sr. Investment Manager
MBA, UNC Chapel Hill

Kevin Taylor
Associate
MS, UT Austin

Patty Steinwedell
Analyst
BA, North Carolina State

RELATIONSHIP MANAGEMENT

Jon Klekman
Analyst
BA, SUNY Binghamton

ADVISORS
- Albourne
- Aon Hewitt
- The Rock Creek Group

EXPERIENCE SUMMARY
- 6 CFA Charter Holders
- 3 CAIAs
- 7 Master's Degrees

Long-Oriented Global Equity Update

Long-Oriented Global Equity Portfolios
As of 06/30/2017

	Assets	1-Year		3-Year		5-Year	
	($ millions)	Return (%)	Alpha (bp)	Return (%)	Alpha (bp)	Return (%)	Alpha (bp)
US Portfolio	**$6,694**	**18.6**	**+13**	**6.8**	**-235**	**13.0**	**-162**
MSCI USA IMI		*18.4*		*9.1*		*14.6*	
Non-US Developed	**6,126**	**22.6**	**+313**	**3.6**	**+292**	**10.4**	**+220**
MSCI EAFE + Canada		*19.5*		*0.7*		*8.2*	
Emerging Markets	**8,312**	**24.7**	**+90**	**1.7**	**+67**	**5.0**	**+99**
MSCI Emerging Markets		*23.8*		*1.1*		*4.0*	
World Equity	**6,686**	**22.1**	**+290**	**4.8**	**-35**	**11.5**	**+74**
MSCI AC World		*19.2*		*5.1*		*10.7*	
Total Global Equity	**$27,817**	**22.3**	**+161**	**4.5**	**-1**	**10.2**	**+32**
Total Global Equity Benchmark		*20.7*		*4.5*		*9.9*	

- Strong equity markets globally
- High 1-year alpha of 161 bps, which corresponds to $356 million in dollar relative value add
- Flat 1-year alpha from US portfolio is an improvement
- Exceptional one-year alpha from Non-US Developed, Emerging Markets, and World managers
- Market return outlook looks different in the future than historical; alpha even more important
- One year manager turnover of 4%

Source: State Street Bank
Note: Performance is net of fees

External Manager Portfolio – Alpha from following our process

Re-Underwriting Underperforming Managers is a Critical Process of External Public Markets

- Portfolio Monitoring: Investigate alarms. Re-underwriting results in “Hold” or “Terminate” recommendation.

Outcomes by Type							
	HIT RATE ($ vs. Policy Bmark)			DOLLAR IMPACT			
	Success	Failure	Hit Rate	Strategy	Policy	Portfolio	Replace
SIGNAL							
CUSUM (50)	25	24	**51.0%**	**$ 496 M**	**$ 489 M**	**$ 506 M**	**-$ 60 M**

Case Study: Emerging Markets Manager tripped CUSUM risk signal alarm March 2015; Re-underwritten “Hold”

- **Investment Philosophy:** Quality-value philosophy; bottom up, fundamental investor; diversified portfolio
- **Long-term characteristics:** 21 year track record, 2.4% annualized alpha, 2 prior CUSUM signals (Average 1 CUSUM / 7-years)
- **Underperformance Analysis:** Sticking to the process, tilting to value as quality got more expensive
- **Renegotiated fee terms and added capital**
- **Investment Results:**
  - **Alpha:** 5.3% annualized, since risk signal
  - **Dollar Impact:** $66 million, relative dollar value add
  - **Fee savings:** $946 thousand (last 12 months) or approximately 13% further discount

Source: TRS IMD

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Hedge Fund Update

Hedge Fund Portfolios *As of 6/30/2017*	Assets	1-Year		3-Year		Since Inception (Oct. 2011)	
	($, millions)	Return (%)	Alpha (bp)	Return (%)	Alpha (bp)	Return (%)	Alpha (bp)
Directional Hedge Funds	**$5,803**	**11.7**	**+538**	**0.9**	**-57**	**5.3**	**+184**
HFRI Fund of Funds Composite		*6.3*		*1.5*		*3.4*	
Stable Value Hedge Funds	**5,492**	**7.0**	**+168**	**4.9**	**+337**	**4.3**	**+103**
HFRI Fund of Funds Conservative		*5.3*		*1.5*		*3.3*	
Total Hedge Funds	***$11,294***	**9.3**	**+342**	**2.7**	**+119**	**4.7**	**+136**
Total Hedge Funds Benchmark		*5.8*		*1.5*		*3.3*	

- Directional Hedge Funds rebounded strongly over the last 12 months
- Stable Value Hedge Funds continued their steady outperformance
- TRS successfully implemented a new fee structure which has been widely recognized and accepted in the industry
- Hedge funds 2% below legislative cap
- Diversification effect has been additive
  - Hedge funds contribute 2.3% to trust-level VaR at 8% of assets

Sources: State Street Bank
Note: Performance is net of fees

Directional Hedge Fund Portfolio

Directional Hedge Fund Objectives	Status	Details
Hedge Fund Types Focus on equity and market sensitive hedge funds	✓	• Return: 4.7%[1] • Correlation to MSCI AC World: 0.8 • Average Sharpe Ratio: 1.0
Market Sensitivity and Risk Core strategies have moderate market sensitivity (beta) and lower risk (volatility) than equities	✓	• Beta to MSCI AC World: 0.3 • Directional HF Volatility: 5.0% • MSCI AC World Volatility: 11.6%
Market Regime Performance Expected to outperform equities when markets are down, but will underperform strong markets	✓	• 88% hit rate vs. equity in equity down months • Average monthly excess return over equities in down months: 1.4% • Inception to date return of 5.3% versus MSCI AC World 11.8%
Performance versus US Treasuries Expected to outperform US Treasuries over the long term	✓	• 5.3 % vs. Treasuries[2] 3.5% • Current 10-year Treasury yield-to-maturity: 2.4%
Performance versus Benchmark HFRI Fund of Funds Composite benchmark with target tracking error of 6%	✓	• 1.8% ahead of HFRI benchmark since inception • Tracking Error: 2.4%

Sources: State Street Bank, Bloomberg
Note: Performance is annualized and is net of fees.
[1]Dates: October 2011 (inception) to June 2017
[2]Return of Bloomberg Barclays US Long Treasury Total Return Index from October 2011 to June 2017

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Stable Value Hedge Fund Portfolio

Stable Value Hedge Fund Objectives	Status	Details
Hedge Fund Types Focus on absolute return hedge funds	✓	• Return: 4.3%[1] • Stable Value HF Volatility: 2.3% • Average Sharpe Ratio: 1.8
Market Sensitivity and Risk Core strategies have low to negative market sensitivity	✓	• Correlation to MSCI AC World: 0.1 • Beta to MSCI AC World: 0.0
Market Regime Performance Expected to have positive returns when markets are down	✓	• Hit rate of 100% versus world equities in down months, outperforming by an average of 2.6%. • Positive returns in 63% of 24 down equity months since October 2011
Performance versus US Treasuries Expected to outperform US Treasuries over the long term	✓	• 4.3% return vs. Treasuries[2] 3.5% • 2.3% volatility vs. Treasuries[2] 10.6% • Current 10-year Treasury yield-to-maturity: 2.4%
Performance versus Benchmark HFRI Fund of Funds Conservative benchmark with target tracking error of 4%	✓	• 1.0% ahead of HRFI benchmark since inception • Tracking Error: 2.4%

Sources: State Street Bank, Bloomberg
Note: Performance is annualized and is net of fees
[1]Dates: October 2011 (inception) to June 2017
[2]Return of Bloomberg Barclays US Long Treasury Total Return Index from October 2011 to June 2017

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TRS Hedge Fund Portfolios: Alpha and Beta

- The TRS hedge fund portfolios and their benchmarks all outperform the equity markets on a risk-adjusted basis

October 2011 - June 2017 (Returns are Annualized)	Equity Beta	Return						
		Risk-Free	+	Beta	+	Alpha	=	Total
HF Directional Portfolio	**0.34**	**0.1%**		**3.9%**		**1.2%**		**5.3%**
HFRI FOF Composite	0.23	0.1%		2.6%		0.7%		3.4%
MSCI ACWI Net w USA Gross								11.8%
Barclays US Long-Term Treasury								3.5%

October 2011 - June 2017 (Returns are Annualized)	Equity Beta	Return						
		Risk-Free	+	Beta	+	Alpha	=	Total
HF Stable Value Portfolio	**0.01**	**0.1%**		**0.1%**		**4.0%**		**4.3%**
HFRI FOF Conservative	0.13	0.1%		1.5%		1.6%		3.3%
MSCI ACWI Net w USA Gross								11.8%
Barclays US Long-Term Treasury								3.5%

Source: State Street Bank, Bloomberg
Note: Managed portfolio performance is net of fees. Due to rounding, totals may not equal sum of the values displayed here. Equity benchmark is MSCI ACWI Net w USA Gross. Risk-free is US T-bill, 3mt.

TRS Fee Initiative – 1 or 30

- A majority of TRS' invested assets and managers have been converted to hurdle-based fee structures
- Endorsements: Albourne, Aon Hewitt & Blackrock
- Independent adoption of 1 or 30 from other firms
  - Hedge Funds & Allocators
- TRS has actively communicated its philosophy with the industry
  - Conferences
  - Publications
  - Texas Teach-In

1 or 30 In The Press

- P&I: *Texas fund taking bold step on fees*
- HFM: *Texas Teacher Retirement System plans '1 or 30' structure*
- Bloomberg: *Globally, at least two dozen well-known managers with institutional investors have either adopted or are working on a so-called '1 or 30' fee model*
- Institutional Investor: *Could this be the holy grail of hedge fund fees?*
- Value Walk: *TRS Pension Managers Seek Win/Win Situations*
- Credit Suisse Mid-Year Survey: *14% of Investors Using/Considering "1 or 30"*

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Conclusion

- The last 12 months saw strong absolute performance in public equity markets, and strong relative performance from active management
  - Over 1 year, External Public Markets portfolios added $729 million in value versus passive benchmarks with all 6 portfolios delivering positive value add
  - Over 5 years, $1,485 million in value added and 5 out of 6 portfolios delivered positive value add
- Long-oriented external strategies will play a key role in the combined Global Equity portfolio
- The hedge fund portfolio provides diversification to the Trust, and the team continues to lead industry innovation

Source: State Street Bank, TRS IMD

APPENDIX

Legislative Authority Detail for Agency Agreements

As of June 30, 2017

	# of Portfolios			Assets ($ billions)			Percentage of Trust		
External Managers	**Agency**	**LP**	**Total**	**Agency**	**LP**	**Total**	**Agency**	**LP**	**Total**
US Portfolio	8	8	16	$4.0	$2.6	$6.7	2.8%	1.9%	4.7%
Non-US Developed	5	3	8	3.3	2.8	6.1	2.4%	2.0%	4.3%
Emerging Markets	8	1	9	7.2	1.1	8.3	5.1%	0.8%	5.9%
World Equity	3	2	5	4.9	1.8	6.7	3.4%	1.3%	4.7%
Total Equity	**24**	**14**	**38**	**$19.4**	**$8.4**	**$27.8**	**13.7%**	**5.9%**	**19.6%**
Public Market SPN	**4**		**4**	**$7.5**		**$7.5**	**5.3%**		**5.3%**
Other	**2**		**2**	**$0.2**		**$0.2**	**0.2%**		**0.2%**
Totals	**30**	**14**	**44**	**$27.2**	**$8.4**	**$35.5**	**19.1%**	**5.9%**	**25.0%**

- TRS is limited by law to 30% Agency Agreement authority. 25% is currently utilized.

Source: State Street Bank

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External Public Critical Processes

Texas Way

Strategic Planning
- Review asset allocation
- Evaluate Premier List needs

Premier List Development
- Initial manager proposal
- Perform minimum criteria analysis
- Collaborative review by TRS, Aon Hewitt & Albourne
- Add/reject proposed portfolio

Alignment Analysis (Legal & Compensation)
- Preliminary review of legal terms
- Preliminary review of financial terms

Certification Process
- Onsite visit conducted
- Receive/review consultant report
- Evaluate 9 critical areas
- Prepare certification report

Risk Analysis
- Quantitative analysis
- Review of current portfolio (characteristics & valuations)
- Develop optimized asset class structure

Final Fit Analysis
- "Alpha Stacking" demonstrated
- Determine initial and optimal investment size

Pre-IIC Negotiations
- Manager fee negotiated
- Near-final terms negotiated

IIC Review and Approval
- Investments presented to IIC for approval
- External consultant provides prudence letter
- Additional requirements met as needed

Final Legal Review
- Finalize terms
- Contracts signed

Funding Execution
- Coordinate with Investment Operations, Asset Allocation & Legal

Portfolio Monitoring
- Monitor manager in key areas
- Investigate alarms with Risk Group

Portfolio Management
- Adjust portfolio to maintain optimal risk
- Implement portfolio decisions

Reporting
- Generate Board, IIC and policy reporting
- Generate ad hoc reporting as needed

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Public SPN Annual Report

Mike Pia, Director
Jean-Benoit (JB) Daumerie, Investment Manager

September 2017

TRS
TEACHER RETIREMENT SYSTEM OF TEXAS
INVESTMENT
MANAGEMENT DIVISION

Agenda

I. Strategic Partnership and Research Overview

II. Public Strategic Partnership Network Annual Report

III. Accomplishments and Priorities

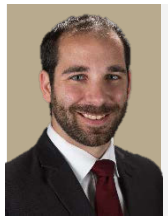
Strategic Partnerships & Research Group (SPR)

Mike Pia, CFA, CAIA
Director
BS Mechanical Engineering, United States Naval Academy
MS Software Engineering, University of West Florida
MBA, Texas Christian University

INVESTMENTS TEAM

PUBLIC MARKETS

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



Christopher White
Associate
BS Engineering Management, United States Military Academy
MBA Finance, UT Austin

PRIVATE MARKETS

Courtney Villalta
Senior Investment Manager
BS Finance, St. Edward's University

Blake Holman
Associate
BA Communications, TX State University
MBA, University of Colorado

ANALYTICS TEAM

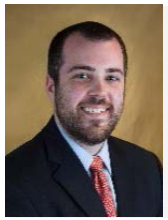
Susan White
Analytics and Support
BS French, The Pennsylvania State University
Claritas Investment Certification

SPR Team Experience Summary
9 Master's Degrees
5 Engineering Degrees
4 CFAs, 2 CAIAs, 1 FRM, 1 CPA

MARKET INTELLIGENCE TEAM

Curt Rogers, CAIA, CFA, FRM
Director
BS & MS Aeronautical Engineering, Massachusetts Institute of Technology
MBA Finance, UT Austin

Phillip Auth, CFA
Investment Manager
BS Economics, University of New Mexico
MBA International Finance, UT Austin



Matt Wey, CPA
Associate
BBA Accounting, Texas A&M
MS Finance & Mathematics, Texas A&M

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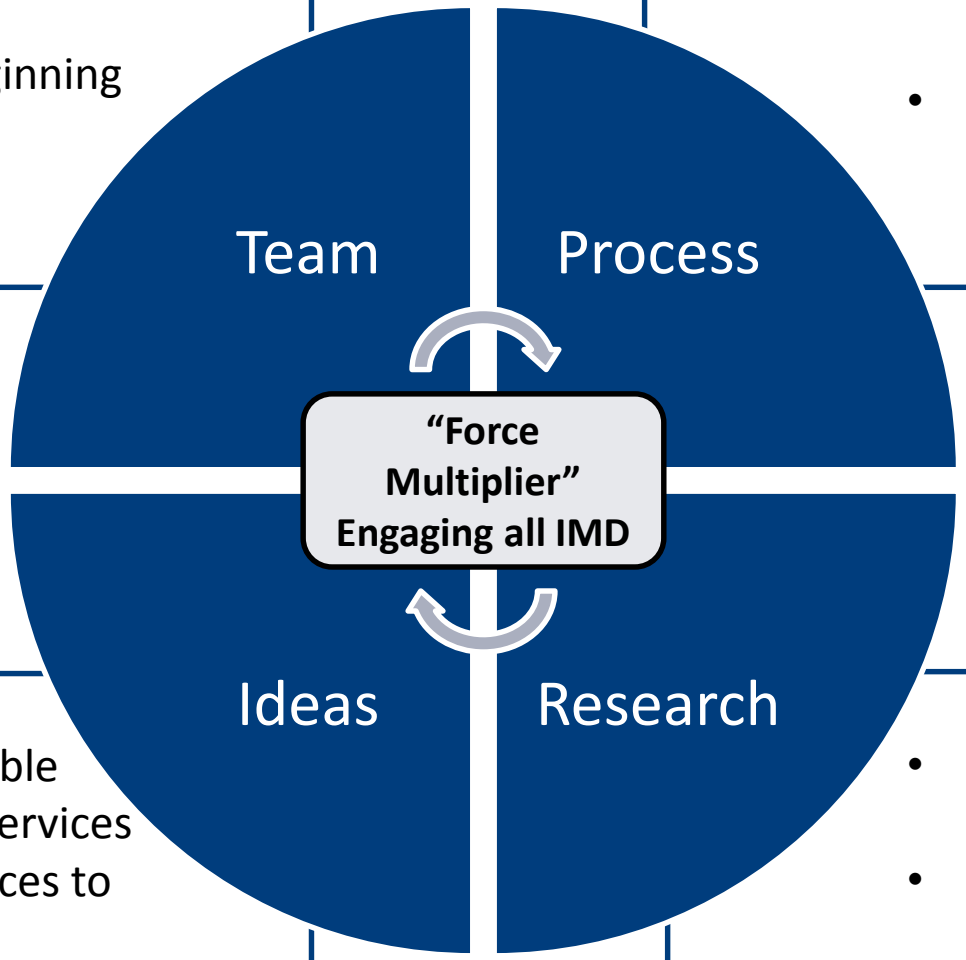
Common Principles of a Strategic Partner

- Fully committed team, beginning with **senior management**

- **Operates globally** with a sustainable business model
- Shares long-term **compensation philosophy** compatible with TRS



- Delivers **full range** of valuable investment products and services
- **Customizes** products/services to specific TRS requirements

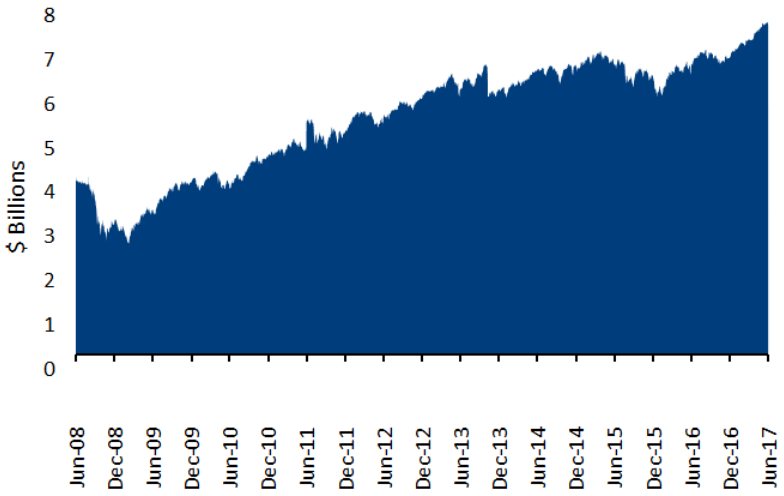
- Produces **proprietary**, value-added investment **research**
- Shares **significant resources** and knowledge

Public Markets SPN Performance

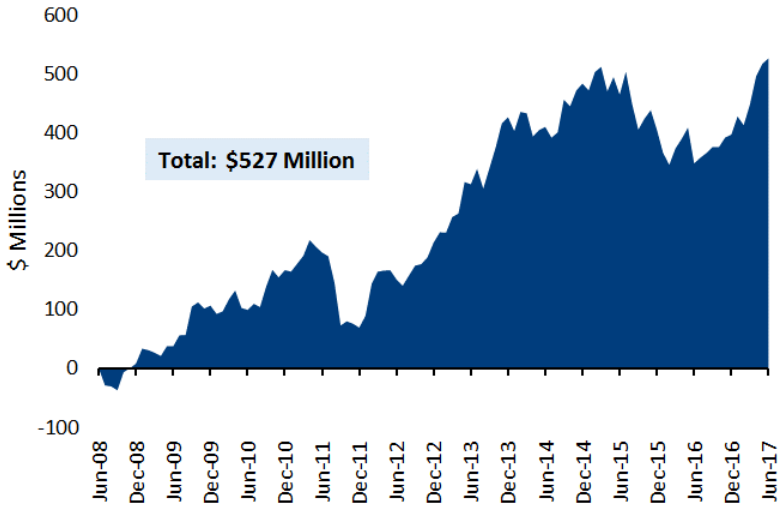
As of June 30, 2017

Program	Assets		Annualized Return			Annualized Alpha			Tracking Error			Information Ratio		
	NAV ($, millions)	% of Trust	1-Year	3-Year	Since Incept.	1-Year	3-Year	Since Incept.	1-Year	3-Year	Since Incept.	1-Year	3-Year	Since Incept.
BlackRock	$1,877	1.3%	14.4%	6.1%	**7.0%**	+291bp	+169bp	**+105bp**	149bp	179bp	**197bp**	1.9	0.9	**0.5**
JP Morgan	1,976	1.4	13.5	5.5	**7.4**	+193	+107	**+150**	87	154	**213**	2.2	0.7	**0.7**
Morgan Stanley	1,809	1.3	13.6	3.8	**6.5**	+207	-68	**+58**	157	243	**195**	1.3	-0.3	**0.3**
Neuberger Berman	1,796	1.3	13.2	3.5	**6.3**	+164	-96	**+44**	89	210	**212**	1.8	-0.5	**0.2**
Total Public SPN	**$7,458**	**5.3%**	**13.7%**	**4.7%**	**6.8%**	**+214bp**	**+29bp**	**+90bp**	**84bp**	**142bp**	**141bp**	**2.5**	**0.2**	**0.6**
Target						**Portfolio/Firm:**		**200bp**	**Firm:**		**250bp**	**Firm:**		**0.8**

Public Markets SPN Assets Under Management



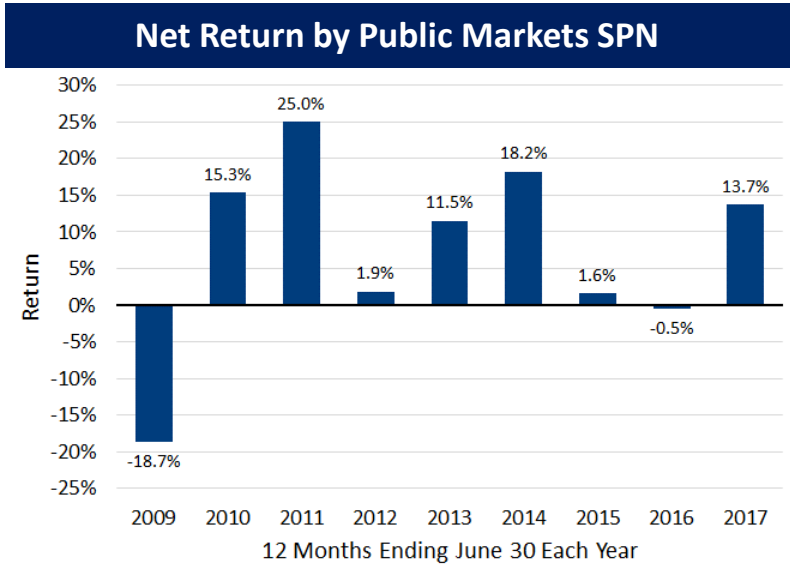
Total Public SPN Cumulative Alpha

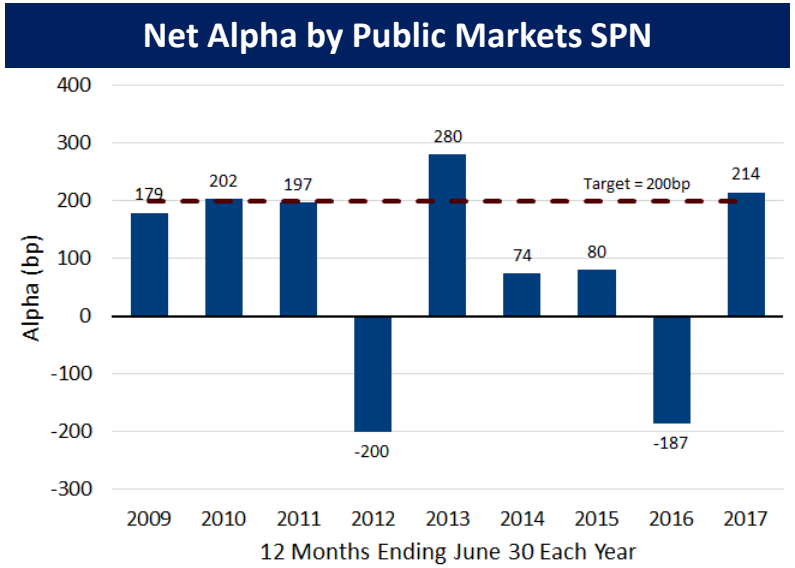


Source: State Street Bank and TRS IMD
Inception of Public SPN: July 2008

Public Markets SPN Performance

As of June 30, 2017





<u>Key Drivers for Recent Outperformance</u>:

- Risk-On environment resulted from politically driven bull market around US and French elections (Treasuries sell-off)
- Mid-late business cycle dynamics fueled prolonged equity rally
- Attractive relative valuations and easier monetary policies provided opportunities in international markets
- Stock selection opportunities rebounded

Source: State Street Bank, TRS IMD
Note: Fiscal year for the Public Markets SPN runs from July to June due to inception of the structure in June 2008

Public Markets SPN Performance

As of June 30, 2017

TUCS Public Markets SPN Performance Comparison

Public Plans > $1 Billion for Periods Ending June 30

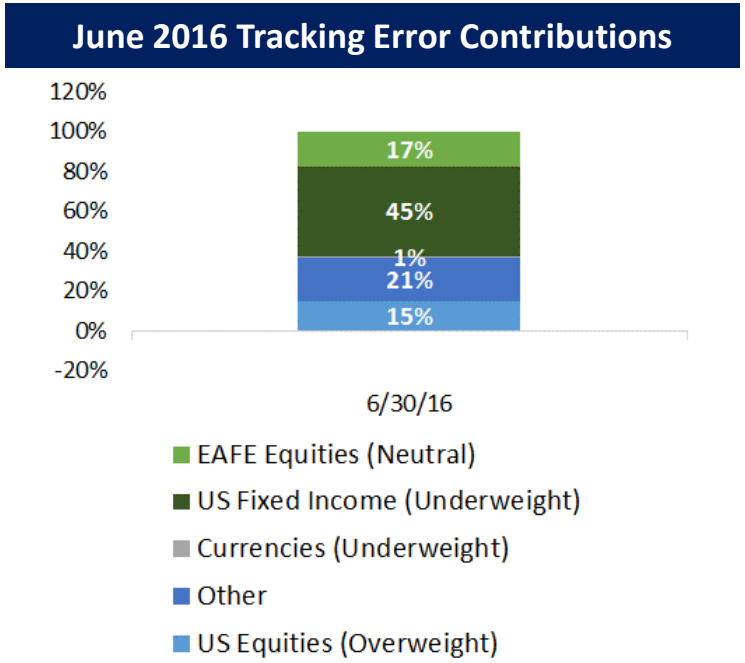
Time Period	Peer Quartile
1 Year	1st
3 Year	3rd
5 Year	3rd
7 Year	1st

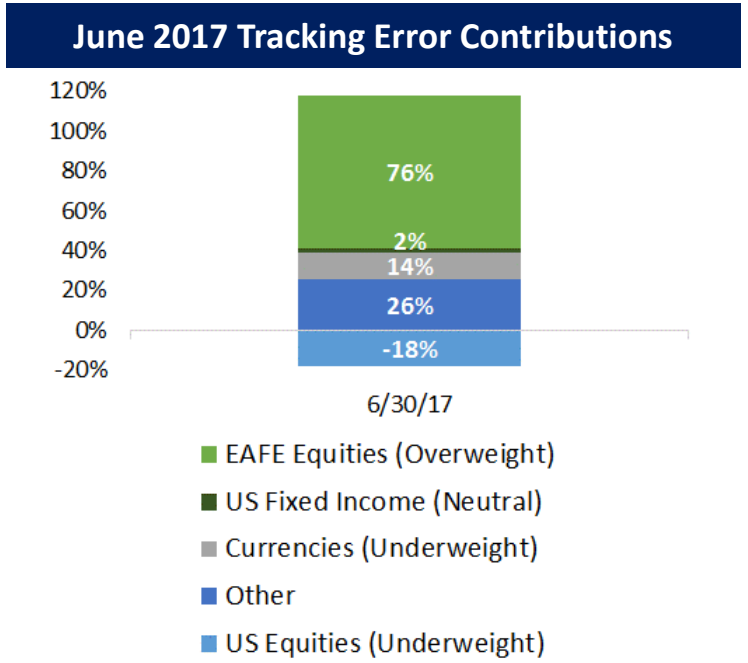
Key Drivers of Relative Performance Versus Peers:

- Above average allocation to non-US equities relative to peers
  - Emerging Markets and EAFE rally: relative overweight adds to recent absolute performance, but drags on medium term performance
- Private asset classes outside Public SPN mandate
  - Private asset classes rally: no allocation drags on medium term relative performance

Source: Wilshire Trust Universe Comparison Service

Public Markets SPN Positioning





<u>Full Transparency on Positioning Leads to Better Insights</u>:

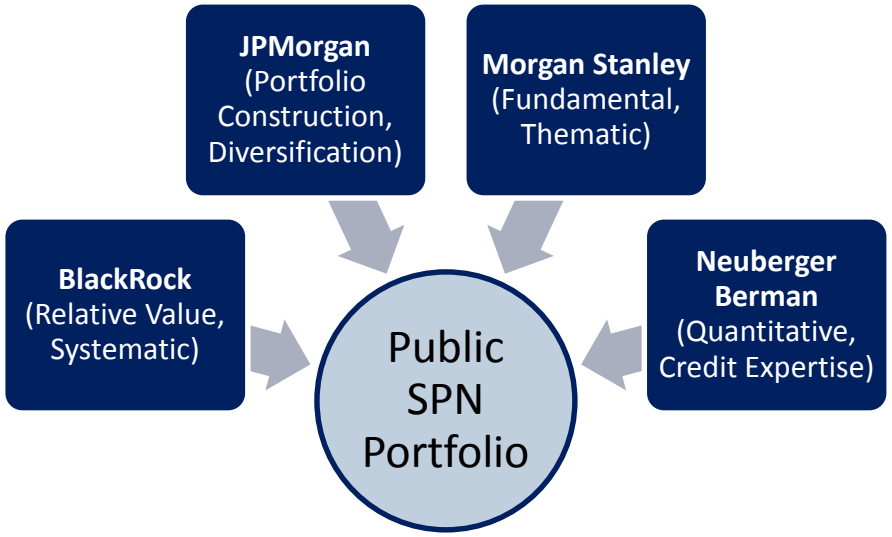
- Regular reporting from partners results in "Common Language"
- Common reporting tool helps identify themes, trends, and high conviction trades across the portfolio
  - Sharing data and information across Trust acts as Force Multiplier
- Trends in past year:
  - "Global reflation" theme through US fixed income has ended
  - Consensus view across partners that EAFE assets should rebound
  - Less constructive view on US equities

Source: TRS IMD
Note: Risk contributions are calculated using average positioning within a month and a 120 month trailing covariance matrix. 'Other' contributions include EM equities, sovereign debt, credit, and commodities

Public Markets SPN Diversification

One Portfolio...Four Different Perspectives / Processes:

- Long-lasting cultures generate persistent strengths
- Diversifying opinions and processes can lead to similar or dissimilar views of the world
- Different implementations of views result in higher risk adjusted returns



Example: Pro-Europe Implementation

Partner	Implementation	Average Correlation with Other Instruments	Instrument YTD Return (through 6/30/17)
BlackRock	EURUSD	0.11	8.6%
JPMorgan	German vs. US FI	0.10	2.2%
Morgan Stanley	Banks vs. Eurozone	0.19	4.8%
Neuberger Berman	Eurostoxx	-0.11	7.7%

Source: TRS IMD
Note: AVG correlation is the trailing 36 month correlation with the other three strategies. YTD return is for listed instrument, assuming position held constant for the holding period 12/31/16 to 6/30/17

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Accomplishments and Priorities

Accomplishments Since Sept 2016

- Achieved $178MM in dollar value add in the year
- Enhanced deep dive and attribution frameworks
- Delivered “Blank Canvas” research project
- Completed 4 additional research projects
- Successfully executed three SPN Summits
  - One Public/Private Joint
  - Two Public Only

Current Priorities

- Generate 200bp of annualized alpha
- Contribute to Global Equity Best Practices project with partner insights
- Distribute quarterly newsletter of partner highlights
- Improve portfolio monitoring and data analytics within SPN portfolios
- Track performance of asset allocation signal from partners

Source: State Street Bank, TRS IMD
Note: Fiscal year for the Public Markets SPN runs from July to June due to inception of the structure in June 2008

APPENDIX

SPR Mandates

Public Investments	• Manage, oversee and monitor four **unique long-term investment relationships in the public markets** around the world
Private Investments	• Work closely with two industry-leading private markets specialist partners to **identify and allocate capital to attractive private opportunities**
Market Intelligence	• **Integrate global-macro-based products and services** into public and private investment decisions across the Trust to enhance returns
Research Provider	• Work with heavily resourced partners to provide **customized, timely investment research and training** that meets the needs of the IMD
Headlight Systems	• Use and disseminate views and positioning data from partners to **provide insight and support to other groups** in the Trust
Innovation Source	• Leverage the TRS investment network to **develop new products and superior processes**

Force Multiplier

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Global Equity Best Practices

Jase Auby, Deputy Chief Investment Officer
Dale West, Sr. Managing Director of Public Markets

September 21, 2017

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Executive Summary

- The Global Equity Best Practices project is nearing a successful conclusion
- The project identified several areas of focus
  1. Improve the organizational focus on the overall results
  2. Increase allocation to internal quantitative portfolios
  3. Address challenged alpha in the US portfolios
  4. Increase focus on the management of compensated risk premiums (e.g. value, size, momentum, quality, and growth)
- The IMD organization is well placed to support the existing portfolio and to pursue improvements and innovation in global equity strategies

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Introduction

Project team

- The project team's six members represent all of the Trust's public equity portfolios

Jase Auby, CFA
Deputy Chief Investment Officer
BS, Harvard College

Project Team Leader

KJ Van Ackeren, CFA
Senior Director
Internal Public Markets
MBA, Texas Christian Univ.
BA, Trinity Univ. of San Antonio

Dale West, CFA
Senior Managing Director
External Public Markets
MBA, Stanford University
BS, University of Texas

Mark Albert, CFA
Senior Director
Asset Allocation
MBA, Univ. of Michigan
BS, Brandeis University

Katy Hoffman
Senior Director
Chief of Staff
MBA, Vanderbilt University
BA, Trinity University

Patrick Consgrove, CFA
Senior Director
Internal Public Markets
MBA, St. Mary's Univ.
BS, Texas A&M University

- We have completed Phase 1 and 2 and are in the process of implementing targets.
  - The initial portfolio will largely be in place by September 30.

1
- Review best practices
- Review all current IMD alpha streams
- Develop database / metrics for evaluation

2
- Identify optimal alpha stream contributions
- Eliminate redundant, unproductive streams
- Create optimal single integrated strategy

3
- Initiative implementation
- Transition plan over time

JUNE 2016 **DEC** **JAN 2017** **JUNE** **JUNE 2017** **DEC**

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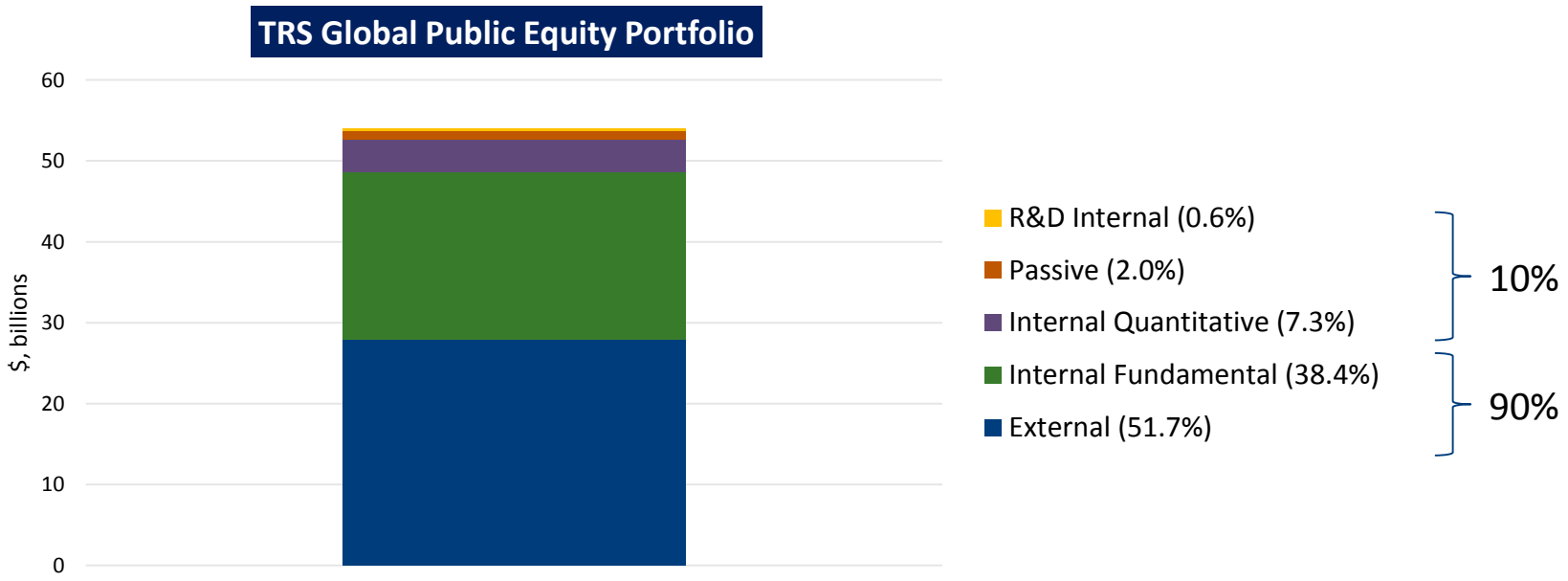
Introduction

Global public equity portfolio

- The global public equity portfolio is currently comprised of five sub-portfolios
  - Internal Fundamental and External Managers are the bulk of the assets – 90% of total public equity portfolio
  - Quant, Low Volatility, Quality and Passive are smaller portfolios – 10% of the total public equity portfolio



- Overall portfolio diversification will improve with larger allocations to quantitative and research portfolios

Source: State Street. As of June 30, 2017.

Introduction

Global public equity portfolio

- Active management has added value for the Trust: +29 bp of alpha over the past 5 years which equates to **$336 million** of value add
  - International markets, both developed and emerging, have delivered alpha
  - The US has been a negative outlier, with both internal fundamental and external portfolios underperforming
    - This is in line with industry data showing little to no value-add by US institutional managers over the last 25 years
    - Internal quantitative portfolios have performed better, but are much smaller, at roughly 10% of total allocation

5Y as of	Annualized Alpha (bp)					Information Ratio					Monthly Hit Rate*				
6/30/2017	Total	USA	EAFE	EM	World	Total	USA	EAFE	EM	World	Total	USA	EAFE	EM	World
Internal Fundamental	-20	-133	+56	+261		-0.21	-1.26	0.32	1.28		52%	35%	55%	53%	
External	+32	-162	+220	+99	+74	0.25	-0.82	0.77	0.60	0.34	58%	38%	57%	50%	55%
Internal Quantitative	+182	+183	+169	+195		1.11	0.84	0.73	0.56		67%	58%	65%	60%	
Internal Quantitative: LowVol**	+384	+405	+228	-286		0.95	0.96	0.50	-0.92		61%	65%	56%	38%	
Internal Quantitative: Quality	+42	+42				0.11	0.11				55%	55%			
Total	**+29**	**-116**	**+153**	**+160**		**0.14**	**-0.84**	**0.58**	**0.83**		**56%**	**39%**	**56%**	**52%**	

**Monthly Hit Rate is defined as the percentage of time a portfolio has higher returns than their benchmark on a monthly basis.*
***Internal Quantitative: LowVol portfolios have less than five years of live performance.*

Source: State Street, TRS IMD

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Our Solution

Starting with good alpha streams

- We have developed a comprehensive solution to address our four areas of focus
  - The solution starts with good alpha streams
- An alpha stream is a strategy with a single, transparent investment approach that can be evaluated as a unit
  - Different investment approaches should be evaluated separately
    - For example, we treat the geographical portfolios of the internal fundamental team separately
- All else being equal, we prefer internal alpha streams
  - See decision flowchart in Appendix
- Evaluate each alpha stream and its contribution to the overall alpha and desired risk premium exposure
- We have identified 42 total alpha streams for the target portfolio

Number of Alpha Streams

	USA	EAFE	EM	World	Total
Internal Fundamental	0	1	1	0	2
Internal Quantitative	4	3	3	0	10
External	10	7	8	5	30
Total	14	11	12	5	42

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Our Solution

Repeatable portfolio construction process

Prefer Internal Portfolios	• Non-US Developed and Emerging Markets fundamental strategies • Quantitative Equity • Low Volatility US and Non-US Developed
Complete With External Portfolios	• Target highly diversifying strategies and strategies that are not currently managed internally
Limit Risk Impact	• Achieve diversification by limiting the risk impact of an individual alpha stream
Target Compensated Risk Premiums	• Target alpha from compensated risk premiums to be one half of the 100 bp excess return target for global equity
Limit Other Risks	• Examples: country, currency, sector • We have the full arsenal of tools including passive and internal quant to manage these risk factors

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Our Solution

Innovation

- The IMD has a well-developed process for developing innovative alpha streams

- Current strategies have grown through this process

R&D Process Graduates
• Low Volatility Equity • Internal Risk Parity • Currency Hedging • Precious Metals • Quantitative Equity

R&D Pipeline
• Risk Premium Maximizing • Fundamental Small-Cap and Mid-Cap US • Trend Following

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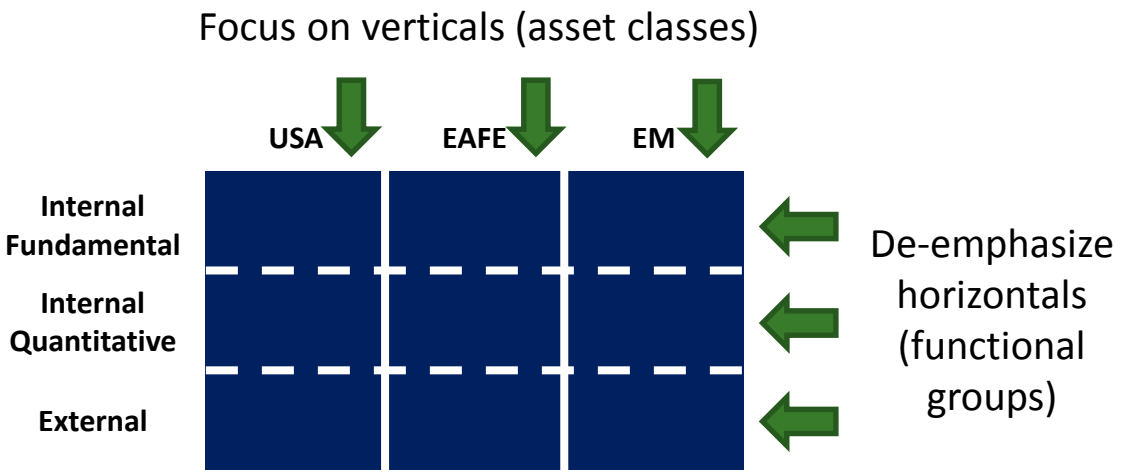
Our Solution

Organizational Evolution

- One Public Markets profit center
  - Ensures focus on the overall Global Equity Portfolio exposures and results
  - Proposed changes to PIP are aligned with this goal
- Internal fundamental team reorganization
  - Shifts in stock coverage to reflect emphasis on international portfolios
  - New priorities of US team:
    - Alpha Opportunities (pre-IPO investments)
    - Supporting principal investing activities throughout the Trust
    - Innovation: Fundamental Small-Cap and Mid-Cap US strategy
- Portfolio construction team with representatives from Internal Fundamental, External and Quantitative teams



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Conclusion

- Our project identifies four main areas of focus
  1. Focusing organization on overall results
  2. Scaling up innovation
  3. Reducing US active management
  4. Targeting risk premiums
- Our solution addresses these four areas:
  - Create Public Markets organization
  - Manage good alpha streams in a total portfolio context
  - Review and replace US alpha streams when warranted
  - Evaluate and manage risk premium impact

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Continuous Improvement

It is not the strongest of the species that survives, nor the one most intelligent, but the one most responsive to change.

- Charles Darwin

APPENDIX

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Peers and their use of risk premium strategies

- A few of our pension fund peers have invested either internally or externally in quantitative portfolios

Fund	AUM	Country	Media Reference
Norway Oil Fund	$884 B	Norway	"Harvest[ing] systematic risk premiums is an integral part of NBIM's management mission." [Value, Small]
APG / ABP	$419 B	Netherlands	Have allocated ~EUR40 billion to portfolios benchmarked to smart beta. In addition, has tilted 50-60% of developed equities to factors. [Value, Momentum, Quality, Defensive, RAFI]
PGGM / PfZW	$215 B	Netherlands	"40% of equity holdings to three factor premiums: value, low-volatility and quality." [Value, Quality, Defensive]
ATP	$122 B	Denmark	15% of risk allocated to "alternative risk premia."
PKA	$28 B	Denmark	"Portfolio targets alternative beta, including dividends, implied volatility, merger arbitrage, value, and liquidity event risk premiums." [Value, Defensive, Liquidity]
AIMco	$80 B	Canada	"We've been doing this for many years and have built models that emphasize value, momentum and quality" [Value, Momentum, Quality]
AP2	$35 B	Sweden	"AP2, the state pension fund in Sweden that oversees $35 billion, tried smart beta in 2002 through an equal-weighted portfolio of Swedish stocks, followed in 2006 by investments in a RAFI index…now, 50 percent of the fund's equities are in the strategies" [RAFI]
CalPERS	$297 B	US	"$28 billion allocated to smart beta" – via internally managed RAFI. Also, has started to invest in factors such as LowVol and Momentum. [RAFI, Momentum, Defensive]

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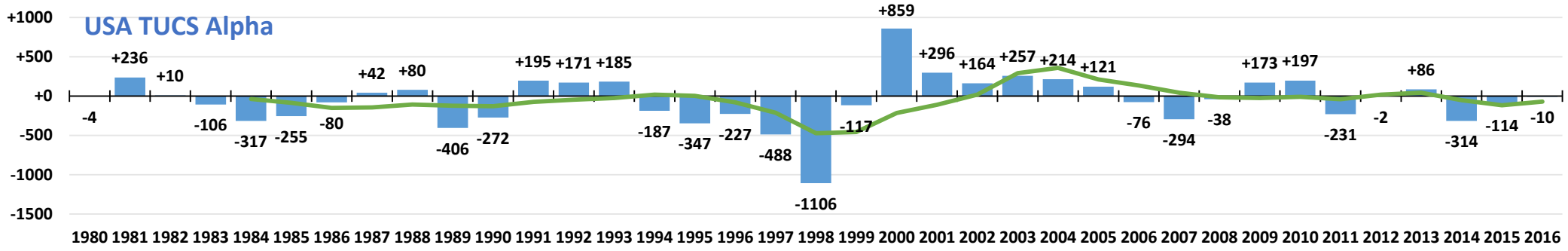
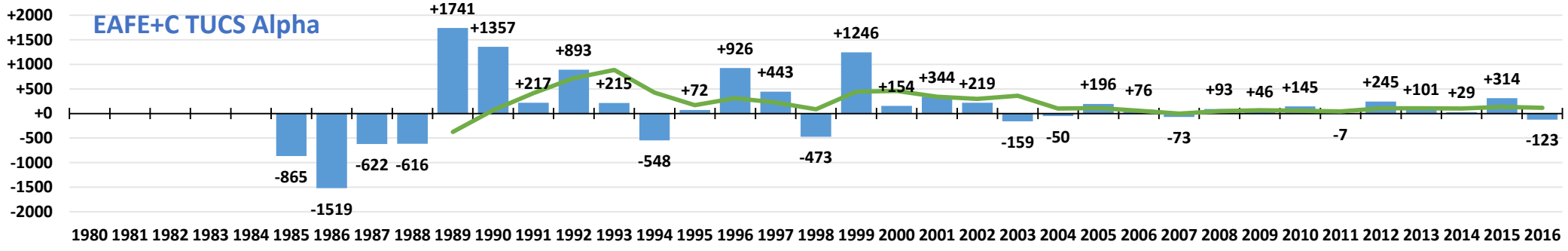
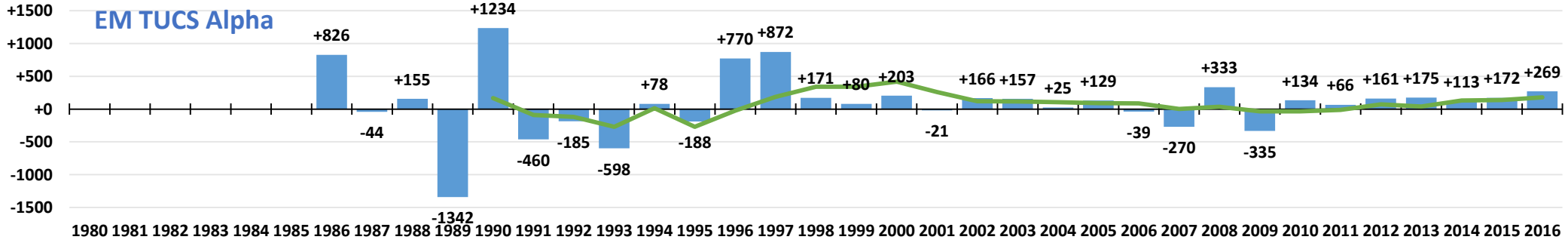
Long Term Alpha Cycles

How have our TUCS peers performed?







Source: Total returns from TUCS; alpha calculated versus TRS benchmarks, 2016 is a partial year (as of September 30, 2016). Green line is rolling five year average.