Wilshire

WILSHIRE ASSOCIATES

Wilshire Consulting

Police and Fire Retirement System

Executive Summary of Investment Performance

September 30, 2018

Wilshire Consulting

Contents

Capital Market Review Tab 1

Investment Performance Tab 2

Appendix

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MARKET ENVIRONMENT

MARKET COMMENTARY

U.S. Equity

The U.S. stock market was up 7.3% for the third quarter of 2018, the strongest quarter in nearly five years. Economic data continues to be strong including the largest increase in real GDP in four years at 4.2% during the second quarter. Third quarter growth was strong, as well, at 3.5%. The U.S. made positive strides on trade with a preliminary, renegotiated trade deal with the European Commission and a finalized deal with South Korea.

The U.S. trade deficit has had a major effect on real GDP during the past six months. A shrinking deficit during the second quarter contributed more to real GDP growth than in any quarter during the past five years. However, the success was short lived as the deficit grew during the third quarter. One specific example of tariff-driven effects is China discontinuing purchases of U.S. soybeans in retaliation for U.S. tariffs.

Non-U.S. Equity

Equity markets outside of the U.S. produced mixed results and trailed the U.S. equity market. Trade tensions weighed heavy on foreign markets while political turmoil in Italy was cause for concern just as the quarter ended. Emerging markets continue to underperform and, in fact, entered a technical bear market during the quarter, down -20% since late January. China's central bank communicated a lack of desire to offer monetary stimulus and liquidity issues have led to a number of corporate bond defaults.

Fixed Income

The U.S. Treasury yield curve rose across all maturities and the bellwether 10-year Treasury yield ended the quarter at 3.05%. The FOMC decided to increase its overnight rate by 25 basis points in September while Fed chair Jerome Powell said it was a "particularly bright moment" for the U.S. economy.

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SEPTEMBER 2018 ASSET CLASS ASSUMPTIONS

	EQUITY						FIXED INCOME						REAL ASSETS					
													REAL ESTATE					
	US STOCK	DEV EX-US STOCK	EMG MRKT STOCK	GLOBAL EX-US STOCK	GLOBAL STOCK	PRIVATE EQUITY	CASH	CORE BOND	LT CORE BOND	US TIPS	HIGH YIELD	NON-US BOND (HDG)	US RES	GLOBAL RES	PRIVATE RE	CMDTY	REAL ASSETS	US CPI
EXPECTED COMPOUND RETURN (%)	6.25	6.25	6.25	6.50	6.50	9.15	2.80	4.00	4.20	3.40	5.15	1.35	5.60	5.80	6.95	4.95	6.65	2.15
EXPECTED ARITHMETIC RETURN (%)	7.55	7.70	9.20	8.10	7.85	12.50	2.80	4.15	4.65	3.55	5.60	1.40	6.95	6.95	7.85	6.00	7.00	2.15
EXPECTED RISK (%)	17.00	18.00	26.00	18.75	17.10	28.00	1.25	5.15	9.85	6.00	10.00	3.50	17.00	15.80	14.00	15.00	8.75	1.75
CASH YIELD (%)	1.75	3.00	2.50	2.90	2.30	0.00	2.80	4.10	5.20	3.55	8.60	1.75	4.00	4.00	2.70	2.80	3.15	0.00
CORRELATIONS																		
US STOCK	1.00																	
DEV EX-US STOCK (USD)	0.81	1.00																
EMERGING MARKET STOCK	0.74	0.74	1.00															
GLOBAL EX-US STOCK	0.83	0.96	0.86	1.00														
GLOBAL STOCK	0.94	0.92	0.82	0.94	1.00													
PRIVATE EQUITY	0.74	0.64	0.62	0.67	0.74	1.00												
CASH EQUIVALENTS	-0.05	-0.09	-0.05	-0.08	-0.07	0.00	1.00											
CORE BOND	0.28	0.13	0.00	0.09	0.20	0.31	0.19	1.00										
LT CORE BOND	0.31	0.16	0.01	0.12	0.23	0.32	0.11	0.93	1.00									
US TIPS	-0.05	0.00	0.15	0.05	0.00	-0.03	0.20	0.60	0.47	1.00								
HIGH YIELD BOND	0.54	0.39	0.49	0.45	0.51	0.34	-0.10	0.25	0.32	0.05	1.00							
NON-US BOND (HDG)	0.16	0.25	-0.01	0.18	0.18	0.26	0.10	0.67	0.64	0.39	0.26	1.00						
US RE SECURITIES	0.59	0.47	0.44	0.49	0.56	0.50	-0.05	0.17	0.23	0.10	0.56	0.05	1.00					
GLOBAL RE SECURITIES	0.65	0.59	0.56	0.62	0.66	0.58	-0.05	0.17	0.22	0.11	0.62	0.03	0.94	1.00				
PRIVATE REAL ESTATE	0.54	0.44	0.44	0.47	0.52	0.51	-0.05	0.19	0.25	0.09	0.57	0.05	0.77	0.76	1.00			
COMMODITIES	0.25	0.34	0.39	0.38	0.32	0.27	0.00	-0.02	-0.02	0.25	0.29	-0.10	0.25	0.28	0.25	1.00		
REAL ASSET BASKET	0.42	0.43	0.50	0.48	0.47	0.43	0.01	0.24	0.25	0.41	0.53	0.06	0.65	0.69	0.69	0.59	1.00	
INFLATION (CPI)	-0.10	-0.15	-0.13	-0.15	-0.13	-0.10	0.10	-0.12	-0.12	0.15	-0.08	-0.08	0.05	0.03	0.05	0.44	0.26	1.00

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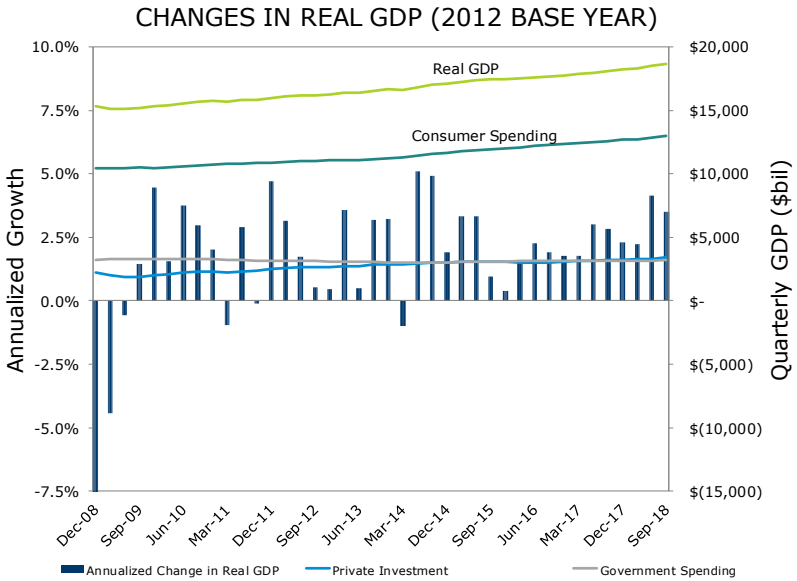
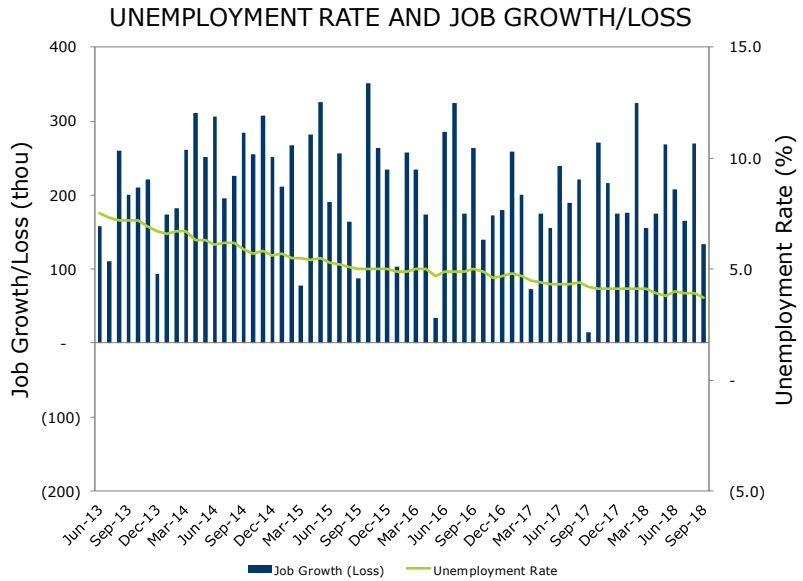
ECONOMIC REVIEW

AS OF SEPT. 30, 2018	KEY ECONOMIC INDICATORS			
CPI (ALL ITEMS)	MONTHLY CHANGE		CUMULATIVE CHANGE	
SEASONALLY ADJUSTED	Sep-18	0.1	3-Mo.	0.5
	Aug-18	0.2	12-Mo.	2.3
	Jul-18	0.2	10-Yr. (Annual)	1.4
BREAKEVEN INFLATION	10-Yr.	2.2		
CONSUMER SENTIMENT	Sep-18	100.1		
U. OF MICHIGAN SURVEY	Aug-18	96.2		
	1-Yr. Ago	95.1	10-Yr. Avg	81.5
MANUFACTURING	Sep-18	59.8	CHANGE IN SECTOR	
INST. FOR SUPPLY MGMT	Aug-18	61.3	>50	Expansion
PURCHASING MNGRS' IDX	1-Yr. Avg.	59.2	<50	Contraction

Note: Seasonally adjusted CPI data is utilized to better reflect short-term pricing activity.





Data sources: Bureau of Labor Statistics, U.S. Treasury, University of Michigan, Institute for Supply Management, Bureau of Economic Analysis

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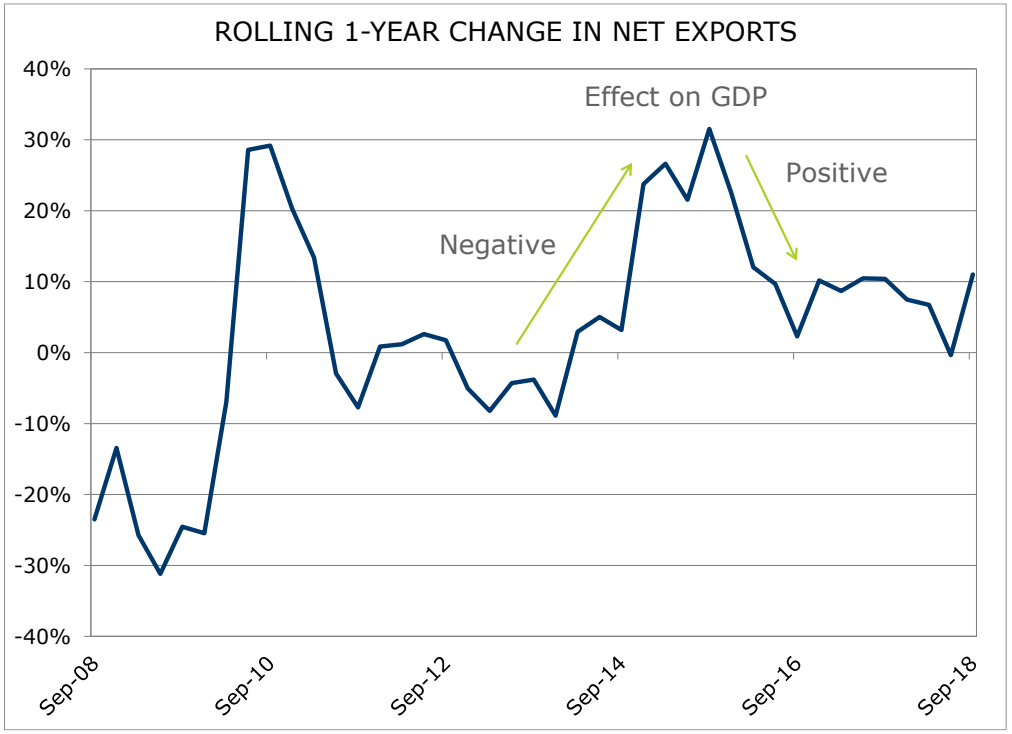
TRADE AND GROWTH

- U.S. began running a sizeable trade deficit during the late 1990s
  - An increase in net exports under those conditions is a drag on economic growth
  - Decreasing exports and/or increasing imports means less consumption of U.S. goods
- Changes in net exports contributed more than 1% to growth during Q2, but detracted 2.5% during Q3



Data sources: U.S. Bureau of Economic Analysis

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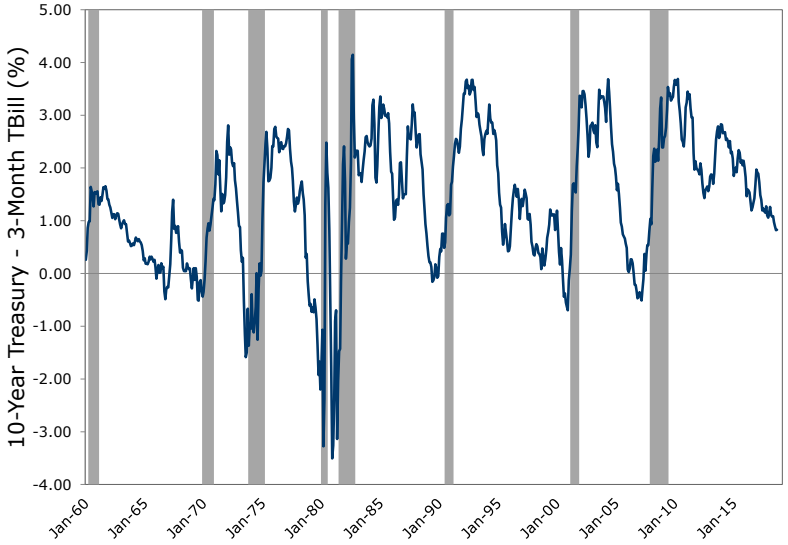
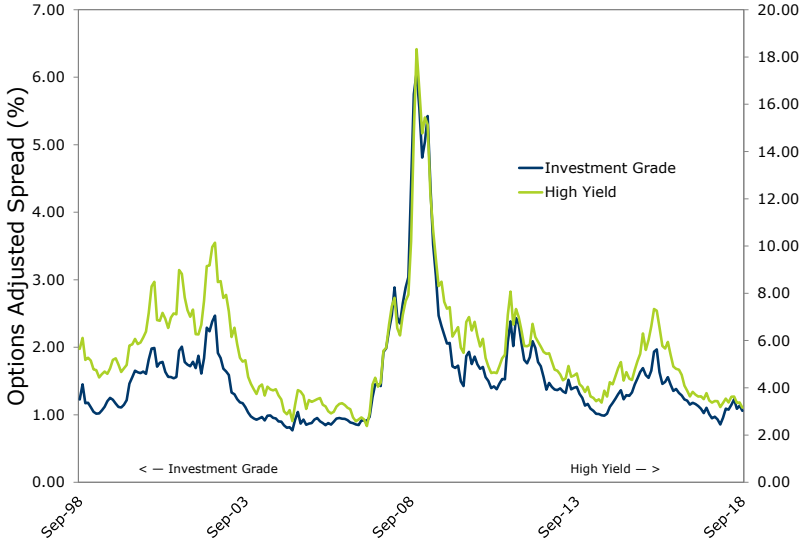
RISK MONITOR

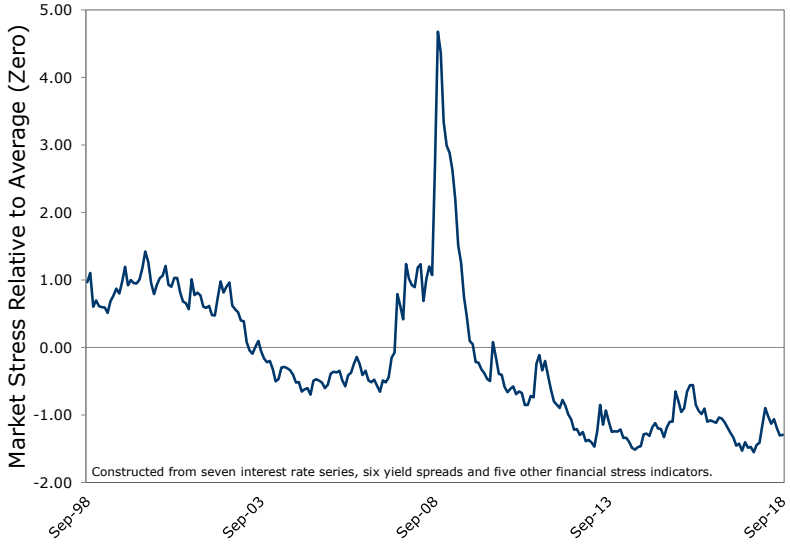
YIELD CURVE SLOPE VS RECESSIONS (IN GRAY)



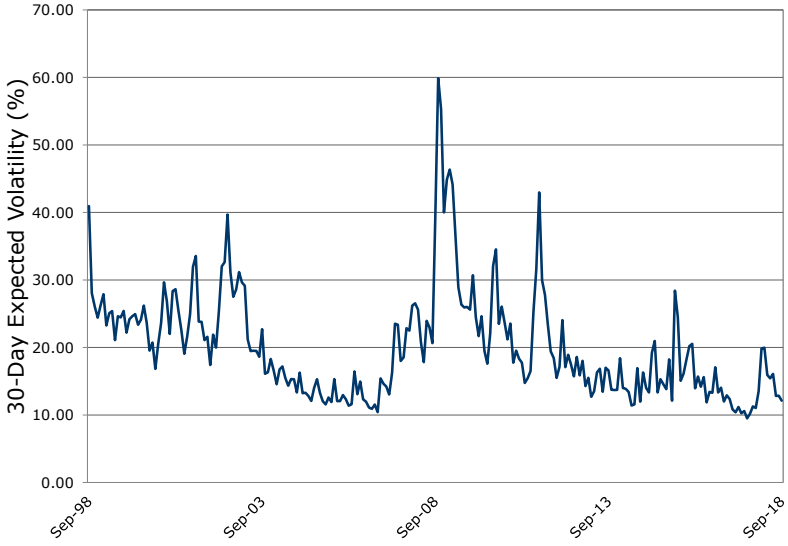
BLOOMBERG BARCLAYS CREDIT INDEXES



ST. LOUIS FED FINANCIAL STRESS INDEX



CBOE VOLATILITY INDEX



Data sources: Federal Reserve, Bloomberg Barclays

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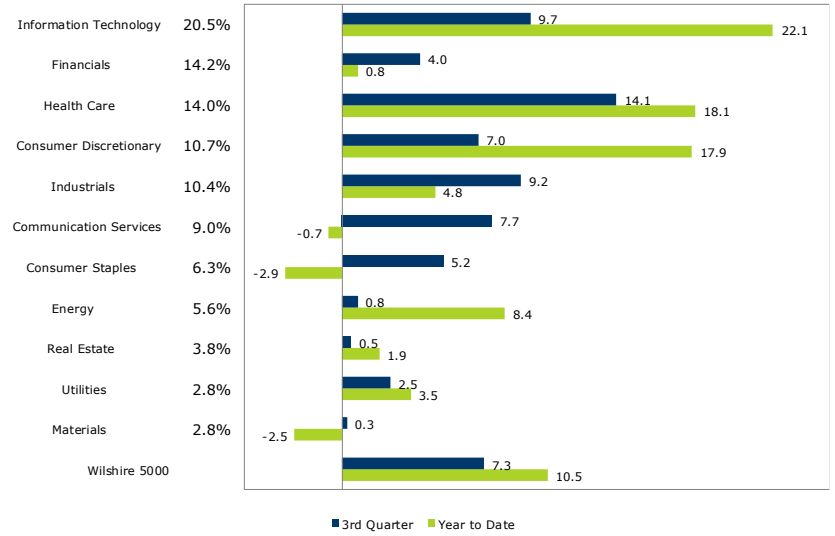
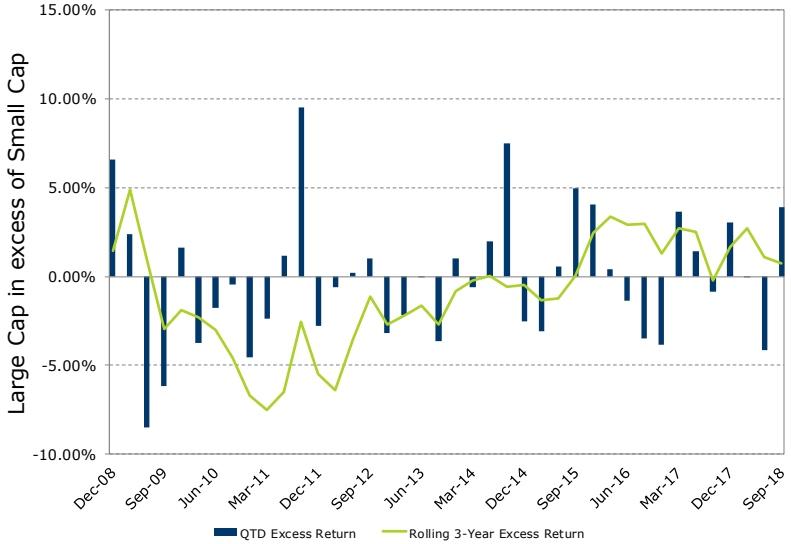
U.S. EQUITY MARKET

AS OF SEPTEMBER 30, 2018	QTR	YTD	1 YR	3 YR	5 YR	10 YR
WILSHIRE 5000 INDEX	7.3	10.5	17.6	17.3	13.6	12.0
WILSHIRE U.S. LARGE CAP	7.7	10.5	17.9	17.4	13.9	11.9
WILSHIRE U.S. SMALL CAP	3.7	11.0	14.9	16.5	11.3	12.8
WILSHIRE U.S. LARGE GROWTH	9.2	15.9	24.4	19.6	16.2	13.7
WILSHIRE U.S. LARGE VALUE	6.3	5.4	11.8	15.0	11.7	10.2
WILSHIRE U.S. SMALL GROWTH	5.3	13.7	18.4	17.4	11.3	13.5
WILSHIRE U.S. SMALL VALUE	2.0	8.2	11.4	15.4	11.2	12.0
WILSHIRE REIT INDEX	0.7	2.3	4.0	7.1	9.2	7.4
MSCI USA MIN. VOL. INDEX	7.7	9.2	14.9	14.7	13.1	11.1
FTSE RAFI U.S. 1000 INDEX	6.1	6.5	13.4	15.5	12.1	12.6

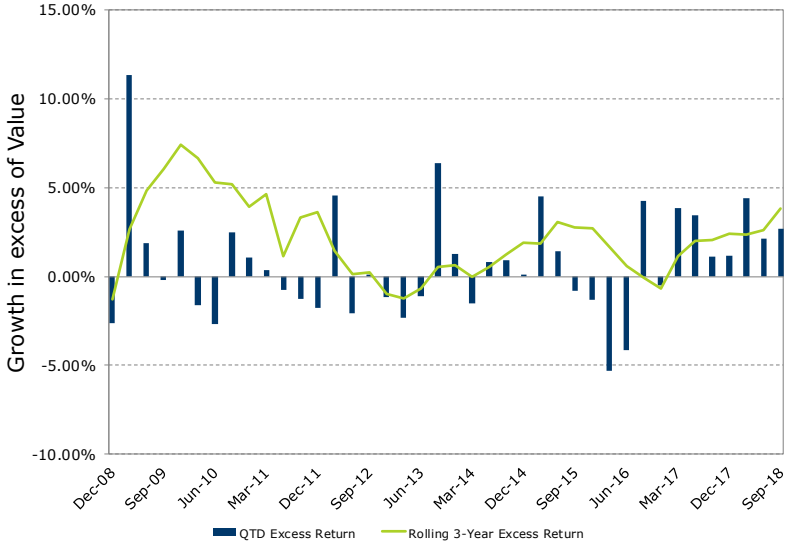
WILSHIRE 5000 SECTOR WEIGHT & RETURN (%)



LARGE CAP VS SMALL CAP



GROWTH VS VALUE



Data sources: Wilshire Compass, Wilshire Atlas

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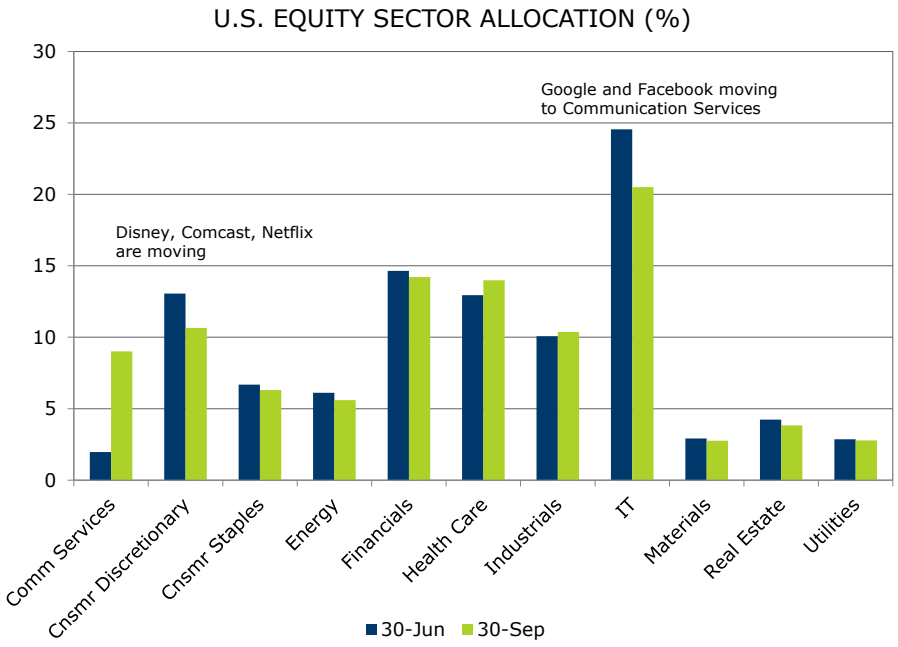
SECTOR ACTIVITY

Communications Services replaces Telecoms, better reflects media and content distribution



Apple and Amazon became the first $Trillion Public Companies

LARGEST U.S. CORPORATIONS AS % OF MARKET VALUE		
Sep-18	Apple Inc	3.9
	Amazon Com Inc	3.1
		6.9
Sep-08	Exxon Mobil Corp	3.2
	General Elec Co	2.0
		5.2
Sep-98	Microsoft Corp	2.6
	General Elec Co	2.5
		5.1
Sep-88	IBM	2.6
	Exxon Mobil Corp	2.3
		4.9
Sep-78	IBM	4.2
	AT&T Corp	4.1
		8.3

Growth stocks have been driving the market for the past 2 years, particularly Technology

WILSHIRE 5000 INDEX AS OF SEPTEMBER 30, 2018		
2-Year Total Return		18%
Cyclical Stocks		14%
	IT	6%
	Financials	3%
Defensive Stocks	Police & Fire	3%
	Health Care	2%

Data sources: Wilshire Atlas

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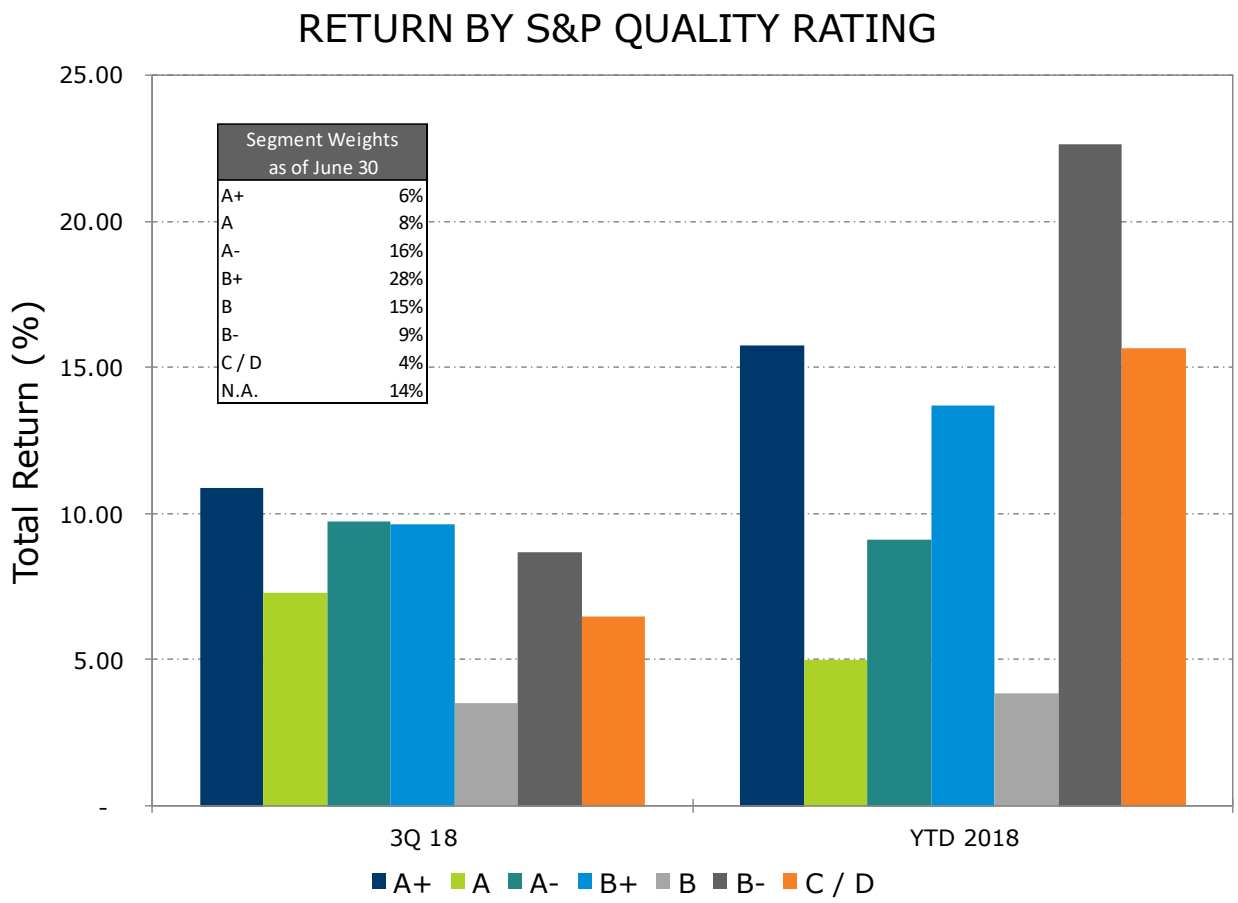
RETURNS BY QUALITY SEGMENT

Returns by quality are mixed during 2018 with both the highest and lowest ranked names leading the market



Data sources: Wilshire Atlas

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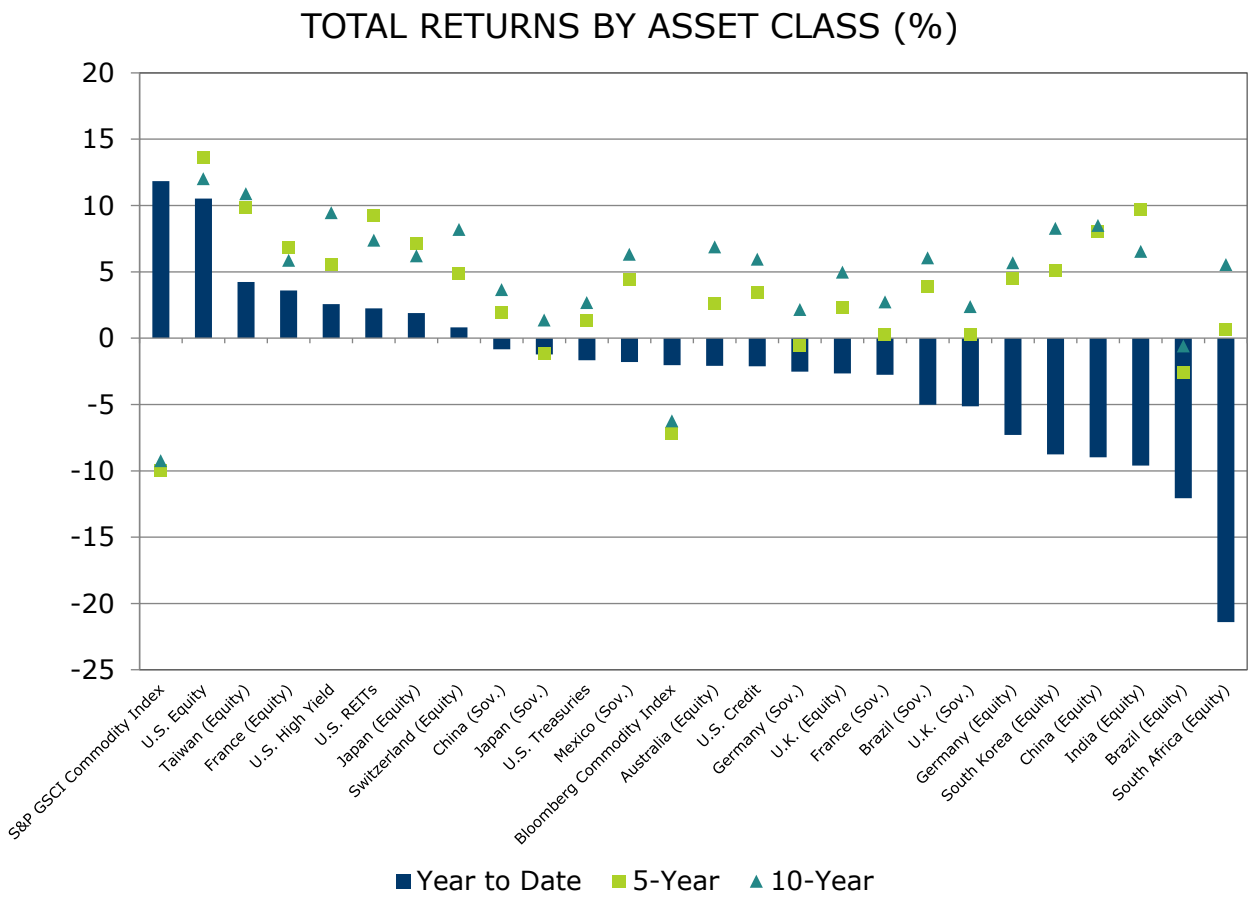
MARKET BREADTH

- Several asset classes produced strong returns during the past decade
- This year, many are either negative or well behind the recent history



Data sources: Wilshire Compass, Bloomberg Barclays

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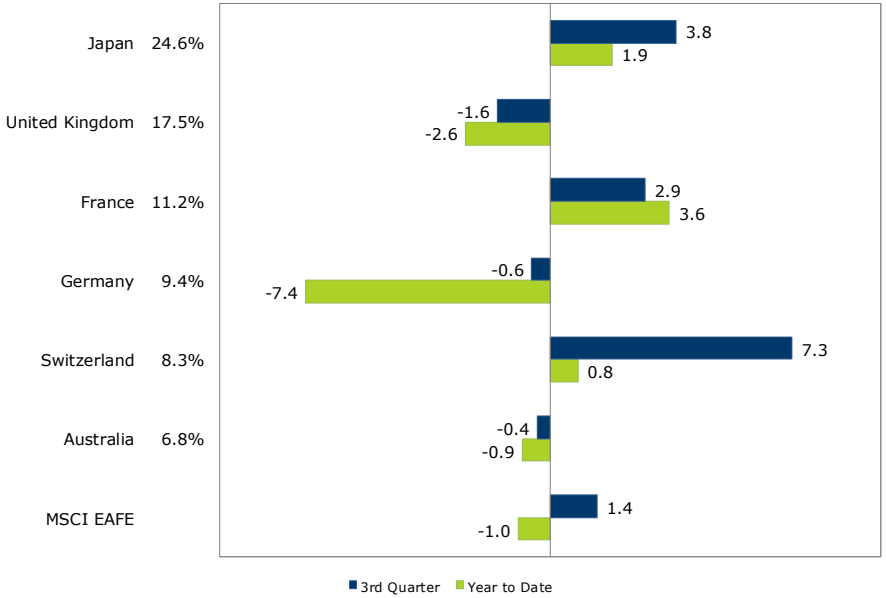
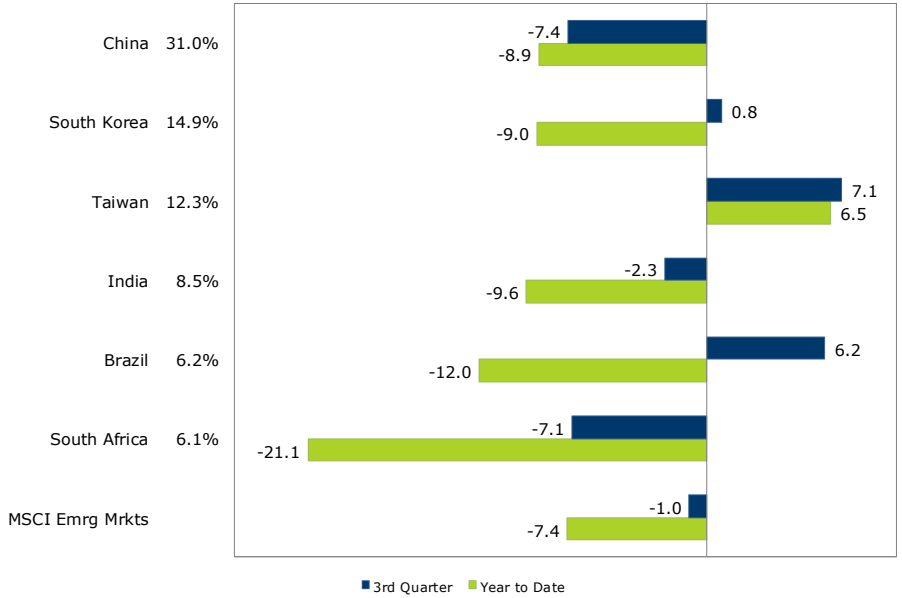
NON-U.S. EQUITY MARKET

AS OF SEPTEMBER 30, 2018	QTR	YTD	1 YR	3 YR	5 YR	10 YR
MSCI ACWI EX-US ($G)	0.8	-2.7	2.3	10.5	4.6	5.7
MSCI EAFE ($G)	1.4	-1.0	3.2	9.8	4.9	5.9
MSCI EMERGING MARKETS ($G)	-1.0	-7.4	-0.4	12.8	4.0	5.8
MSCI FRONTIER MARKETS ($G)	-1.9	-12.4	-7.5	5.7	3.3	0.5
MSCI ACWI EX-US GROWTH ($G)	-0.2	-2.2	3.5	11.0	5.7	6.2
MSCI ACWI EX-US VALUE ($G)	1.9	-3.1	1.0	9.9	3.5	5.1
MSCI ACWI EX-US SMALL ($G)	-1.4	-4.1	2.2	11.8	6.6	9.2
MSCI ACWI MINIMUM VOLATILITY	5.9	5.9	11.1	12.7	10.2	9.6
MSCI EAFE MINIMUM VOLATILITY	2.3	2.3	5.9	9.3	7.5	7.8
FTSE RAFI DEVELOPED EX-US	1.6	-2.0	2.6	11.0	5.0	6.2
MSCI EAFE LC (G)	2.4	1.8	5.6	9.9	8.4	7.2

MSCI EAFE: LARGEST COUNTRIES & RETURN (USD)



MSCI EM: LARGEST COUNTRIES & RETURN (USD)



Data sources: Wilshire Compass

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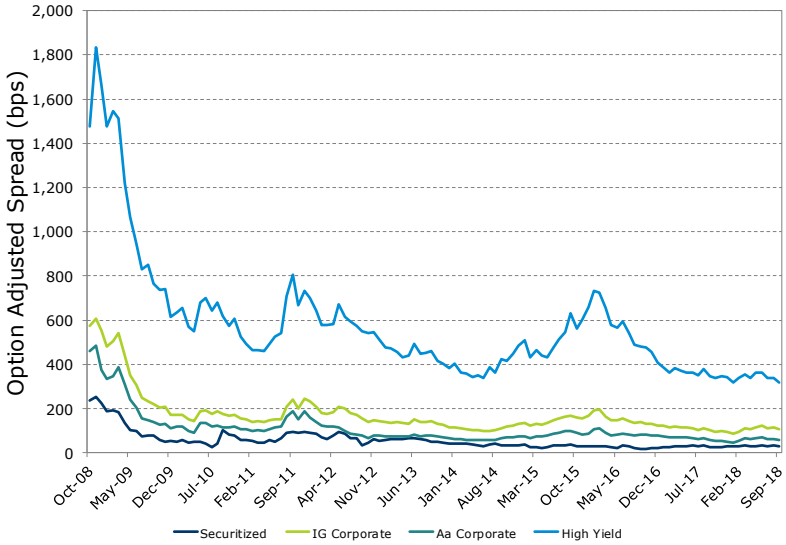
U.S. FIXED INCOME

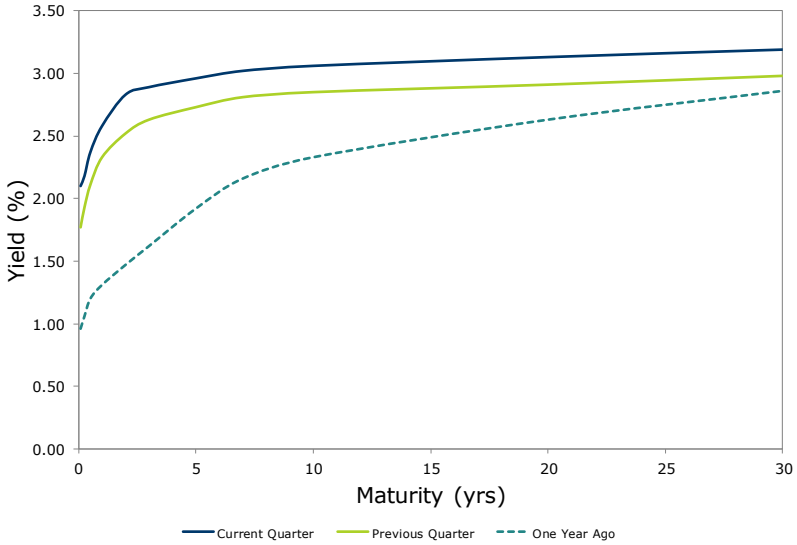
AS OF SEPTEMBER 30, 2018	YTM	DURATION	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS AGGREGATE	3.5	6.0	0.0	-1.6	-1.2	1.3	2.2	3.8
BLOOMBERG BARCLAYS TREASURY	2.9	6.0	-0.6	-1.7	-1.6	0.2	1.3	2.7
BLOOMBERG BARCLAYS GOV'T-REL.	3.5	5.3	0.4	-0.9	-0.6	1.8	2.3	3.3
BLOOMBERG BARCLAYS SECURITIZED	3.6	5.2	-0.1	-1.0	-0.9	1.0	2.0	3.5
BLOOMBERG BARCLAYS CORPORATE	4.1	7.2	1.0	-2.3	-1.2	3.1	3.5	6.4
BLOOMBERG BARCLAYS LT G/C	4.1	14.8	-0.5	-5.4	-2.7	3.4	5.2	7.1
BLOOMBERG BARCLAYS LT TREASURY	3.2	17.0	-2.9	-5.8	-3.6	0.7	4.4	5.4
BLOOMBERG BARCLAYS LT GOV't-REL.	4.5	12.0	0.6	-3.2	-1.2	4.8	5.6	6.7
BLOOMBERG BARCLAYS LT CORP.	4.7	13.6	1.3	-5.5	-2.4	5.2	5.7	8.7
BLOOMBERG BARCLAYS U.S. TIPS *	3.0	7.6	-0.8	-0.8	0.4	2.0	1.4	3.3
BLOOMBERG BARCLAYS HIGH YIELD	6.5	3.8	2.4	2.6	3.0	8.1	5.5	9.5
TREASURY BILLS	2.2	0.25	0.5	1.3	1.6	0.8	0.5	0.3

* Yield and Duration statistics are for a proxy index based on similar maturity, the Bloomberg Barclays U.S. Treasury 7-10 Year Index

BLOOMBERG BARCLAYS FIXED INCOME INDEXES



TREASURY YIELD CURVE



Data sources: Wilshire Compass, Bloomberg Barclays, U.S. Treasury

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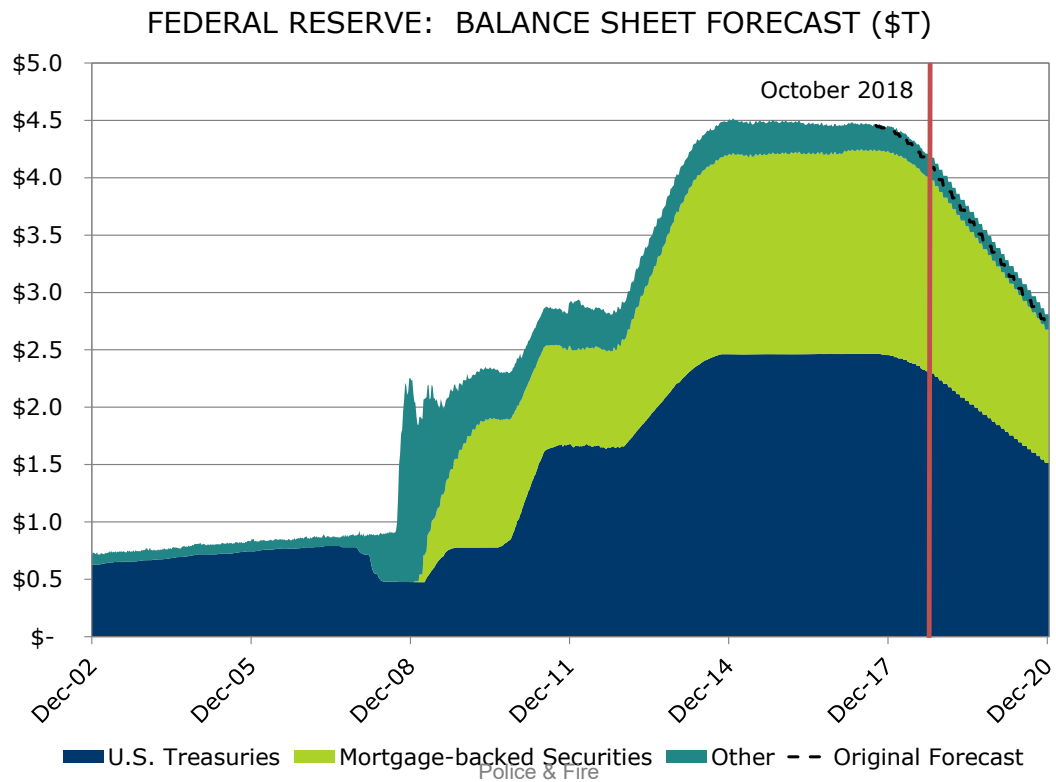
FEDERAL RESERVE

- Federal Reserve began their balance sheet normalization program during October 2017; targeting $10B in reductions per month while increasing to $50B per month in Q4 2018

- Generally on pace with their initial plan, the Federal Reserve has reduced their total assets by $280 billion through September 2018



Data sources: Federal Reserve

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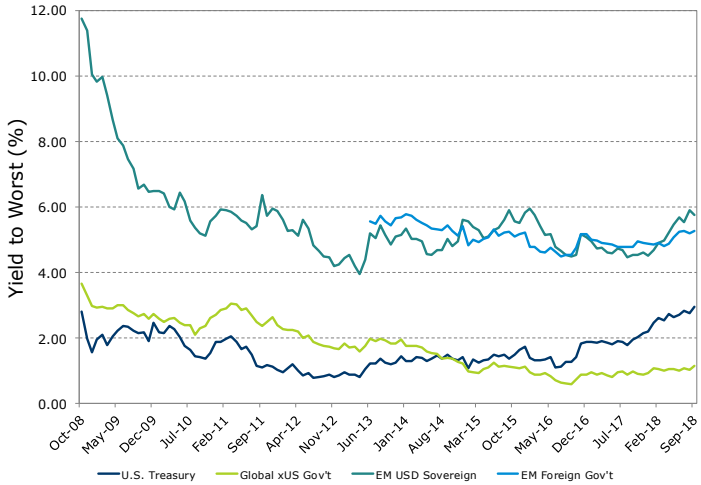
NON-U.S. FIXED INCOME

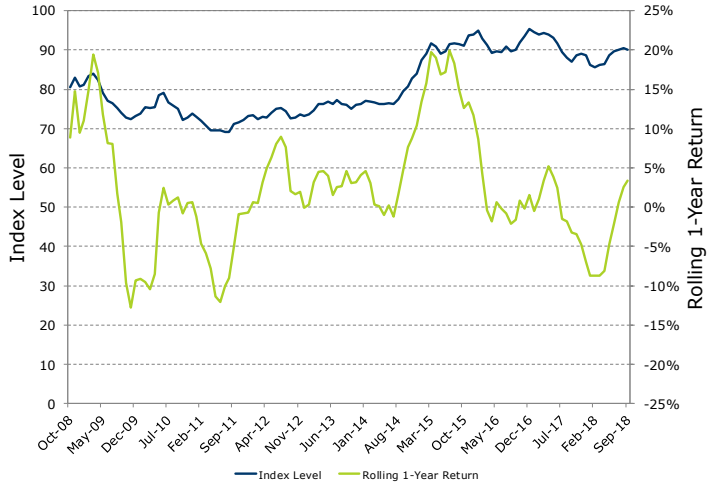
AS OF SEPTEMBER 30, 2018	QTR	YTD	1 YR	3 YR	5 YR	10 YR
DEVELOPED MARKETS						
BLMBRG BRCLYS GLBL AGGREGATE xUS	-1.7	-3.0	-1.4	2.4	-0.3	2.2
BLMBRG BRCLYS GLBL AGGREGATE xUS *	-0.2	1.3	2.4	3.1	3.8	4.2
BLMBRG BRCLYS GLOBAL INF LNKD xUS	-2.2	-4.9	-1.2	2.2	1.4	3.1
BLMBRG BRCLYS GLOBAL INF LNKD xUS *	-0.8	0.0	3.3	5.3	5.9	5.6
EMERGING MARKETS (HARD CURRENCY)						
BLMBRG BRCLYS EM USD AGGREGATE	1.6	-2.3	-1.7	5.4	4.5	7.4
EMERGING MARKETS (FOREIGN CURRENCY)						
BLMBRG BRCLYS EM LOCAL CURR. GOV'T	-0.3	-5.8	-3.7	4.8	0.0	3.3
BLMBRG BRCLYS EM LOCAL CURR. GOV'T *	0.5	0.2	0.2	2.5	2.3	3.5
EURO vs. DOLLAR	-0.5	-3.3	-1.8	1.3	-3.0	-1.9
YEN vs. DOLLAR	-2.5	-0.8	-0.9	1.8	-2.9	-0.7
POUND vs. DOLLAR	-1.2	-3.6	-2.8	-4.9	-4.2	-3.1

* Returns are reported in terms of local market investors, which removes currency effects.

BLOOMBERG BARCLAYS FIXED INCOME INDEXES



U.S. DOLLAR INDEX: MAJOR CURRENCIES



Data sources: Wilshire Compass, Bloomberg Barclays, Federal Reserve Bank of St. Louis

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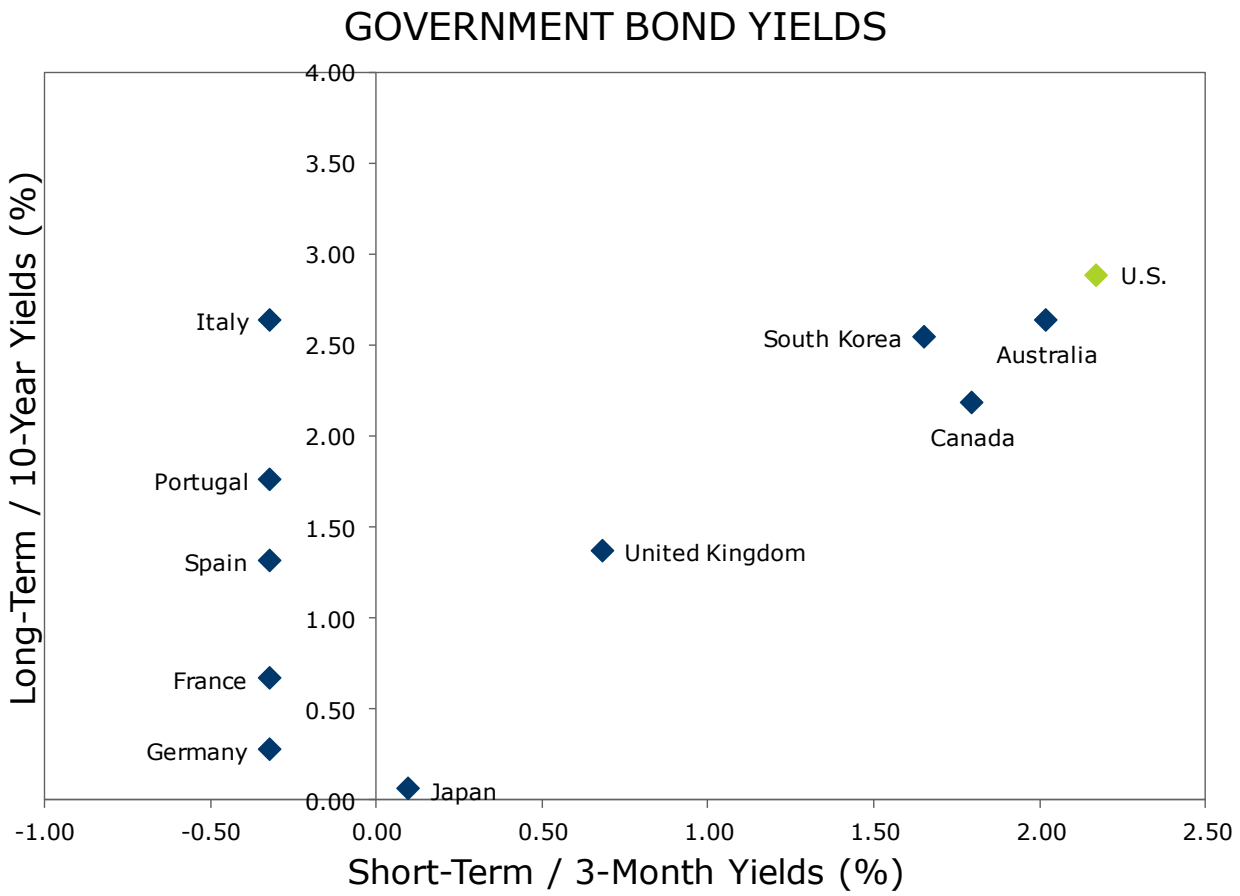
GLOBAL INTEREST RATES

Negative short-term rates remain in Europe; Long rates jumped in Italy during the quarter



Data sources: Organization for Economic Co-operation and Development

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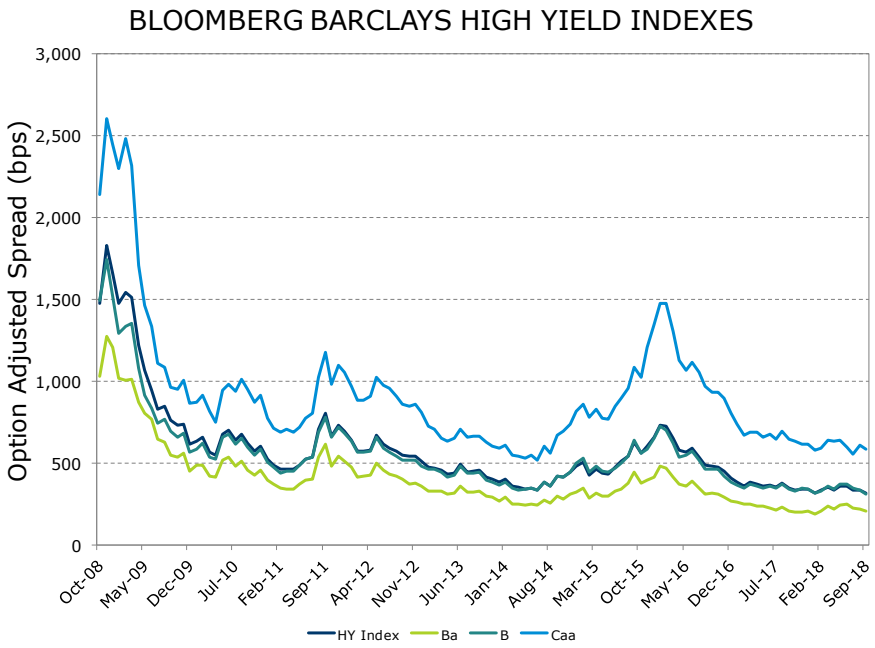
HIGH YIELD BOND MARKET

AS OF SEPTEMBER 30, 2018		QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS HIGH YIELD		2.4	2.6	3.0	8.1	5.5	9.5
CREDIT SUISSE LEVERAGED LOAN		1.9	4.3	5.6	5.4	4.4	5.8
HIGH YIELD QUALITY DISTRIBUTION	WEIGHT						
Ba U.S. HIGH YIELD	42.8%	2.3	0.5	0.9	6.7	5.5	9.0
B U.S. HIGH YIELD	41.9%	2.3	3.2	3.5	7.6	5.0	8.1
Caa U.S. HIGH YIELD	14.3%	2.7	6.0	7.1	12.5	6.9	10.2
Ca to D U.S. HIGH YIELD	0.8%	7.0	30.1	31.1	28.3	-4.4	9.4
Non-Rated U.S. HIGH YIELD	0.2%	1.5	2.9	0.9	1.8	0.6	3.2



Data sources: Wilshire Compass, Bloomberg Barclays

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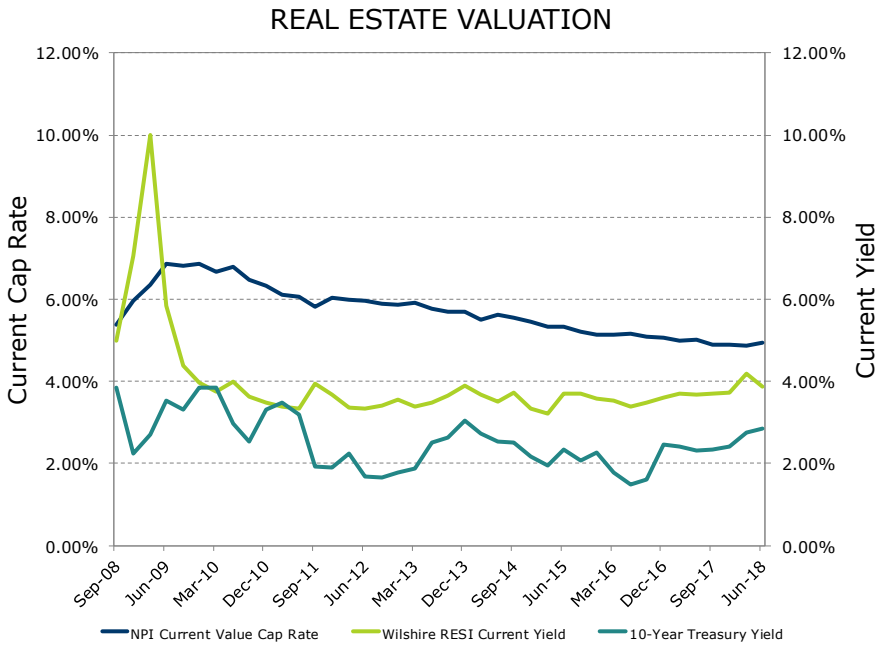
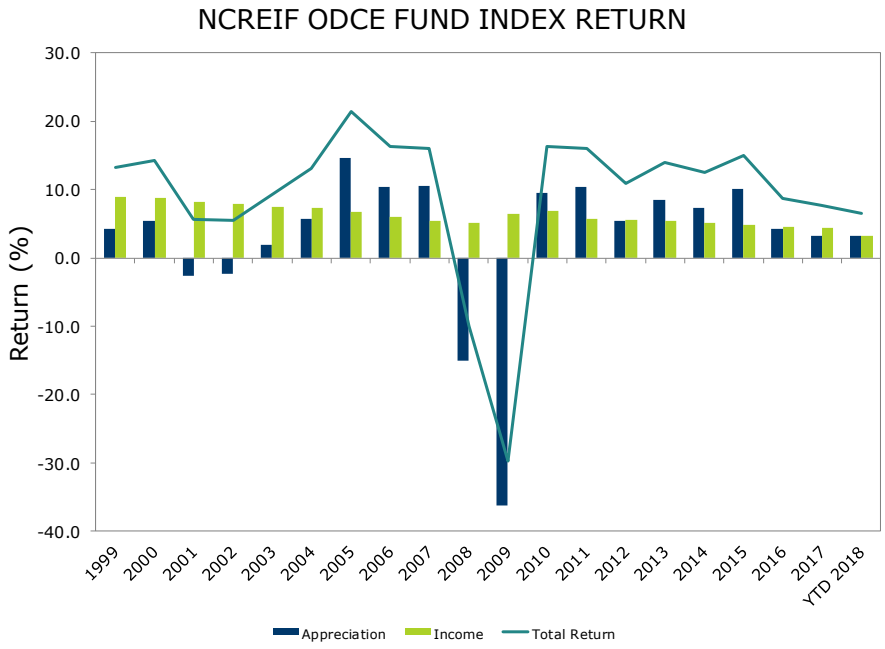
REAL ASSETS

AS OF SEPTEMBER 30, 2018	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS U.S. TIPS	-0.8	-0.8	0.4	2.0	1.4	3.3
BLOOMBERG COMMODITY INDEX	-2.0	-2.0	2.6	-0.1	-7.2	-6.2
WILSHIRE GLOBAL RESI INDEX	0.3	0.8	4.0	7.2	7.3	7.6
NCREIF ODCE FUND INDEX	2.1	6.5	8.7	8.8	10.7	5.6
NCREIF TIMBERLAND INDEX	1.0	2.4	4.0	3.5	6.0	4.0
ALERIAN MLP INDEX (OIL & GAS)	6.6	5.9	4.9	4.4	-2.7	9.2





Data sources: Wilshire Compass, National Council of Real Estate Investment Fiduciaries

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ASSET CLASS PERFORMANCE

ASSET CLASS RETURNS - BEST TO WORST						ANNUALIZED 5-YEAR AS OF 9/2018
2013	2014	2015	2016	2017	2018 YTD	
U.S. Equity 33.1%	REITs 31.8%	REITs 4.2%	MLPs 18.3%	Emrg Mrkts 37.7%	U.S. Equity 10.5%	U.S. Equity 13.6%
MLPs 27.6%	U.S. Equity 12.7%	U.S. Equity 0.7%	High Yield 17.1%	Developed 25.6%	MLPs 5.9%	REITs 9.2%
Developed 23.3%	Core Bond 6.0%	Core Bond 0.6%	U.S. Equity 13.4%	U.S. Equity 21.0%	High Yield 2.6%	High Yield 5.5%
High Yield 7.4%	MLPs 4.8%	T-Bills 0.1%	Commodities 11.8%	High Yield 7.5%	REITs 2.3%	Developed 4.9%
REITs 1.9%	U.S. TIPS 3.6%	Developed -0.4%	Emrg Mrkts 11.6%	REITs 4.2%	T-Bills 1.3%	Emrg Mrkts 4.0%
T-Bills 0.1%	High Yield 2.5%	U.S. TIPS -1.4%	REITs 7.2%	Core Bond 3.6%	U.S. TIPS -0.8%	Core Bond 2.2%
Core Bond -2.0%	T-Bills 0.0%	High Yield -4.5%	U.S. TIPS 4.7%	U.S. TIPS 3.0%	Developed -1.0%	U.S. TIPS 1.4%
Emrg Mrkts -2.3%	Emrg Mrkts -1.8%	Emrg Mrkts -14.6%	Core Bond 2.6%	Commodities 1.7%	Core Bond -1.6%	T-Bills 0.5%
U.S. TIPS -8.6%	Developed -4.5%	Commodities -24.7%	Developed 1.5%	T-Bills 0.8%	Commodities -2.0%	MLPs -2.7%
Commodities -9.5%	Commodities -17.0%	MLPs -32.6%	T-Bills 0.3%	MLPs -6.5%	Emrg Mrkts -7.4%	Commodities -7.2%

Data sources: Wilshire Compass

Note: Developed asset class is developed equity markets ex-U.S., ex-Canada

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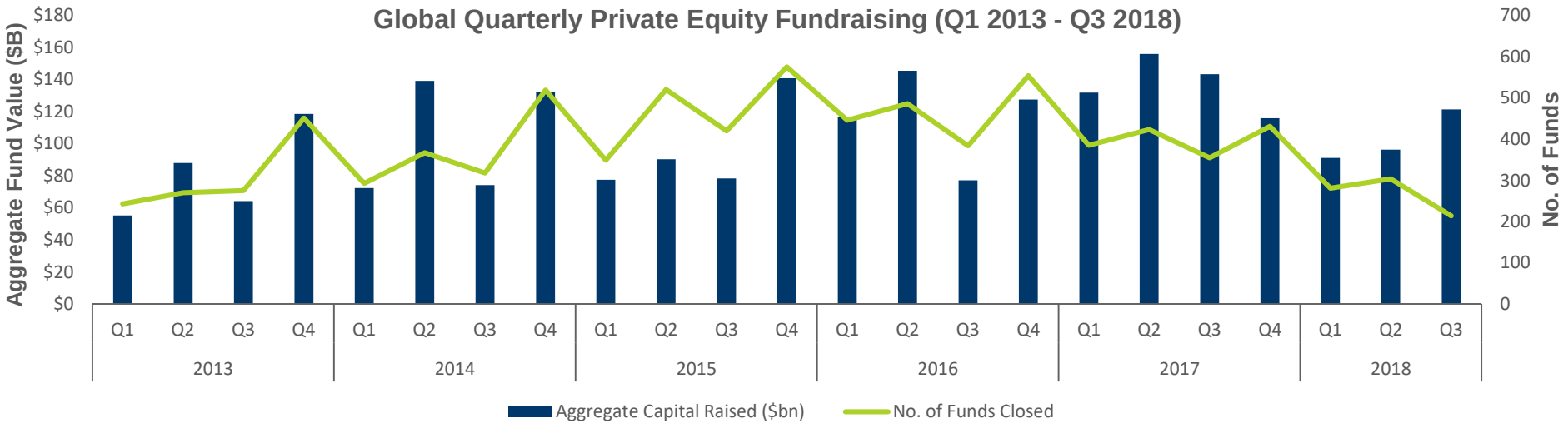
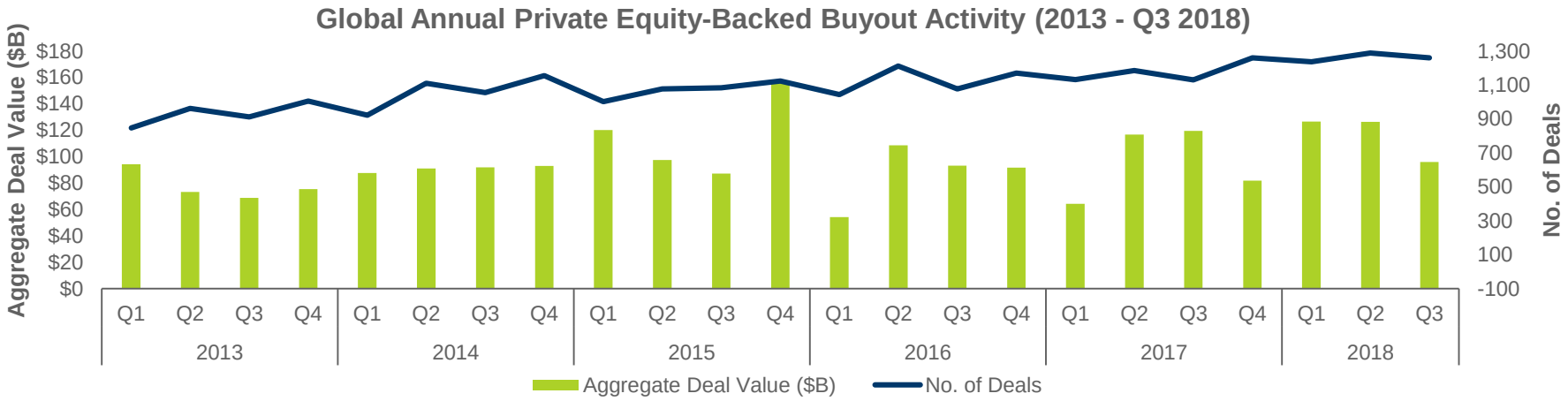
APPENDIX: PRIVATE MARKETS UPDATE

PRIVATE EQUITY – FUNDRAISING & INVESTMENT ACTIVITY





Source: Preqin, as of September 30, 2018.

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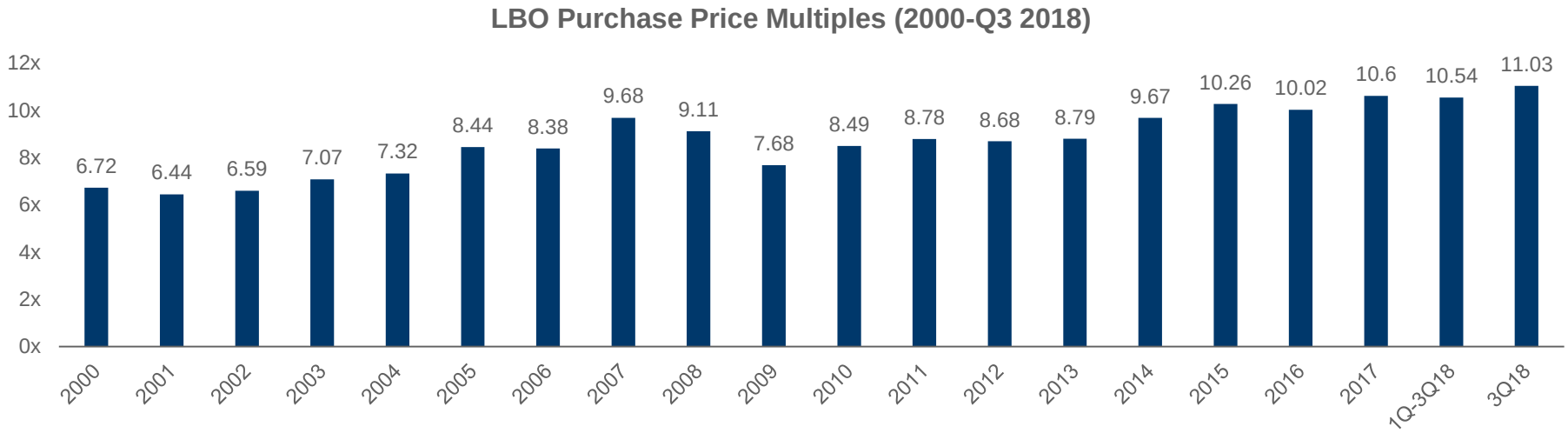
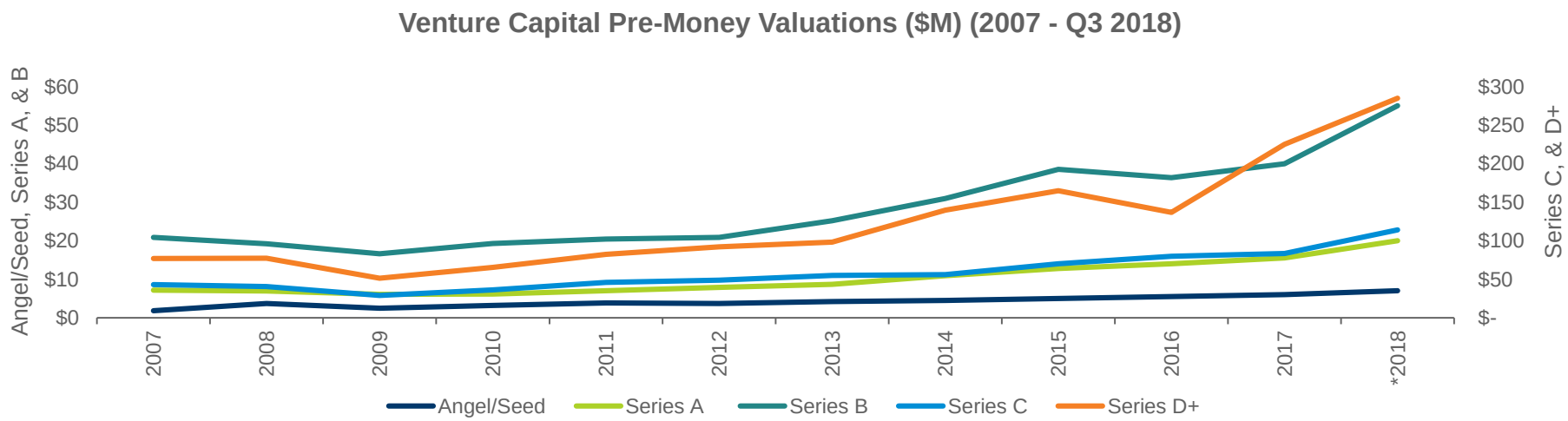
PRIVATE EQUITY – PRICING & VALUATIONS





Source: S&P LBO; Pitchbook, *as of September 30, 2018.

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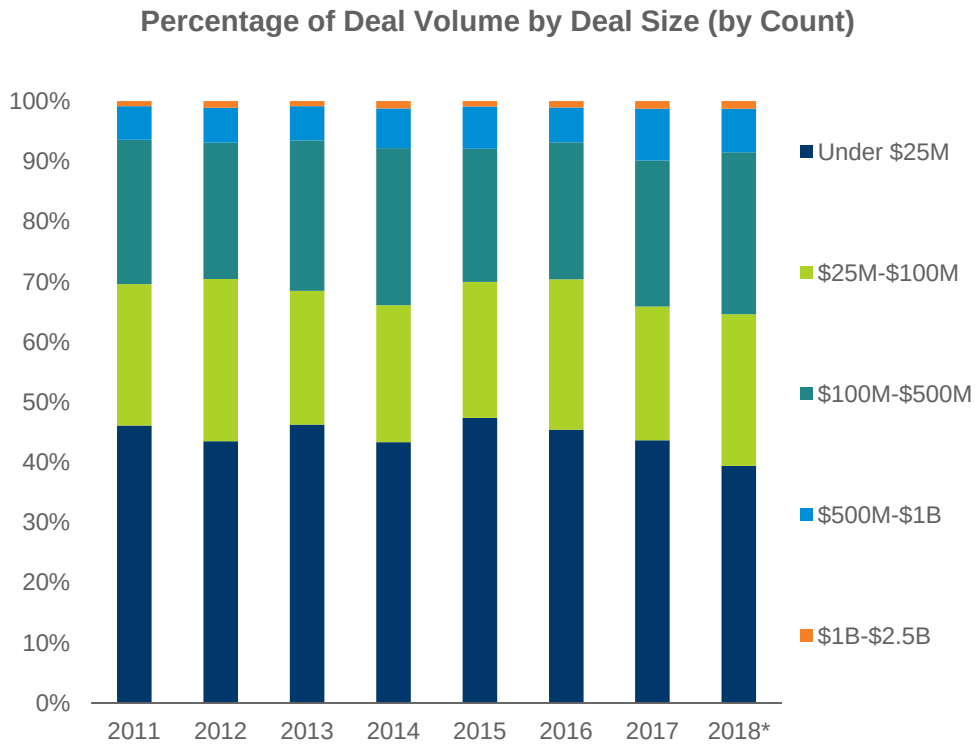
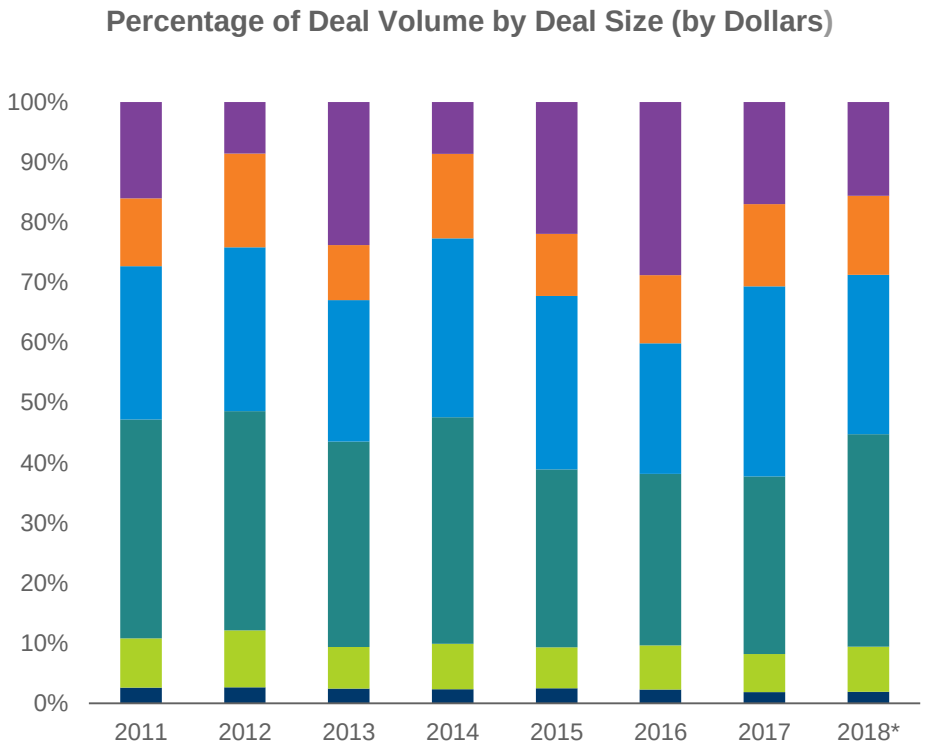
Wilshire Private Markets

U.S. INVESTMENT ACTIVITY BY DEAL SIZE





- Deal volume continues to be dominated by lower middle market deals with investment sizes below $100 million through the third quarter of 2018
- However, deals with below $100 million check sizes comprised only 9% of all deal volume by amount of capital invested in the third quarter of 2018

Source: PitchBook, *as of September 30, 2018.

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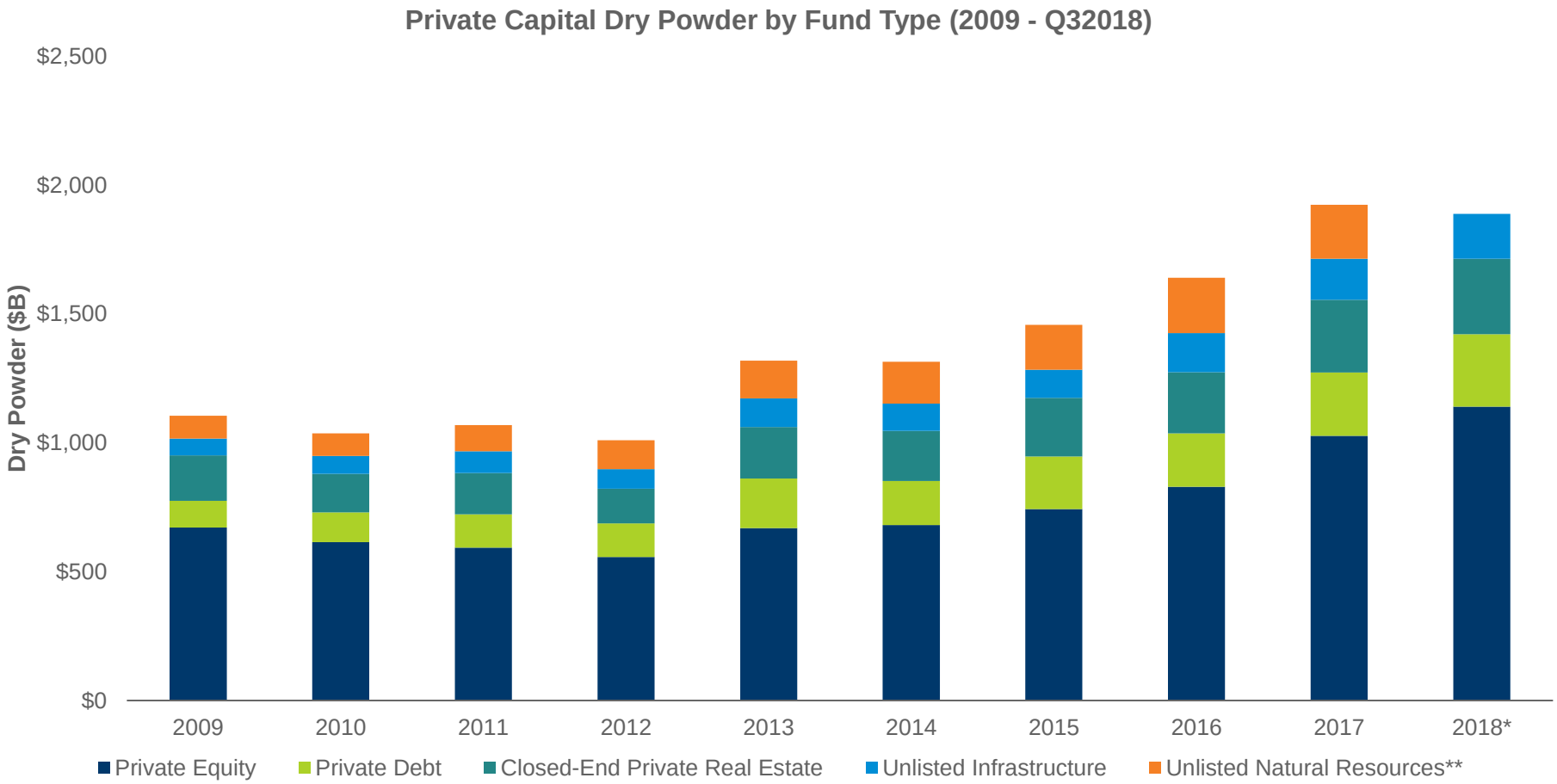
Wilshire Private Markets

PRIVATE CAPITAL DRY POWDER



- Global private capital dry powder continues to increase, topping $1.8 trillion across all fund types
- Private equity comprises over 60% of total dry powder in the market as of Q3 2018

Source: Preqin, *as of September 30, 2018.

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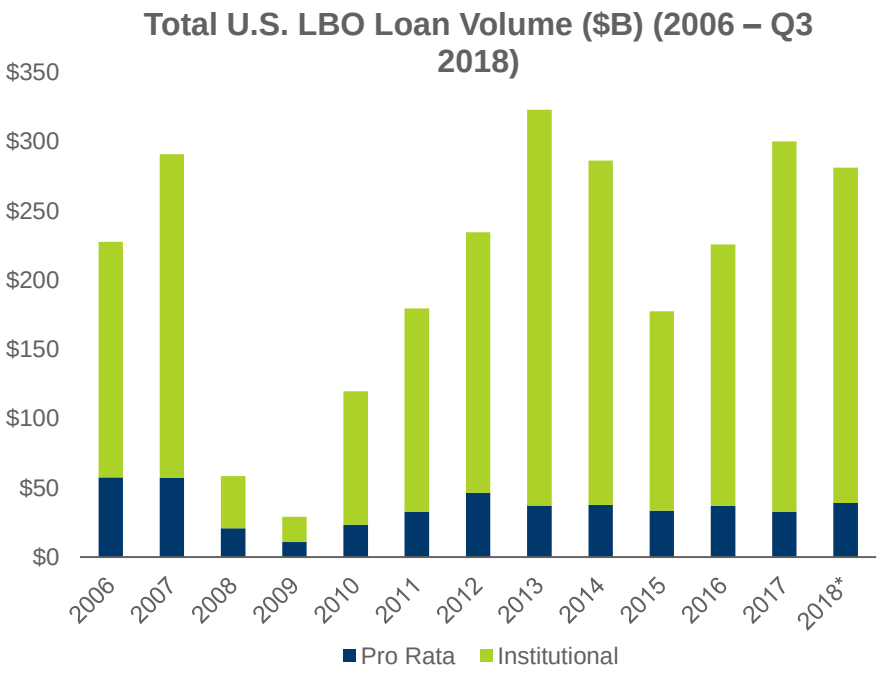
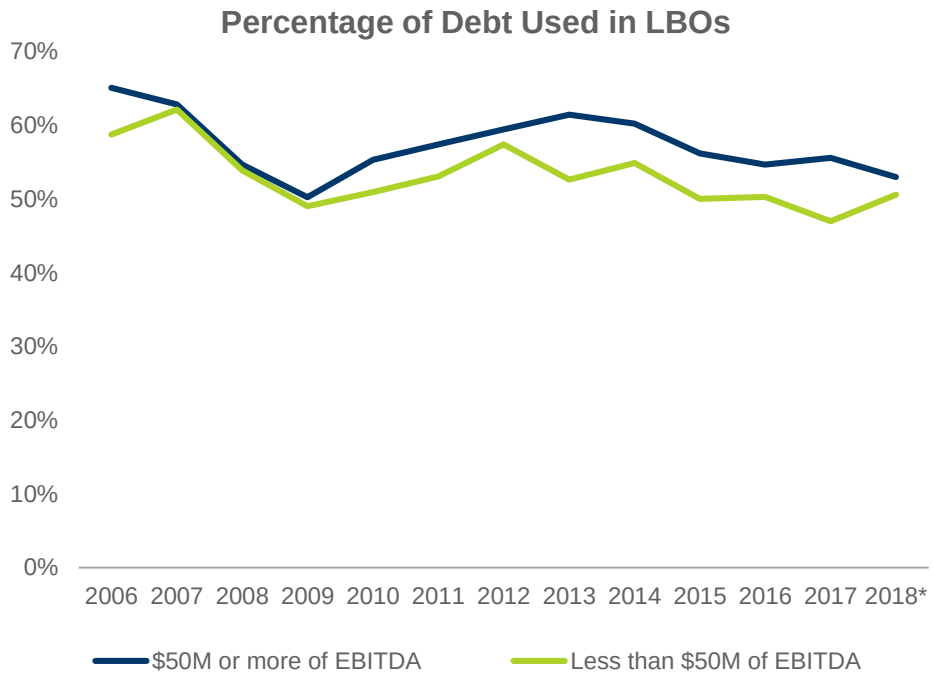
PRIVATE EQUITY - U.S. DEBT MARKETS





- Loan volume in 2017 increased by approximately $27 billion from the prior year and is on pace to once again increase year-over-year through the third quarter of 2018
- Availability of debt capital has slightly driven up the percentage of debt used to finance leveraged buyouts of less than $50 million of EBITDA through the third quarter of 2018

Source: S&P LBO, *as of September 30, 2018.

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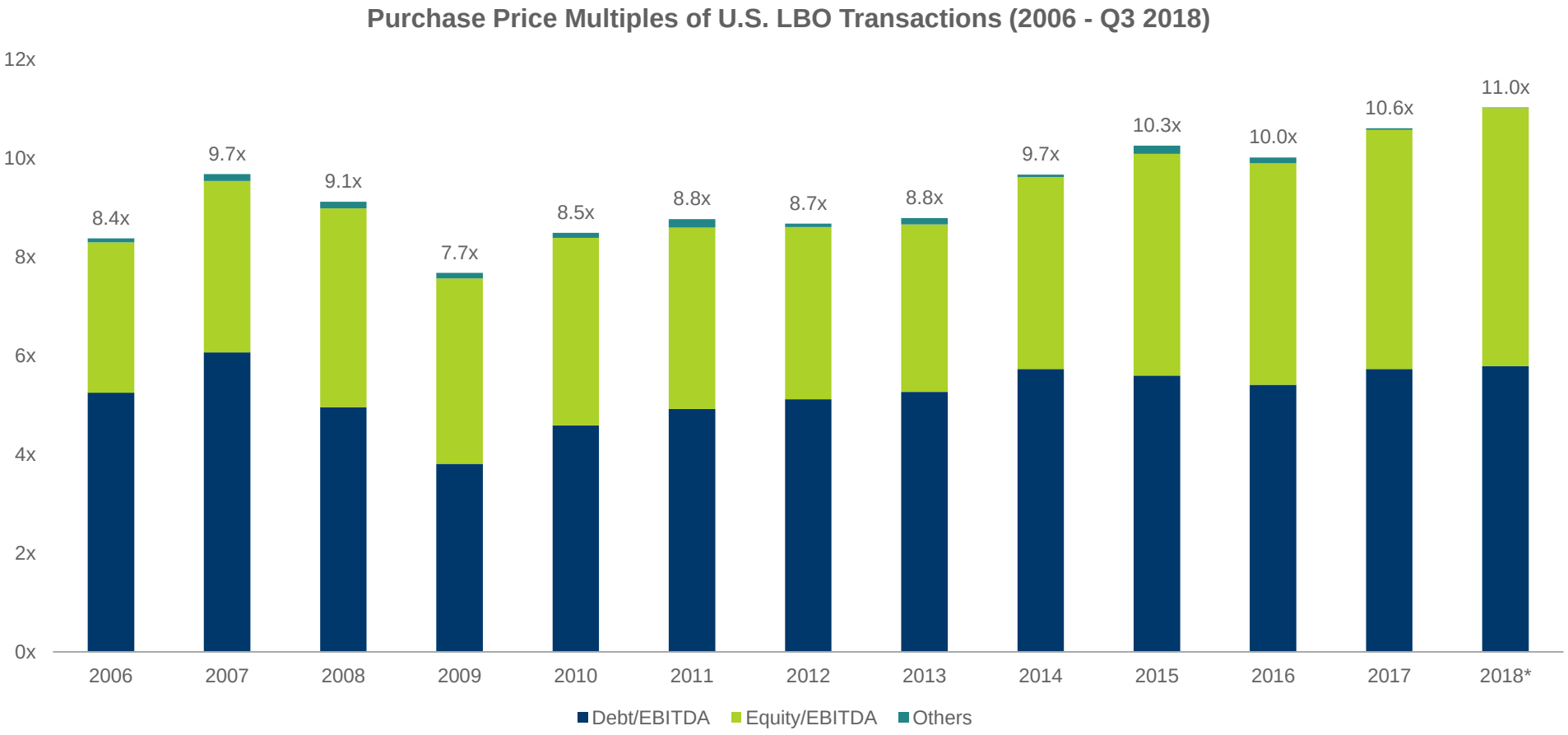
PRIVATE EQUITY - U.S. LBO PURCHASE PRICE MULTIPLES



- Due to the amount of debt that is readily available, purchase price multiples for U.S. LBOs have increased slightly through Q3 2018 relative to 2017 levels

Source: S&P LBO, *as of September 30, 2018.

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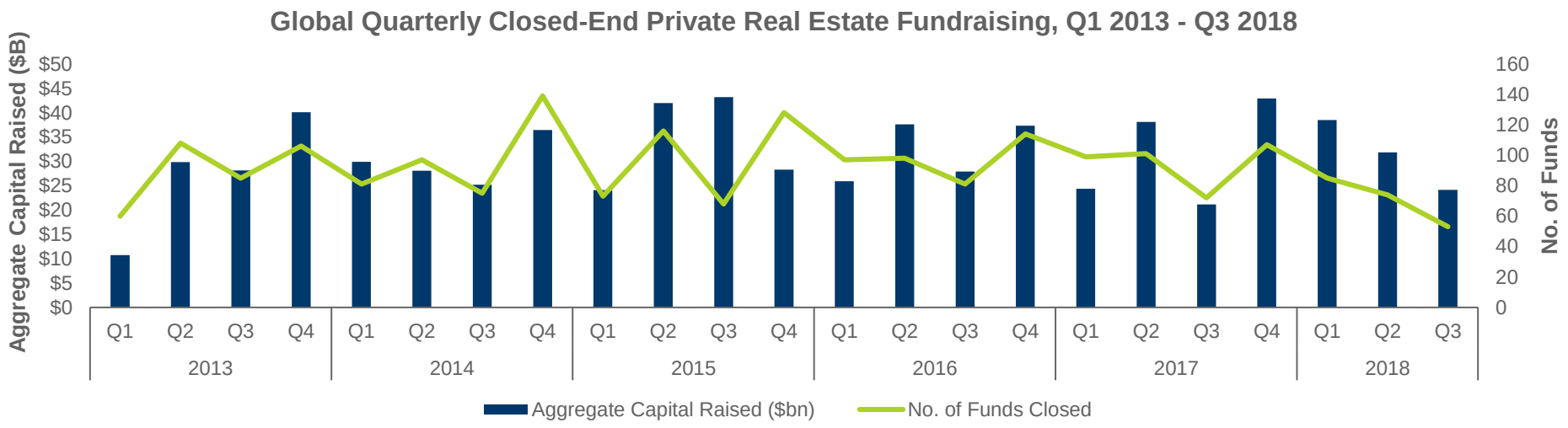
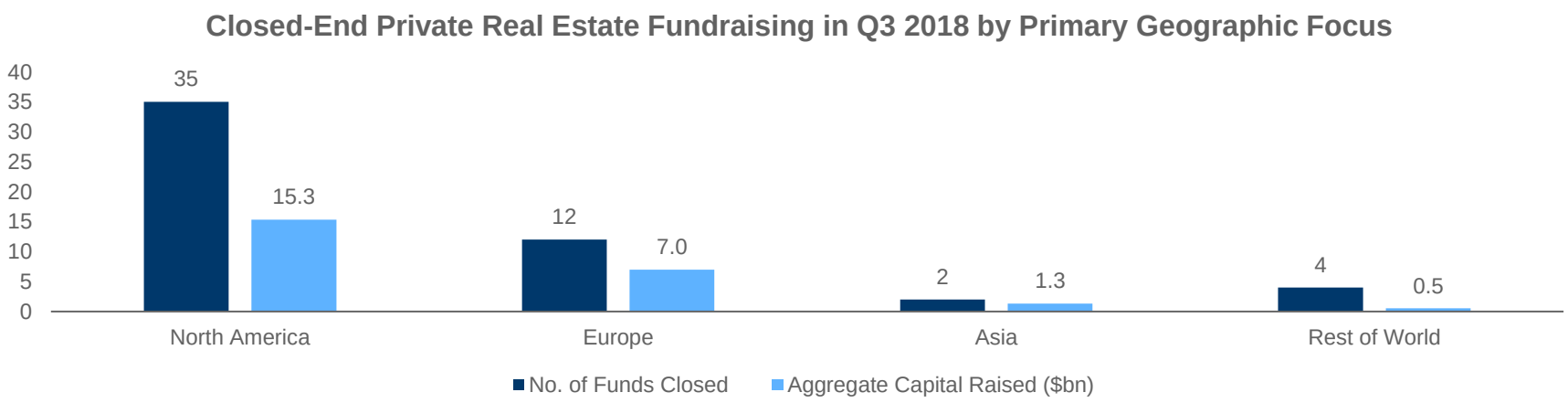
PRIVATE REAL ESTATE – FUNDRAISING ACTIVITY





Source: Preqin, as of October 2, 2018.

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TOTAL FUND

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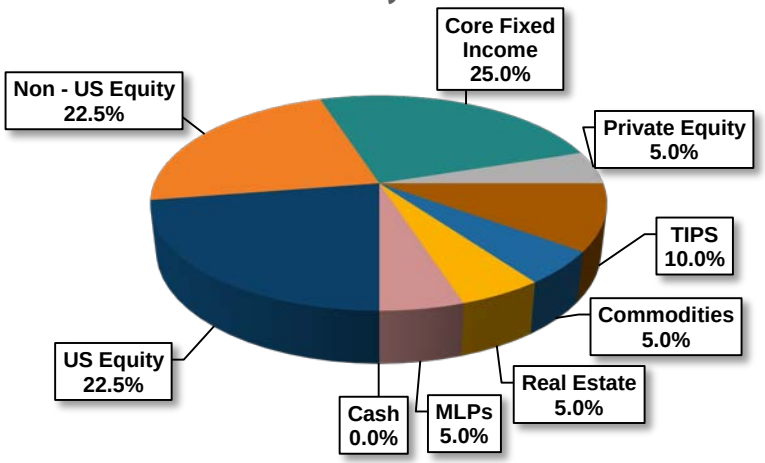
Policy Allocation vs Actual Allocation

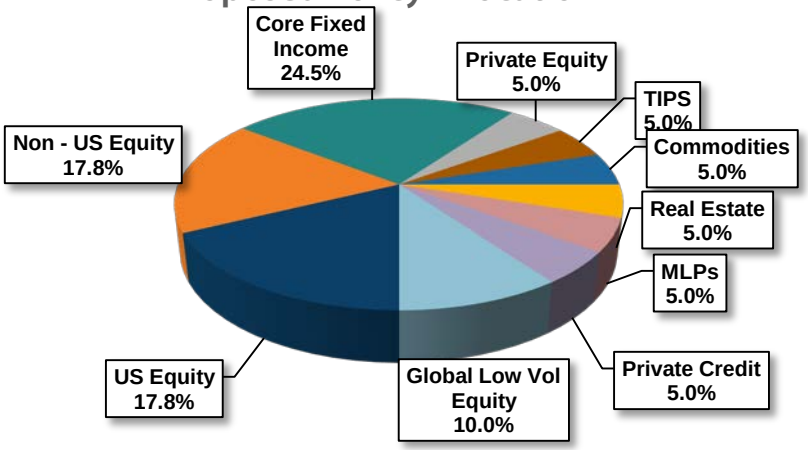
Total Fund Composite

As of September 30, 2018

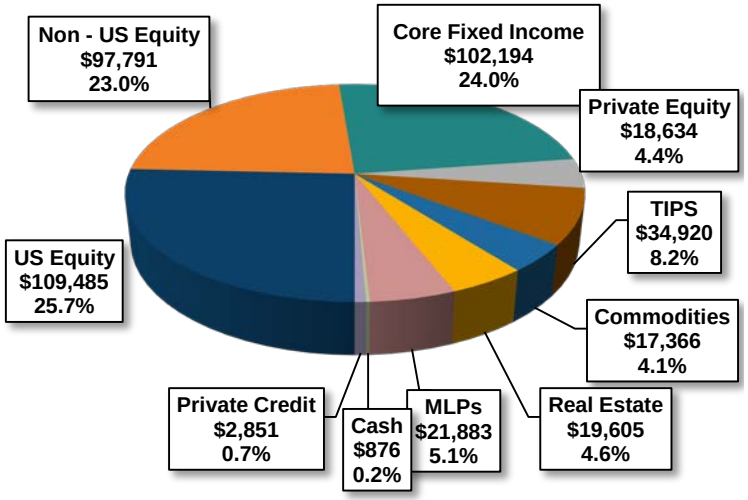
Current Policy Allocation



Proposed Policy Allocation



Actual Allocation (in $'000)



Total Assets: $425,605,491

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Current Policy Allocation vs Actual Allocation

Total Fund Composite

As of September 30, 2018

	Market Value (in $'000)	Asset Allocation			
		Actual	Current Policy	Proposed Policy	Variance Current
US Equity	$109,485	25.72%	22.50%	17.75%	3.22%
Non - US Equity	$97,791	22.98%	22.50%	17.75%	0.48%
Global Low Volatility Equity	$0	0.00%	0.00%	10.00%	0.00%
Private Equity	$18,634	4.38%	5.00%	5.00%	-0.62%
Private Credit	$2,851	0.67%	0.00%	5.00%	0.67%
Total Growth Assets	**$228,761**	**53.75%**	**50.00%**	**55.50%**	**3.75%**
Core Fixed Income	$102,194	24.01%	25.00%	24.50%	-0.99%
Cash	$876	0.21%	0.00%	0.00%	0.21%
Total Diversifying Assets	**$103,070**	**24.22%**	**25.00%**	**24.50%**	**-0.78%**
TIPS	$34,920	8.20%	10.00%	5.00%	-1.80%
Commodities	$17,366	4.08%	5.00%	5.00%	-0.92%
Real Estate	$19,605	4.61%	5.00%	5.00%	-0.39%
MLPs	$21,883	5.14%	5.00%	5.00%	0.14%
Total Inflation Hedging Assets	**$93,774**	**22.03%**	**25.00%**	**20.00%**	**-2.97%**
Total Fund Composite	**$425,605**	**100.00%**	**100.00%**	**100.00%**	**0.00%**

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Proposed Policy Allocation vs Actual Allocation

Total Fund Composite

As of September 30, 2018

	Market Value (in $'000)	Asset Allocation			
		Actual	Proposed Policy	Current Policy	Variance Proposed
US Equity	$109,485	25.72%	17.75%	22.50%	7.97%
Non - US Equity	$97,791	22.98%	17.75%	22.50%	5.23%
Global Low Volatility Equity	$0	0.00%	10.00%	0.00%	-10.00%
Private Equity	$18,634	4.38%	5.00%	5.00%	-0.62%
Private Credit	$2,851	0.67%	5.00%	0.00%	-4.33%
Total Growth Assets	**$228,761**	**53.75%**	**55.50%**	**50.00%**	**-1.75%**
Core Fixed Income	$102,194	24.01%	24.50%	25.00%	-0.49%
Cash	$876	0.21%	0.00%	0.00%	0.21%
Total Diversifying Assets	**$103,070**	**24.22%**	**24.50%**	**25.00%**	**-0.28%**
TIPS	$34,920	8.20%	5.00%	10.00%	3.20%
Commodities	$17,366	4.08%	5.00%	5.00%	-0.92%
Real Estate	$19,605	4.61%	5.00%	5.00%	-0.39%
MLPs	$21,883	5.14%	5.00%	5.00%	0.14%
Total Inflation Hedging Assets	**$93,774**	**22.03%**	**20.00%**	**25.00%**	**2.03%**
Total Fund Composite	**$425,605**	**100.00%**	**100.00%**	**100.00%**	**0.00%**

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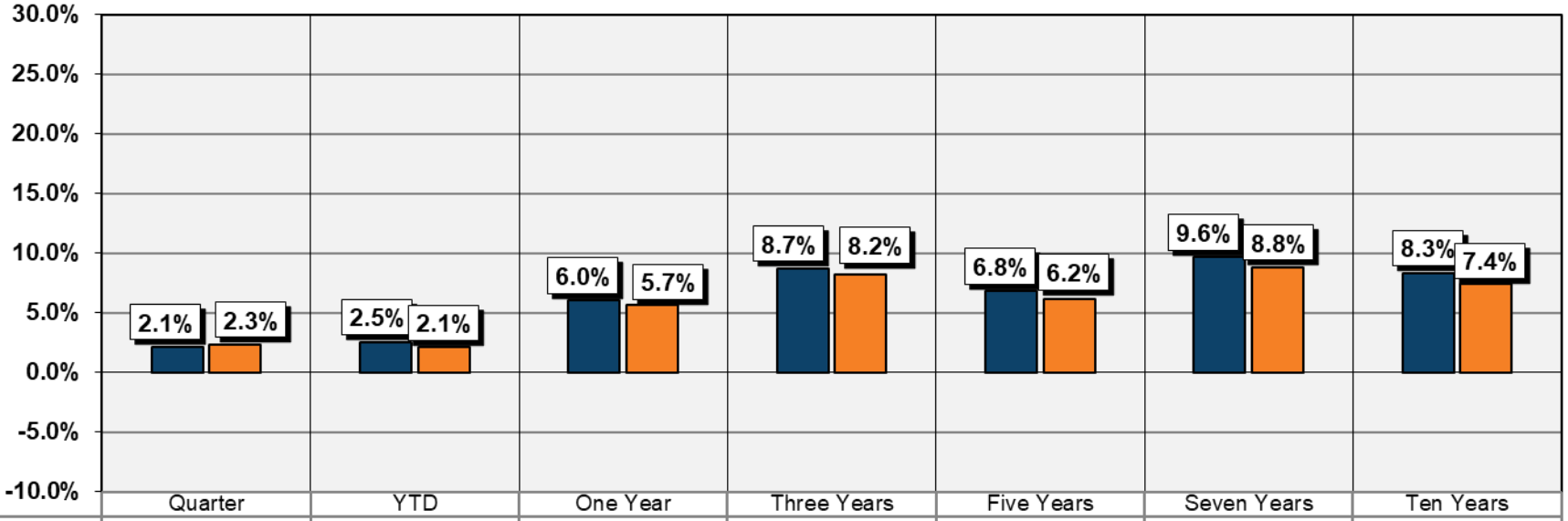
Investment Performance

Total Fund Composite*

As of September 30, 2018



	Quarter	YTD	One Year	Three Years	Five Years	Seven Years	Ten Years
Total Fund Composite	2.1%	2.5%	6.0%	8.7%	6.8%	9.6%	8.3%
Total Fund Policy**	2.3%	2.1%	5.7%	8.2%	6.2%	8.8%	7.4%

*Returns are net of fees.

**Policy index = Wilshire 5000 (22.50%), MSCI ACWI ex U.S. (22.50%), Bloomberg Barclays Aggregate (25.00%), Bloomberg Barclays TIPS (10.00%), FTSE EPRA NAREIT Dev RE (5.00%), Wilshire 5000 +2.5% (5.00%), Bloomberg Commodity Index (5.00%), S&P MLP Index (5.00%)

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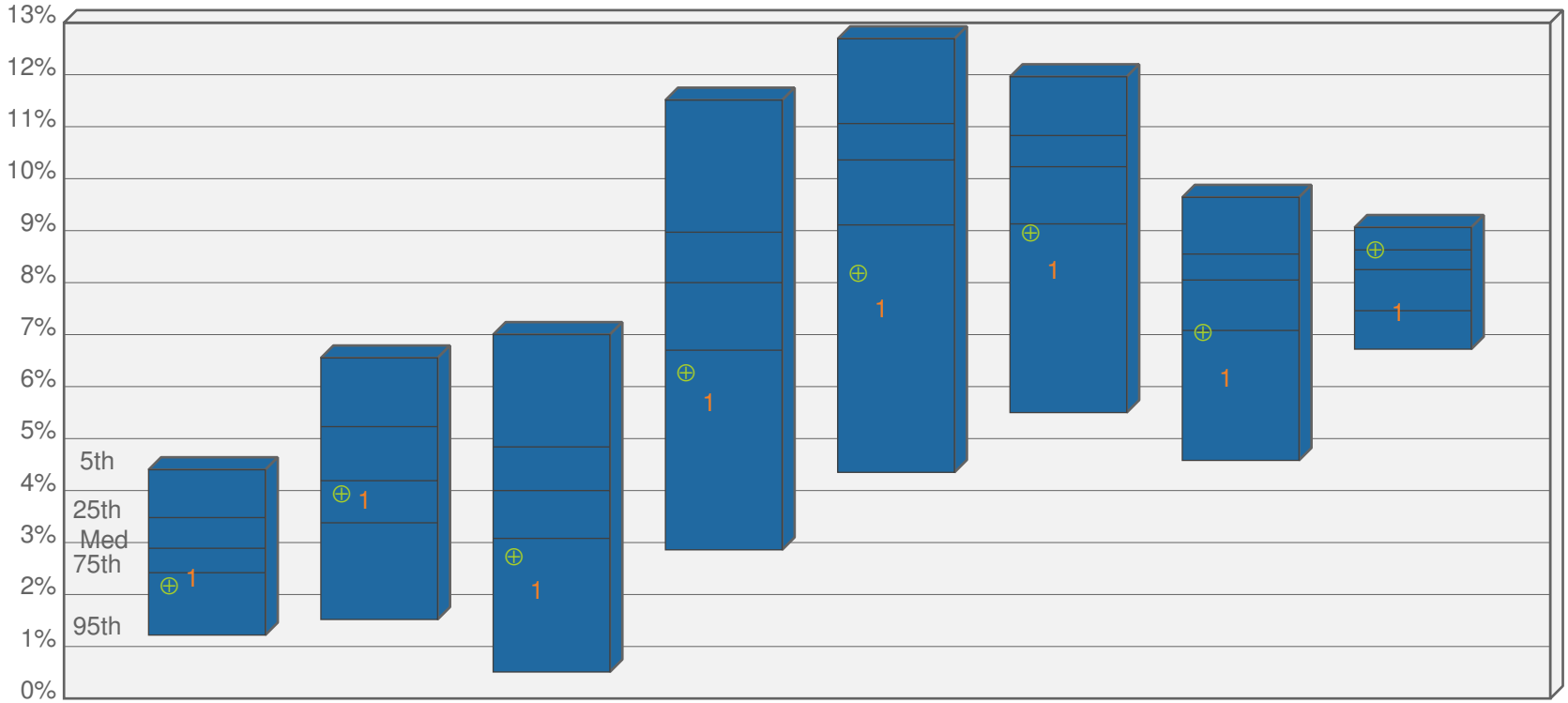
PERFORMANCE COMPARISON

Total Fund Composite

Periods Ended September 30, 2018



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
⊕ Total Fund	2.17 (84)	3.95 (59)	2.73 (80)	6.27 (80)	8.19 (85)	8.96 (79)	7.05 (77)	8.64 (24)
1 Policy Index	2.32 (76)	3.82 (63)	2.08 (86)	5.70 (84)	7.51 (87)	8.24 (85)	6.16 (88)	7.43 (75)
5th %tile	4.40	6.55	7.00	11.51	12.69	11.96	9.64	9.06
25th %tile	3.48	5.23	4.84	8.97	11.06	10.83	8.55	8.63
Median	2.89	4.19	4.00	8.00	10.36	10.23	8.05	8.25
75th %tile	2.42	3.38	3.08	6.70	9.11	9.13	7.08	7.46
95th %tile	1.22	1.52	0.51	2.86	4.35	5.50	4.58	6.72
Number of Funds	166	165	163	163	158	153	148	130

*TUCS Total Ret of Master Trusts - Public Universe - Gross of Fees

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PERFORMANCE COMPARISON

Trailing Returns

Periods Ended September 30, 2018

	1 Qtr	YTD	1 Year	3 Yrs	5 Yrs	7 Yrs	10 Yrs	Incept Date	Incept Ret
U.S. Equity Composite									
Net of Fee Return	**6.83**	**10.33**	**16.88**	**17.61**	**13.79**	**17.41**	**12.64**	**9/30/87**	**9.83**
Wilshire 5000	7.27	10.53	17.60	17.27	13.63	16.86	12.02	9/30/87	9.80
Value Added	-0.44	-0.20	-0.72	0.35	0.16	0.55	0.63	9/30/87	0.03
Core Fixed Composite									
Net of Fee Return	**0.19**	**-1.79**	**-1.13**	**2.54**	**3.20**	**3.47**	**5.66**	**9/30/87**	**6.69**
Bloomberg Aggregate	0.02	-1.60	-1.22	1.31	2.16	2.02	3.77	9/30/87	6.29
Value Added	0.18	-0.20	0.09	1.23	1.04	1.44	1.89	9/30/87	0.40
Non-U.S. Equity Composite									
Net of Fee Return	**0.49**	**-0.69**	**2.96**	**10.43**	**5.57**	**8.88**	**6.82**	**12/31/89**	**8.18**
Policy Benchmark	0.71	-3.09	1.76	9.97	4.12	7.25	5.18	12/31/89	4.60
Value Added	-0.22	2.40	1.20	0.46	1.45	1.63	1.64	12/31/89	3.57
Real Estate Composite									
Net of Fee Return	**-0.57**	**-2.47**	**2.46**	**4.16**	**4.21**	**7.91**		**6/30/09**	**9.26**
FTSE EPRA/NAREIT Dev (N)	-0.30	0.06	3.66	6.19	5.43	9.28		6/30/09	10.56
Value Added	-0.27	-2.53	-1.20	-2.03	-1.23	-1.37		6/30/09	-1.30
Commodities Composite									
Net of Fee Return	**-3.04**	**-2.60**	**4.68**	**2.50**	**-5.63**			**3/31/13**	**-6.51**
Bloomberg Commodity Index	-2.02	-2.03	2.59	-0.11	-7.18			3/31/13	-7.87
Value Added	-1.01	-0.58	2.09	2.62	1.55			3/31/13	1.35
MLP Composite									
Net of Fee Return	**6.17**	**9.00**	**8.48**	**5.40**				**3/31/15**	**-4.09**
Alerian MLP Index	6.57	7.65	7.34	4.96				3/31/15	-5.16
Value Added	-0.40	1.35	1.14	0.43				3/31/15	1.07

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PERFORMANCE COMPARISON

Trailing Returns

Periods Ended September 30, 2018

	1 Qtr	YTD	1 Year	3 Yrs	5 Yrs	7 Yrs	10 Yrs	Incept Date	Incept Ret
TIPS Composite									
Net of Fee Return	**-0.81**	**-1.05**	**0.24**	**2.01**				**6/30/15**	**1.45**
Barclays U.S. TIPS	-0.82	-0.84	0.41	2.04				6/30/15	1.52
Value Added	0.01	-0.21	-0.17	-0.03				6/30/15	-0.07
Total Real Assets Composite									
Net of Fee Return	**0.21**	**0.35**	**3.10**	**3.37**				**3/31/15**	**-0.32**
Policy Index	0.49	0.94	3.07	3.30				3/31/15	-0.31
Value Added	-0.28	-0.59	0.03	0.07				3/31/15	-0.00
Private Equity Composite									
Net of Fee Return	**3.67**	**14.16**	**19.78**	**13.93**	**13.10**	**9.71**		**6/30/10**	**8.99**
Wilshire 5000 +2.5%	7.89	12.40	20.10	19.77	16.13	19.36		6/30/10	18.23
Value Added	-4.22	1.76	-0.32	-5.84	-3.02	-9.64		6/30/10	-9.24
Total Fund									
Net of Fee Return	**2.11**	**2.54**	**6.01**	**8.69**	**6.79**	**9.63**	**8.34**	**9/30/87**	**8.23**
Policy Index	2.32	2.08	5.70	8.24	6.16	8.79	7.43	9/30/87	8.23
Value Added	-0.21	0.46	0.31	0.45	0.63	0.83	0.91	9/30/87	0.00

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CUSTOM BENCHMARK SPECIFICATION

Total Fund

September 30, 2018

	Quarter Start	Quarter End	Percent	Description
Policy Index	12/79	6/98	55.00	Wilshire 5000
			40.00	Bloomberg Aggregate
			5.00	MSCI EAFE Index (N)
	9/98	9/02	50.00	Wilshire 5000
			40.00	Bloomberg Aggregate
			10.00	MSCI EAFE Index (N)
	12/02	3/06	50.00	Wilshire 5000
			35.00	Bloomberg Aggregate
			15.00	MSCI EAFE Index (N)
	6/06	6/06	55.00	Wilshire 5000
			30.00	Bloomberg Aggregate
			15.00	MSCI EAFE Index (N)
	9/06	6/09	55.00	Wilshire 5000
			30.00	Bloomberg Aggregate
			15.00	MSCI ACWI ex US (N)
	9/09	3/10	5.00	FTSE EPRA/NAREIT Dev (N)
			15.00	MSCI ACWI ex US (N)
			30.00	Bloomberg Aggregate
			50.00	Wilshire 5000
	6/10	12/12	5.00	FTSE EPRA/NAREIT Dev (N)
			5.00	Wilshire 5000 + 2.5%
			30.00	Bloomberg Aggregate
			15.00	MSCI ACWI ex US (N)
			45.00	Wilshire 5000
	3/13	3/15	5.00	FTSE EPRA/NAREIT Dev (N)
			40.00	Wilshire 5000
			15.00	MSCI ACWI ex US (N)
			30.00	Bloomberg Aggregate
			5.00	Wilshire 5000 + 2.5%

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CUSTOM BENCHMARK SPECIFICATION

Total Fund

September 30, 2018

	Quarter Start	Quarter End	Percent	Description
Policy Index (cont.)			5.00	Bloomberg Commodity Index
	6/15	9/18	22.50	Wilshire 5000
			5.00	Wilshire 5000 + 2.5%
			22.50	MSCI ACWI ex US (N)
			25.00	Bloomberg Aggregate
			5.00	FTSE EPRA/NAREIT Dev (N)
			5.00	Bloomberg Commodity Index
			10.00	Bloomberg U.S. TIPS
			5.00	S&P MLP Index

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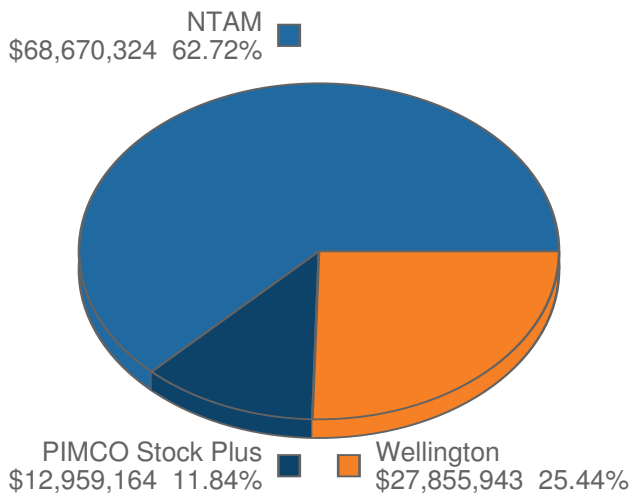
U.S. EQUITY

Wilshire Consulting

MANAGER ALLOCATION

U.S. Equity Composite

As of September 30, 2018



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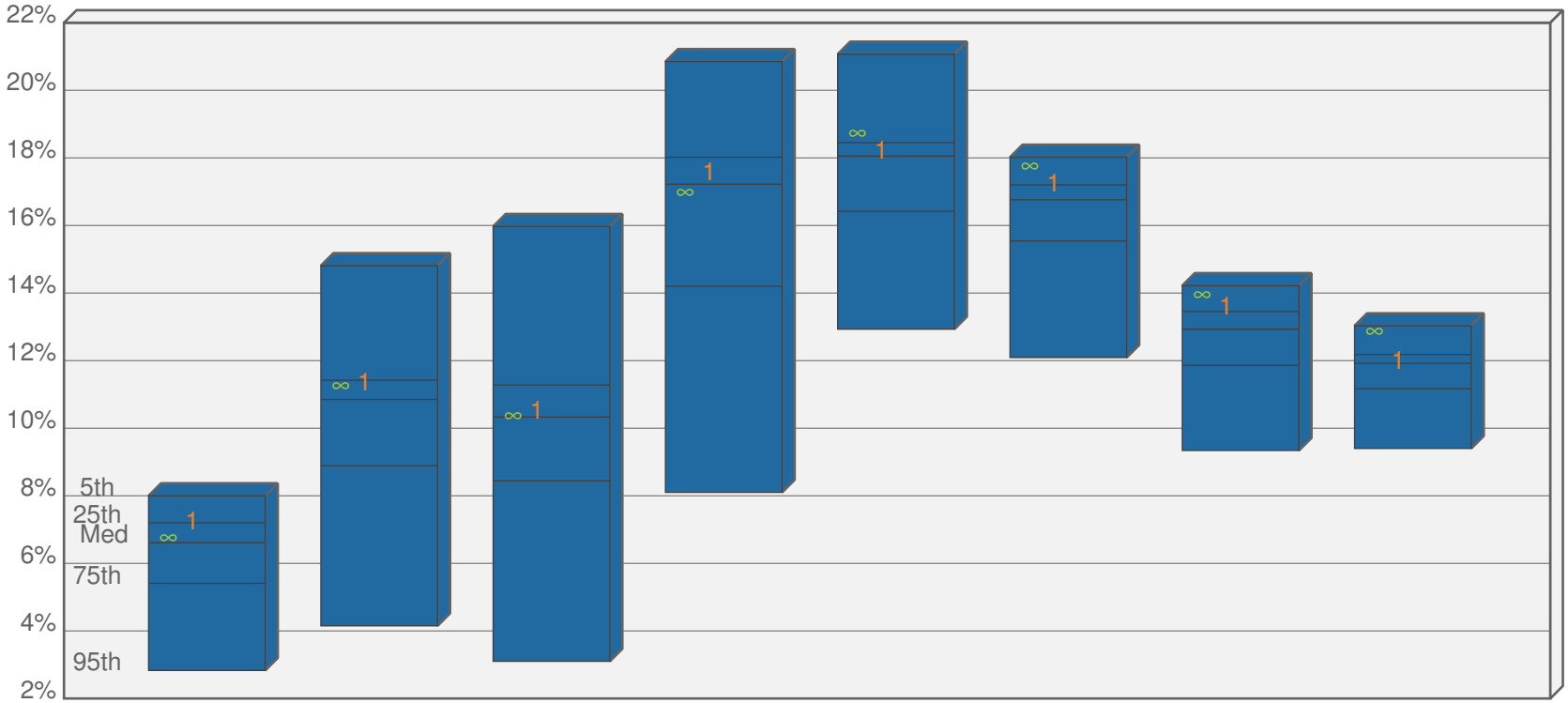
PERFORMANCE COMPARISON

U.S. Equity Composite

Periods Ended September 30, 2018



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
∞ U.S. Equity Composite	6.83 (40)	11.33 (30)	10.43 (47)	17.04 (54)	18.79 (20)	17.81 (5)	14.01 (9)	12.92 (6)
1 Wilshire 5000	7.27 (21)	11.38 (28)	10.53 (45)	17.60 (42)	18.24 (35)	17.27 (18)	13.63 (17)	12.02 (39)
5th %tile	8.00	14.81	15.97	20.85	21.07	18.02	14.22	13.03
25th %tile	7.20	11.42	11.28	18.02	18.45	17.20	13.45	12.18
Median	6.61	10.85	10.33	17.22	18.05	16.76	12.93	11.92
75th %tile	5.41	8.89	8.44	14.20	16.42	15.54	11.86	11.17
95th %tile	2.83	4.15	3.10	8.10	12.93	12.09	9.34	9.40
Number of Funds	140	137	133	132	116	111	100	76

*TUCS Total Ret of US Equity Investment Pools Universe - Gross of Fees

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PERFORMANCE COMPARISON

Trailing Returns

Periods Ended September 30, 2018

	1 Qtr	YTD	1 Year	3 Yrs	5 Yrs	7 Yrs	10 Yrs	Incept Date	Incept Ret
NTAM									
Net of Fee Return	**7.70**	**10.52**	**17.87**	**17.29**	**13.95**	**16.92**	**11.98**	**9/30/98**	**7.66**
Policy Benchmark	7.71	10.57	17.92	17.31	13.95	16.91	11.96	9/30/98	7.65
Value Added	-0.01	-0.04	-0.05	-0.02	0.00	0.01	0.02	9/30/98	0.00
PIMCO Stock Plus									
Net of Fee Return	**7.93**	**10.37**	**17.92**	**17.78**	**14.03**	**18.06**	**13.44**	**9/30/00**	**6.63**
Standard & Poor's 500	7.71	10.57	17.92	17.31	13.95	16.91	11.96	9/30/00	6.07
Value Added	0.22	-0.20	0.00	0.47	0.08	1.15	1.48	9/30/00	0.56
Wellington									
Net of Fee Return	**4.03**	**9.83**	**14.05**	**18.32**	**13.24**	**18.85**	**14.26**	**9/30/99**	**11.94**
Russell 2000	3.58	11.51	15.24	17.12	11.07	16.43	11.11	9/30/99	8.96
Value Added	0.46	-1.68	-1.19	1.20	2.17	2.42	3.15	9/30/99	2.98
U.S. Equity Composite									
Net of Fee Return	**6.83**	**10.33**	**16.88**	**17.61**	**13.79**	**17.41**	**12.64**	**9/30/87**	**9.83**
Wilshire 5000	7.27	10.53	17.60	17.27	13.63	16.86	12.02	9/30/87	9.80
Value Added	-0.44	-0.20	-0.72	0.35	0.16	0.55	0.63	9/30/87	0.03

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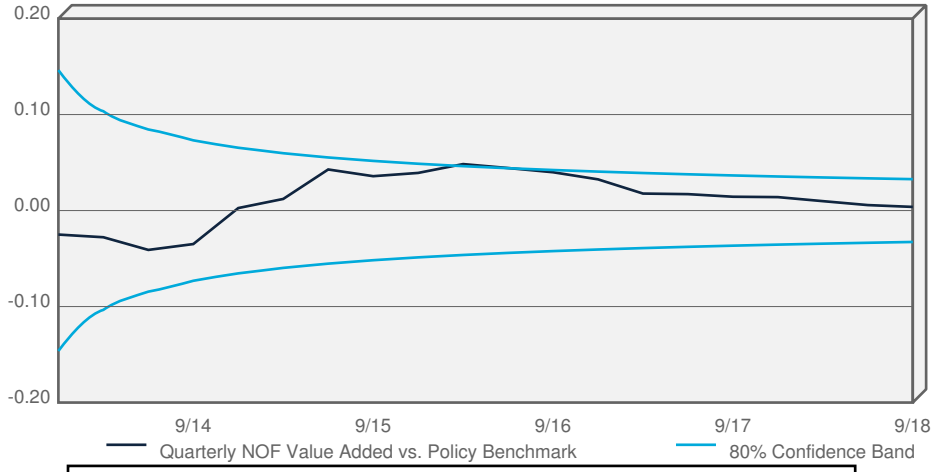
INVESTMENT MANAGER ANALYSIS

NTAM

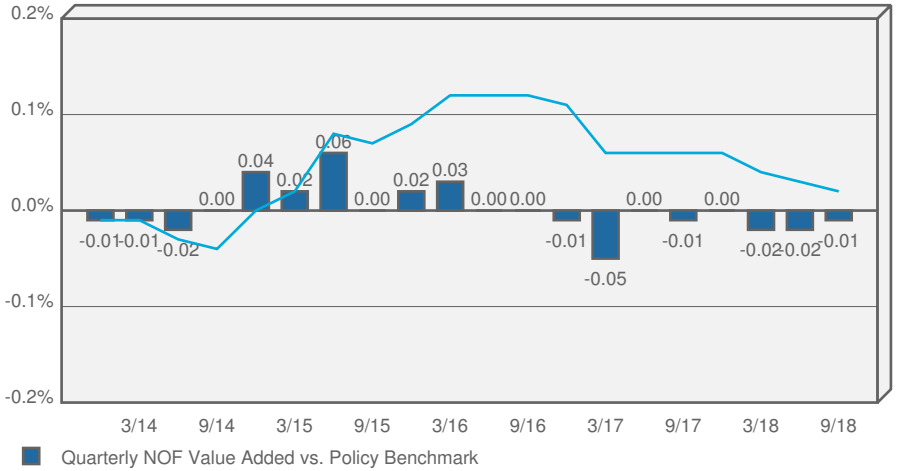
September 30, 2018

Cumulative Skill Analysis vs Benchmark

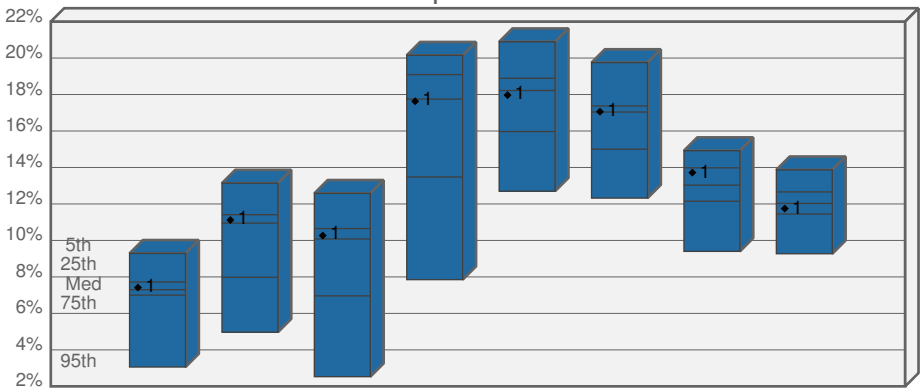


Excess Return:	0.00	Information Ratio:	0.09
Excess Risk:	0.04	T-Stat:	0.19

Value-Added Analysis vs Benchmark

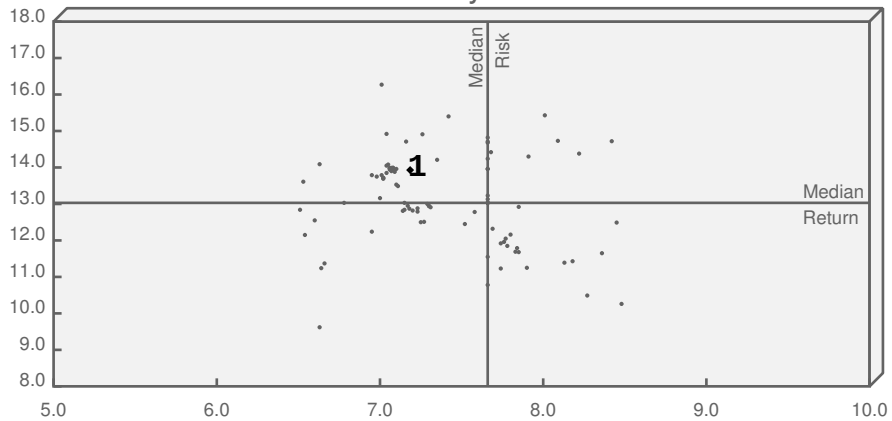


Performance Comparison vs Peer Universe*



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
◆ NTAM	7.71 (34)	11.41 (26)	10.56 (34)	17.92 (39)	18.26 (47)	17.35 (27)	14.01 (20)	12.04 (46)
1 Policy Benchma	7.71 (34)	11.41 (26)	10.57 (30)	17.92 (39)	18.26 (47)	17.31 (31)	13.95 (32)	11.96 (51)
Median	7.30	10.95	10.08	17.75	18.22	17.04	13.03	12.03
Number of Funds	115	113	113	112	108	108	95	52

Five Year Risk/Return Analysis vs Peer Universe*



Description	Legend	Gross Fee Ret		Standard Deviation	
		Value	Rank	Value	Rank
NTAM	◆	14.01	20	7.25	75
Policy Benchmark	1	13.95	32	7.26	73
Median		13.03		7.66	

*TUCS Total Returns of Large Neutral Equity Portfolios Universe - Gross of Fees

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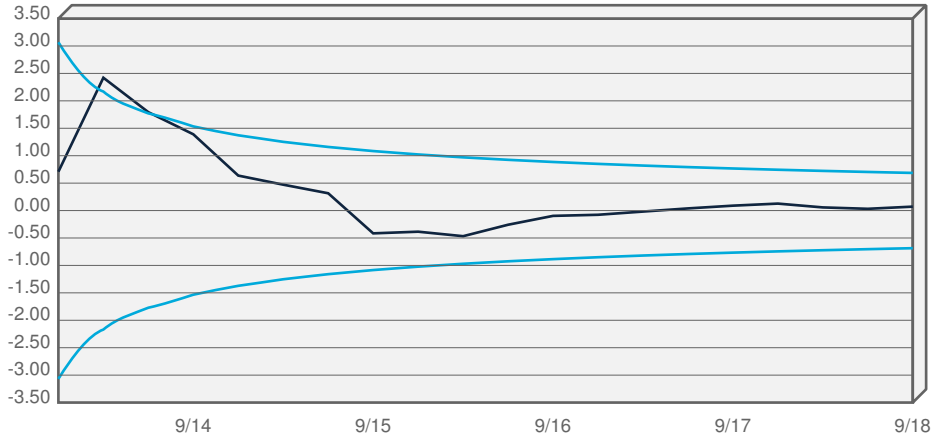
Wilshire Consulting

INVESTMENT MANAGER ANALYSIS

PIMCO Stock Plus

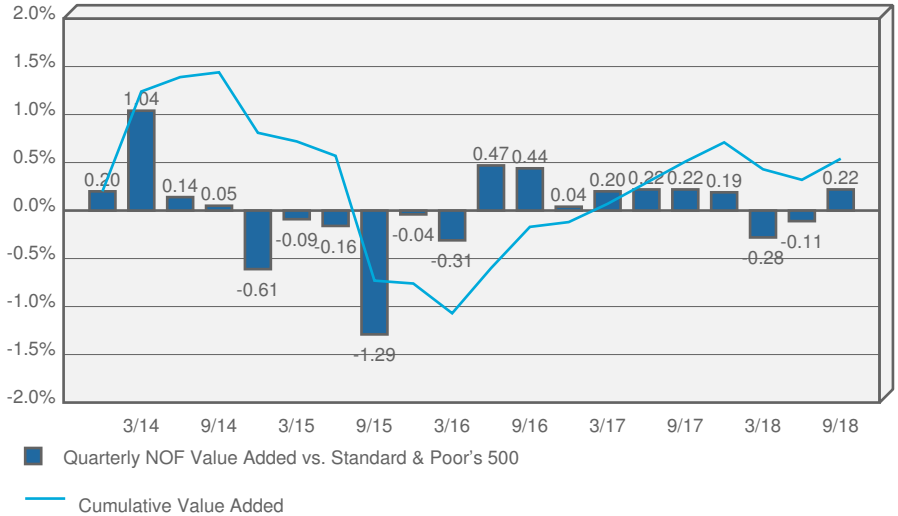
September 30, 2018

Cumulative Skill Analysis vs Benchmark

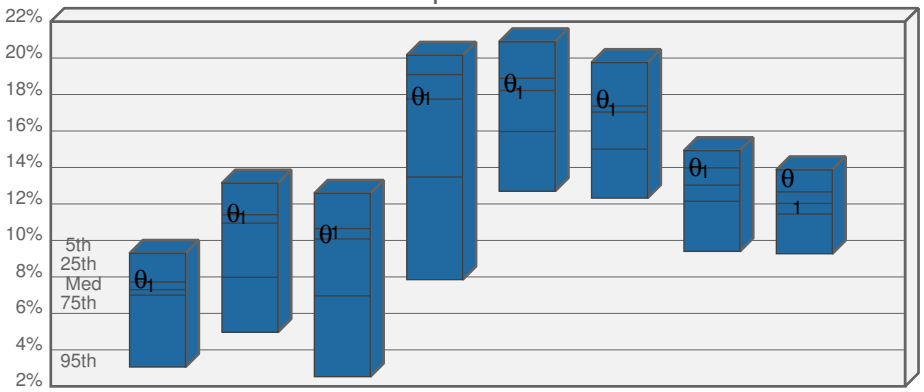


Excess Return:	0.07	Information Ratio:	0.08
Excess Risk:	0.93	T-Stat:	0.17

Value-Added Analysis vs Benchmark

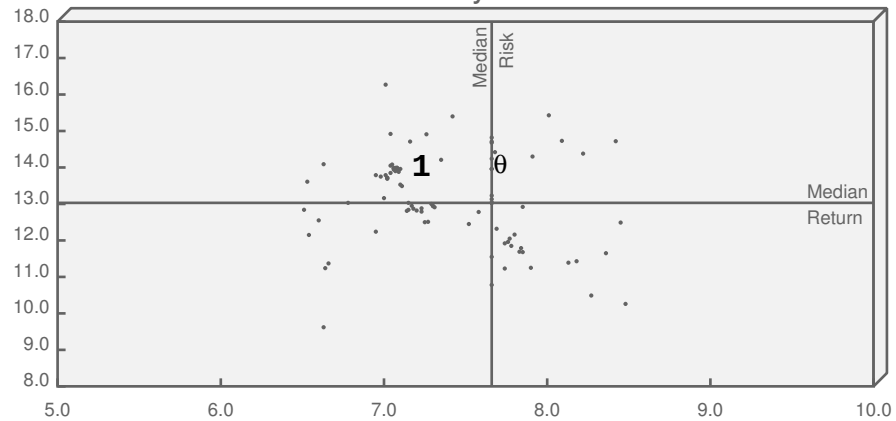


Performance Comparison vs Peer Universe*



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
θ PIMCO Stock Pl	7.93 (18)	11.52 (17)	10.37 (47)	17.92 (39)	18.65 (27)	17.78 (11)	14.03 (20)	13.44 (11)
1 Standard & Poo	7.71 (34)	11.41 (26)	10.57 (30)	17.92 (39)	18.26 (47)	17.31 (31)	13.95 (32)	11.96 (51)
Median	7.30	10.95	10.08	17.75	18.22	17.04	13.03	12.03
Number of Funds	115	113	113	112	108	108	95	52

Five Year Risk/Return Analysis vs Peer Universe*



Description	Legend	Gross Fee Ret		Standard Deviation	
		Value	Rank	Value	Rank
PIMCO Stock Plus	θ	14.03	20	7.76	46
Standard & Poor's 500	1	13.95	32	7.26	73
Median		13.03		7.66	

*TUCS Total Returns of Large Neutral Equity Portfolios Universe - Gross of Fees

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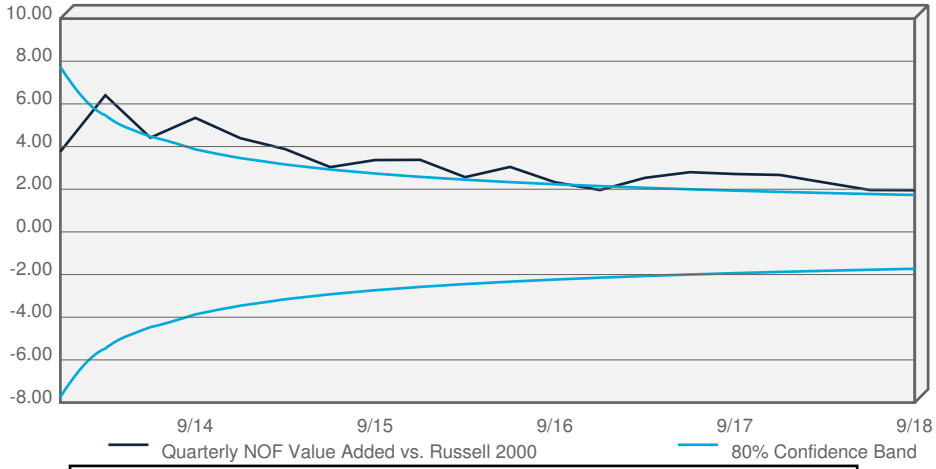
Wilshire Consulting

INVESTMENT MANAGER ANALYSIS

Wellington

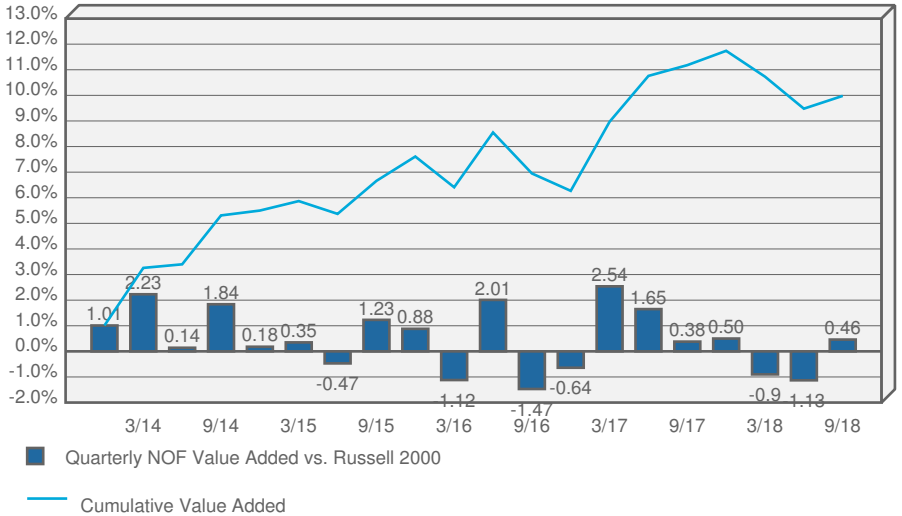
September 30, 2018

Cumulative Skill Analysis vs Benchmark

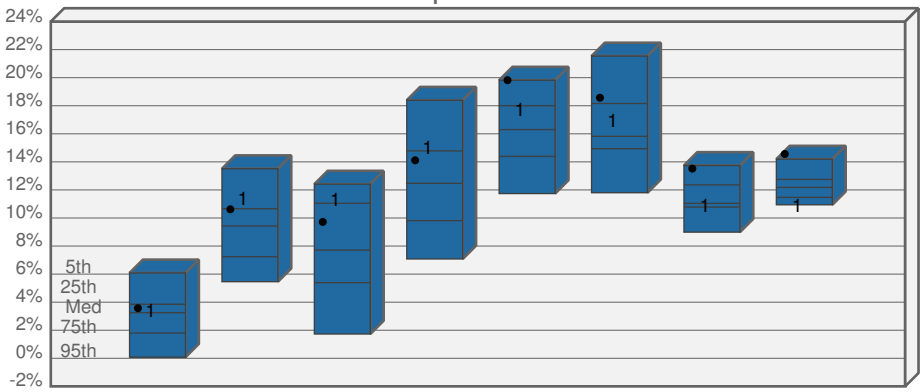


Excess Return:	1.95	Information Ratio:	0.83
Excess Risk:	2.35	T-Stat:	1.86

Value-Added Analysis vs Benchmark

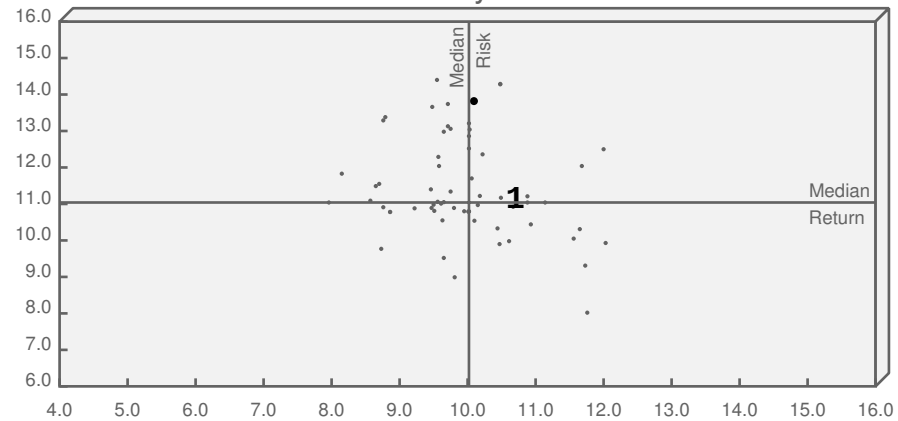


Performance Comparison vs Peer Universe*



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
● Wellington	3.95 (23)	11.00 (23)	10.10 (27)	14.49 (25)	20.20 (4)	18.95 (16)	13.90 (4)	14.94 (1)
1 Russell 2000	3.58 (27)	11.61 (17)	11.51 (20)	15.24 (22)	17.96 (25)	17.12 (39)	11.07 (45)	11.11 (93)
Median	3.25	9.43	7.71	12.47	16.30	15.82	11.04	12.18
Number of Funds	69	69	68	68	66	66	63	35

Five Year Risk/Return Analysis vs Peer Universe*



Description	Legend	Gross Fee Ret		Standard Deviation	
		Value	Rank	Value	Rank
Wellington	●	13.90	4	10.25	38
Russell 2000	1	11.07	45	10.78	27
Median		11.04		10.02	

*TUCS Total Returns of Small Neutral Equity Portfolios Universe - Gross of Fees

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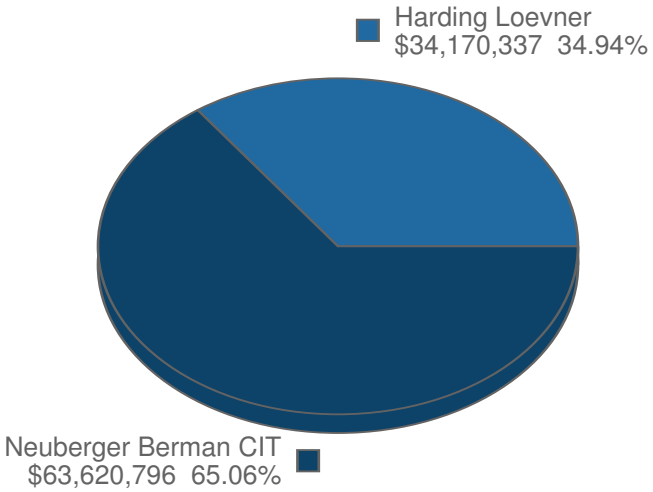
NON-U.S. EQUITY

Wilshire Consulting

MANAGER ALLOCATION

Non-U.S. Equity Composite

As of September 30, 2018



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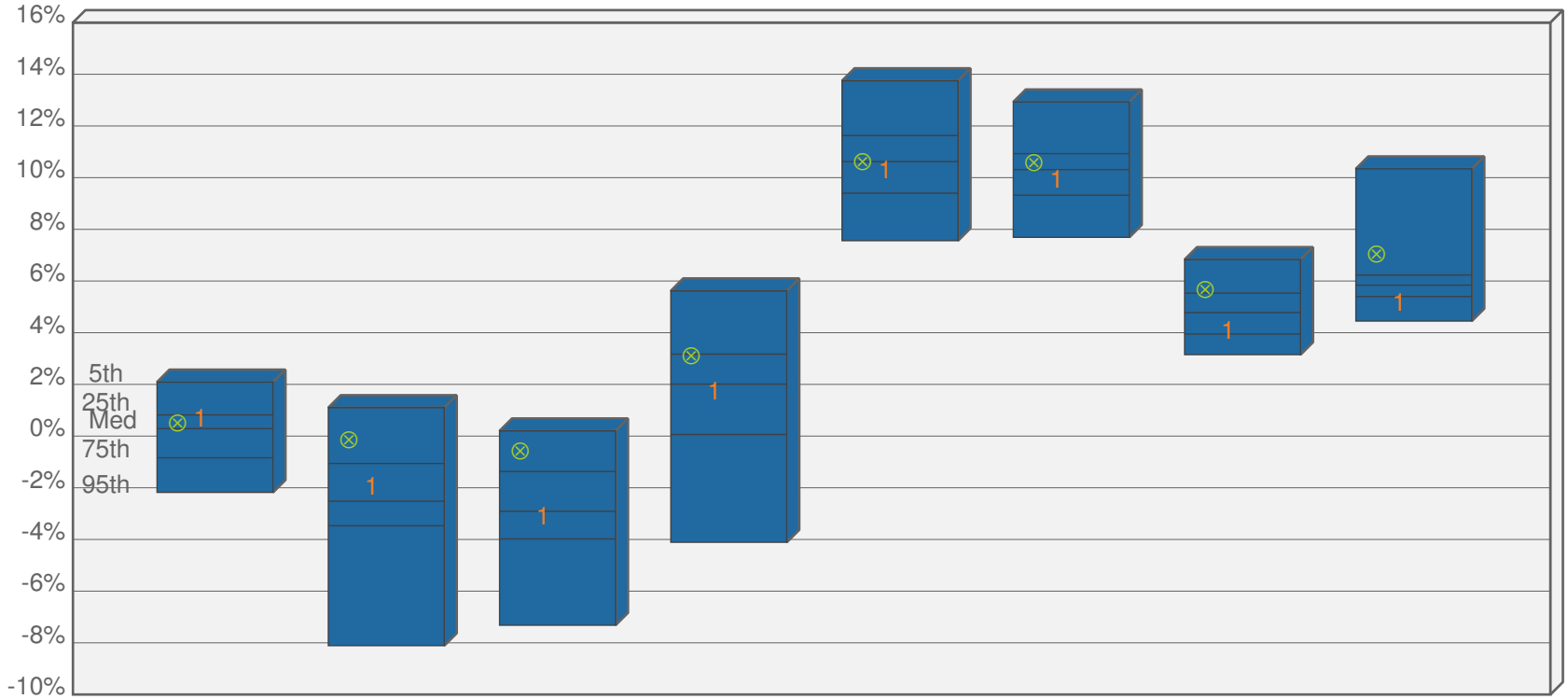
PERFORMANCE COMPARISON

Non-U.S. Equity Composite

Periods Ended September 30, 2018



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
⊗ Non-U.S. Equity Composit	0.53 (40)	-0.12 (15)	-0.55 (12)	3.14 (27)	10.65 (48)	10.61 (39)	5.69 (16)	7.07 (12)
1 Policy Benchmark	0.71 (35)	-1.93 (36)	-3.09 (51)	1.76 (55)	10.32 (67)	9.97 (59)	4.12 (65)	5.18 (88)
5th %tile	2.09	1.10	0.20	5.62	13.75	12.93	6.83	10.34
25th %tile	0.82	-1.06	-1.37	3.17	11.63	10.93	5.53	6.23
Median	0.29	-2.52	-2.91	2.01	10.62	10.31	4.78	5.84
75th %tile	-0.84	-3.47	-3.98	0.06	9.40	9.32	3.95	5.40
95th %tile	-2.18	-8.11	-7.32	-4.11	7.56	7.69	3.15	4.45
Number of Funds	90	88	85	84	79	78	72	49

*TUCS Total Ret of Non-US Equity Investment Pools Universe - Gross of Fees

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PERFORMANCE COMPARISON

Trailing Returns

Periods Ended September 30, 2018

	1 Qtr	YTD	1 Year	3 Yrs	5 Yrs	7 Yrs	10 Yrs	Incept Date	Incept Ret
Neuberger Berman CIT									
Net of Fee Return	**-0.80**							**6/30/18**	**-0.80**
MSCI ACWI ex US (N)	0.71							6/30/18	0.71
Value Added	-1.51							6/30/18	-1.51
Neuberger Berman Composite									
Net of Fee Return	**-0.21**	**-1.82**	**1.77**	**9.19**	**5.22**	**8.60**	**6.63**	**6/30/06**	**3.65**
MSCI ACWI ex US (N)	0.71	-3.09	1.76	9.97	4.12	7.25	5.18	6/30/06	3.73
Value Added	-0.92	1.27	0.01	-0.78	1.10	1.35	1.44	6/30/06	-0.08
Harding Loevner									
Net of Fee Return	**1.79**	**1.49**	**5.25**	**12.88**				**3/31/15**	**7.13**
MSCI ACWI X US (N)	0.71	-3.09	1.76	9.97				3/31/15	4.69
Value Added	1.08	4.58	3.49	2.91				3/31/15	2.43
Non-U.S. Equity Composite									
Net of Fee Return	**0.49**	**-0.69**	**2.96**	**10.43**	**5.57**	**8.88**	**6.82**	**12/31/89**	**8.18**
Policy Benchmark	0.71	-3.09	1.76	9.97	4.12	7.25	5.18	12/31/89	4.60
Value Added	-0.22	2.40	1.20	0.46	1.45	1.63	1.64	12/31/89	3.57

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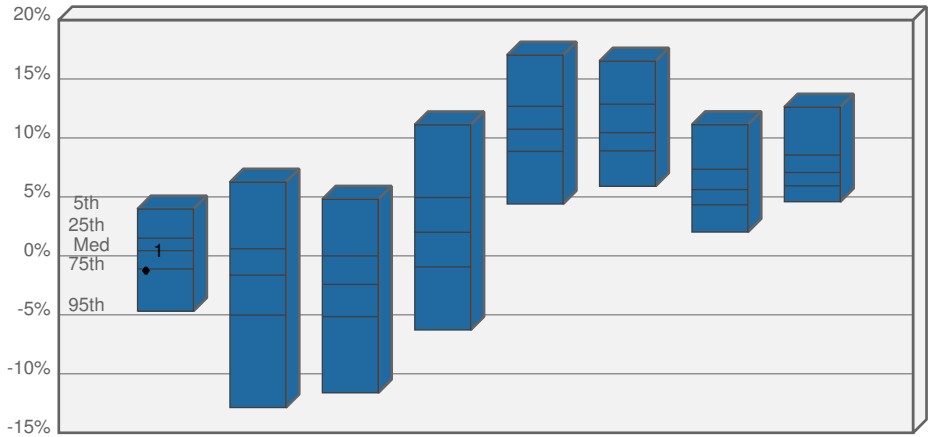
INVESTMENT MANAGER ANALYSIS

Neuberger Berman CIT

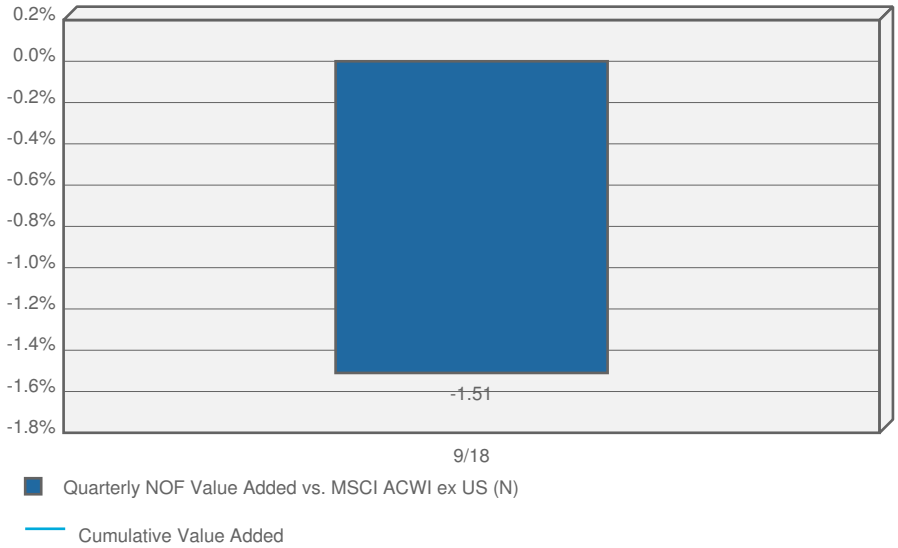
September 30, 2018

Performance Comparison vs Peer Universe*



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
◆ Neuberger Berm	-0.80 (68)							
1 MSCI ACWI ex U	0.71 (44)							
Median	0.44	-1.63	-2.42	2.00	10.74	10.45	5.62	7.07
Number of Funds	978	958	946	938	903	879	809	543

Value-Added Analysis vs Benchmark



*TUCS Total Returns of International Equity Portfolios Universe - Gross of Fees

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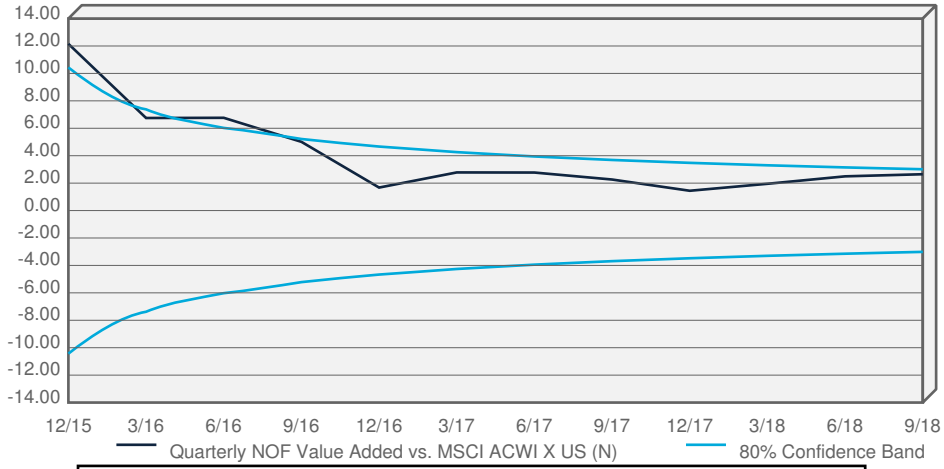
INVESTMENT MANAGER ANALYSIS

Harding Loevner

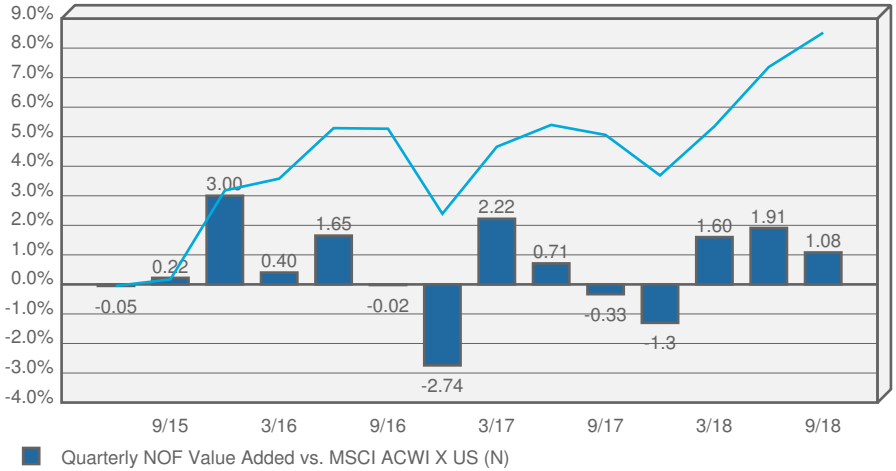
September 30, 2018

Cumulative Skill Analysis vs Benchmark

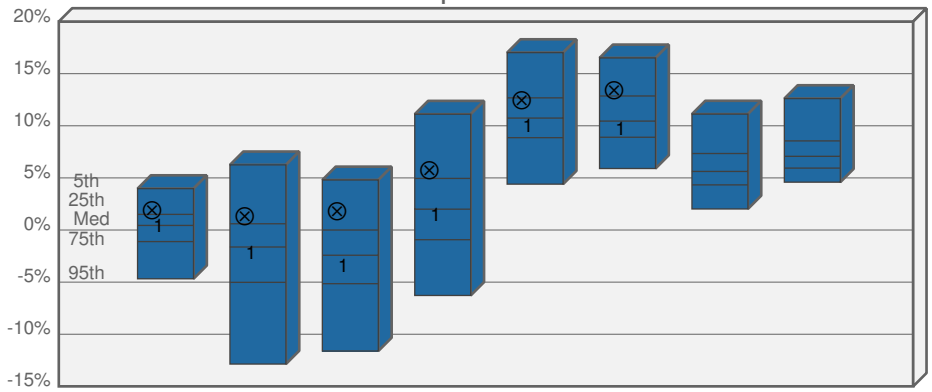


Excess Return:	2.65	Information Ratio:	0.84
Excess Risk:	3.17	T-Stat:	1.45

Value-Added Analysis vs Benchmark

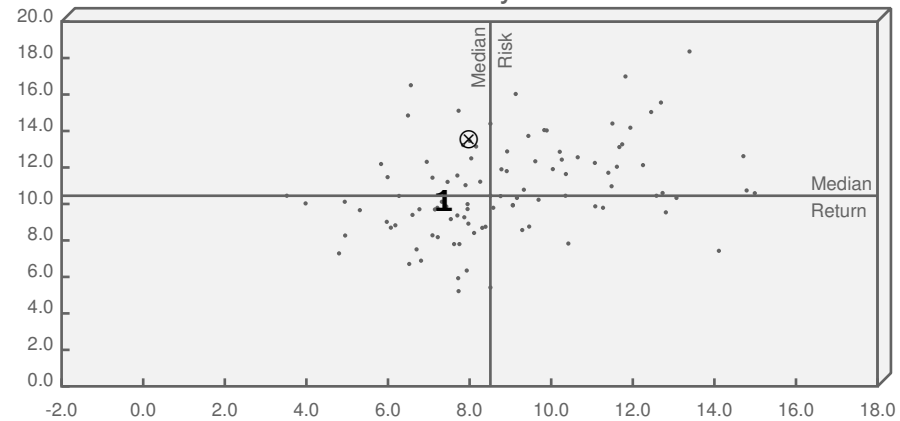


Performance Comparison vs Peer Universe*



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
⊗ Harding Loevne	1.91 (18)	1.33 (19)	1.89 (14)	5.79 (19)	12.55 (26)	13.47 (20)		
1 MSCI ACWI X US	0.71 (44)	-1.93 (51)	-3.09 (58)	1.76 (52)	10.32 (58)	9.97 (58)		
Median	0.44	-1.63	-2.42	2.00	10.74	10.45	5.62	7.07
Number of Funds	978	958	946	938	903	879	809	543

Three Year Risk/Return Analysis vs Peer Universe*



Description	Legend	Gross Fee Ret Value	Gross Fee Ret Rank	Standard Deviation Value	Standard Deviation Rank
Harding Loevner	⊗	13.47	20	8.09	57
MSCI ACWI X US (N)	1	9.97	58	7.49	72
Median		10.46		8.51	

*TUCS Total Returns of International Equity Portfolios Universe - Gross of Fees

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ALTERNATIVE INVESTMENTS

Wilshire Consulting

Investment Performance

Private Partnerships

As of September 30, 2018

Partnership	Commitment Value	Inception Date	Capital Called		Capital Distributed		Fair Value	Total Value / Paid-In Capital [1]	Annualized IRR
			Amount	%	Amount	%			
Private Equity Program									
Adams Street Direct 2010 Fund	$500,000	April 27, 2010	$473,300	95%	$521,329	104%	$299,164	1.73	12.92%
Adams Street Non-US Dev. 2010 Fund	$1,500,000	April 27, 2010	$1,313,250	88%	$843,415	56%	$1,069,982	1.46	11.21%
Adams Street Non-US EM 2010 Fund	$500,000	January 3, 2011	$434,000	87%	$118,384	24%	$566,522	1.58	11.67%
Adams Street US 2010 Fund	$2,500,000	April 27, 2010	$2,202,500	88%	$1,415,629	57%	$2,176,892	1.63	13.84%
Adams Street 2013 Global Fund	$5,000,000	July 3, 2013	$3,775,000	76%	$538,386	11%	$4,377,923	1.30	10.04%
Aberdeen Global Partners	$5,000,000	January 17, 2012	$4,850,000	97%	$1,449,684	29%	$5,175,543	1.37	10.16%
Adams Street 2015 Global	$6,500,000	September 30, 2015	$3,644,368	56%	$825,449	13%	$3,723,427	1.25	25.80%
Adams Street 2017 Global	$6,000,000	June 17, 2017	$1,221,000	20%	$0	0%	$1,244,049	1.02	6.03%
Private Equity Composite	**$27,500,000**	**April 27, 2010**	**$17,913,418**	**65%**	**$5,712,276**	**21%**	**$18,633,502**	**1.36**	**12.07%**
Private Credit Managers									
Grosvenor Opportunistic Credit V	$14,000,000	September 17, 2018	$2,851,230	20%	$0	0%	$2,851,230	1.00	-
50 South Sponsor Backed Credit	$7,000,000	October 4, 2018	-		-		-	-	-
Private Credit Composite	**$21,000,000**	**September 17, 2018**	**$2,851,230**	**14%**	**$0**	**0%**	**$2,851,230**	**1.00**	**-**

[1]TVPI = Fair Value + Capital Distributed / Capital Called

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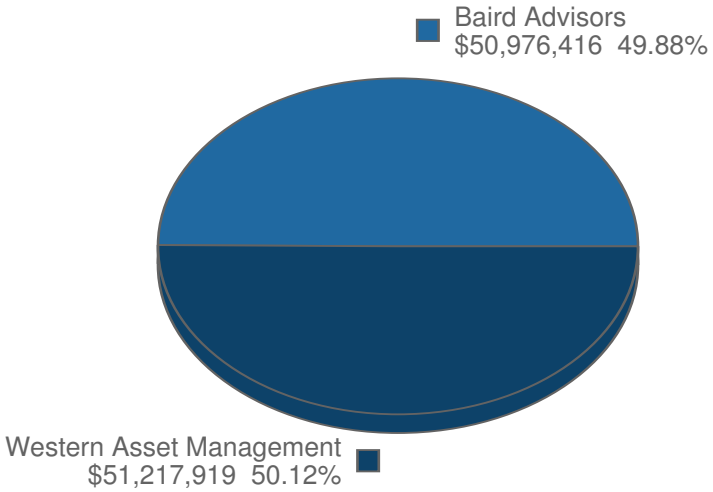
CORE FIXED INCOME

Wilshire Consulting

MANAGER ALLOCATION

Core Fixed Composite

As of September 30, 2018



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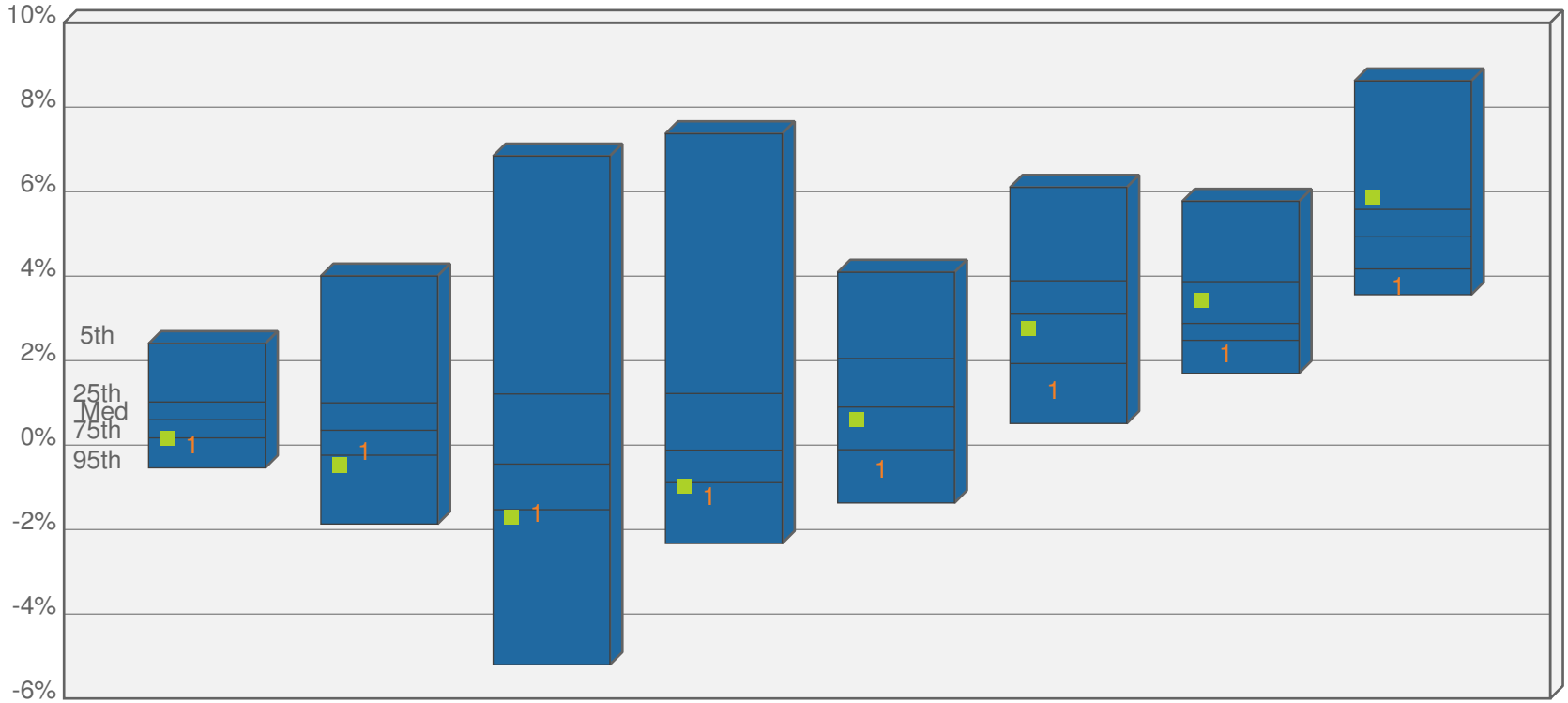
PERFORMANCE COMPARISON

Core Fixed Composite

Periods Ended September 30, 2018



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
Core Fixed Composite	0.19 (74)	-0.45 (79)	-1.67 (82)	-0.94 (76)	0.64 (54)	2.78 (59)	3.45 (35)	5.91 (14)
1 Bloomberg Aggreg	0.02 (85)	-0.14 (68)	-1.60 (78)	-1.22 (81)	-0.57 (86)	1.31 (90)	2.16 (83)	3.77 (86)
5th %tile	2.40	4.00	6.84	7.37	4.09	6.10	5.77	8.62
25th %tile	1.02	1.00	1.21	1.22	2.05	3.89	3.87	5.58
Median	0.60	0.35	-0.45	-0.12	0.90	3.10	2.88	4.93
75th %tile	0.17	-0.24	-1.53	-0.89	-0.11	1.93	2.48	4.17
95th %tile	-0.54	-1.87	-5.20	-2.33	-1.37	0.51	1.70	3.56
Number of Funds	130	127	121	116	95	91	85	57

*TUCS Total Ret of Fixed Income Investment Pools Universe - Gross of Fees

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PERFORMANCE COMPARISON

Trailing Returns

Periods Ended September 30, 2018

	1 Qtr	YTD	1 Year	3 Yrs	5 Yrs	7 Yrs	10 Yrs	Incept Date	Incept Ret
Baird Advisors									
Net of Fee Return	**0.06**	**-1.38**	**-0.79**	**1.97**	**2.78**	**2.86**	**4.58**	**3/31/03**	**4.19**
Bloomberg Aggregate	0.02	-1.60	-1.22	1.31	2.16	2.02	3.77	3/31/03	3.81
Value Added	0.05	0.22	0.43	0.66	0.62	0.84	0.81	3/31/03	0.38
Western Asset Management									
Net of Fee Return	**0.20**	**-2.33**	**-1.59**	**3.06**	**3.59**	**3.99**	**6.62**	**3/31/04**	**4.76**
Bloomberg Aggregate	0.02	-1.60	-1.22	1.31	2.16	2.02	3.77	3/31/04	3.70
Value Added	0.18	-0.73	-0.37	1.75	1.42	1.96	2.85	3/31/04	1.06
Core Fixed Composite									
Net of Fee Return	**0.19**	**-1.79**	**-1.13**	**2.54**	**3.20**	**3.47**	**5.66**	**9/30/87**	**6.69**
Bloomberg Aggregate	0.02	-1.60	-1.22	1.31	2.16	2.02	3.77	9/30/87	6.29
Value Added	0.18	-0.20	0.09	1.23	1.04	1.44	1.89	9/30/87	0.40

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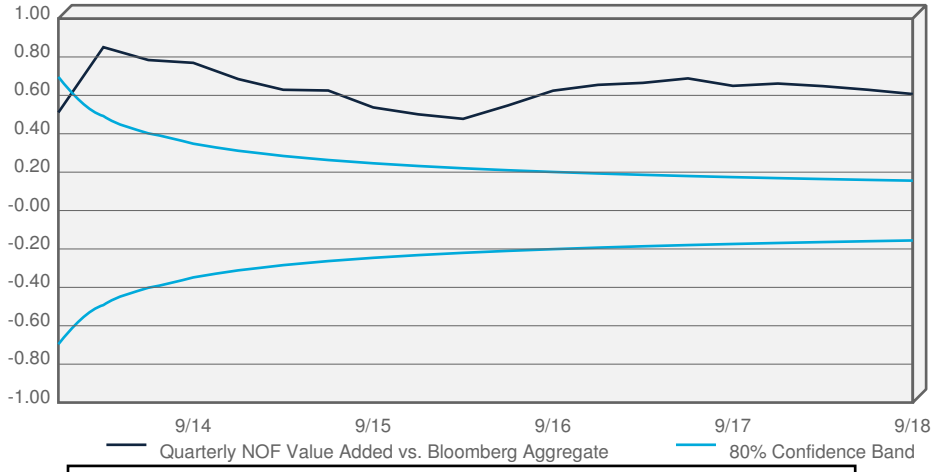
INVESTMENT MANAGER ANALYSIS

Baird Advisors

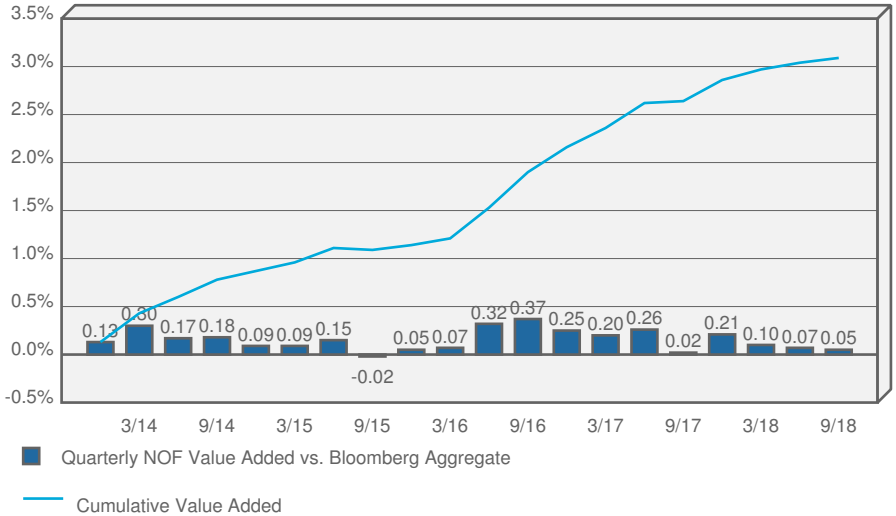
September 30, 2018

Cumulative Skill Analysis vs Benchmark

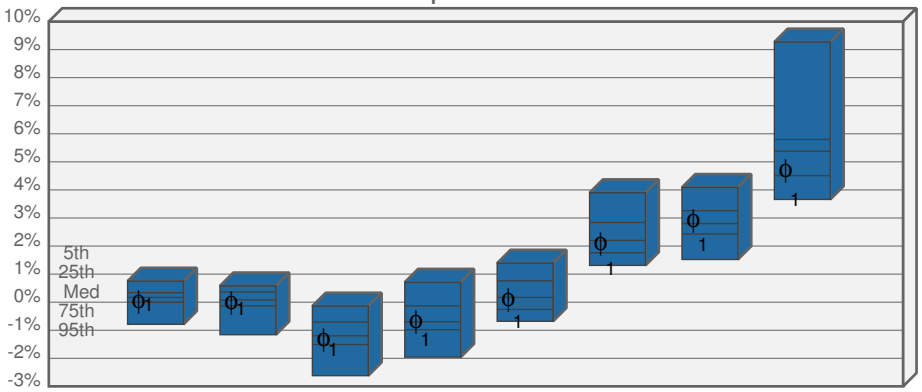


Excess Return:	0.61	Information Ratio:	2.87
Excess Risk:	0.21	T-Stat:	6.41

Value-Added Analysis vs Benchmark

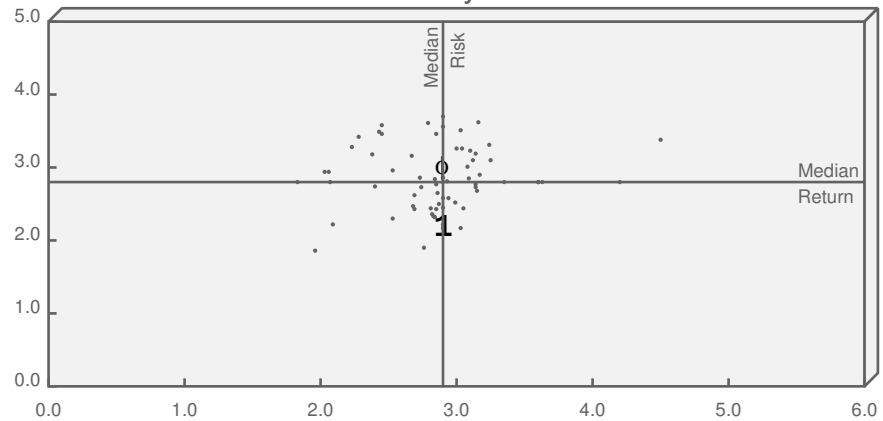


Performance Comparison vs Peer Universe*



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
ϕ Baird Advisors	0.12 (60)	0.08 (50)	-1.22 (52)	-0.58 (40)	0.21 (45)	2.19 (51)	3.00 (36)	4.81 (70)
1 Bloomberg Aggr	0.02 (72)	-0.14 (77)	-1.60 (83)	-1.22 (84)	-0.57 (93)	1.31 (95)	2.16 (89)	3.77 (94)
Median	0.17	0.08	-1.20	-0.70	0.17	2.20	2.80	5.38
Number of Funds	88	88	87	86	83	82	72	46

Five Year Risk/Return Analysis vs Peer Universe*



Description	Legend	Gross Fee Ret Value	Gross Fee Ret Rank	Standard Deviation Value	Standard Deviation Rank
Baird Advisors	ϕ	3.00	36	2.95	45
Bloomberg Aggregate	1	2.16	89	2.94	47
Median		2.80		2.90	

*TUCS Total Returns of Fixed Income Portfolios - Core Universe - Gross of Fees

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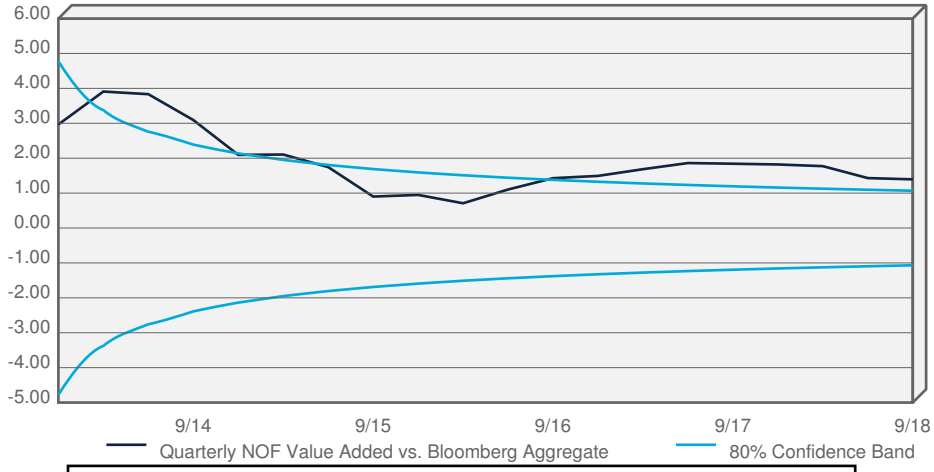
INVESTMENT MANAGER ANALYSIS

Western Asset Management

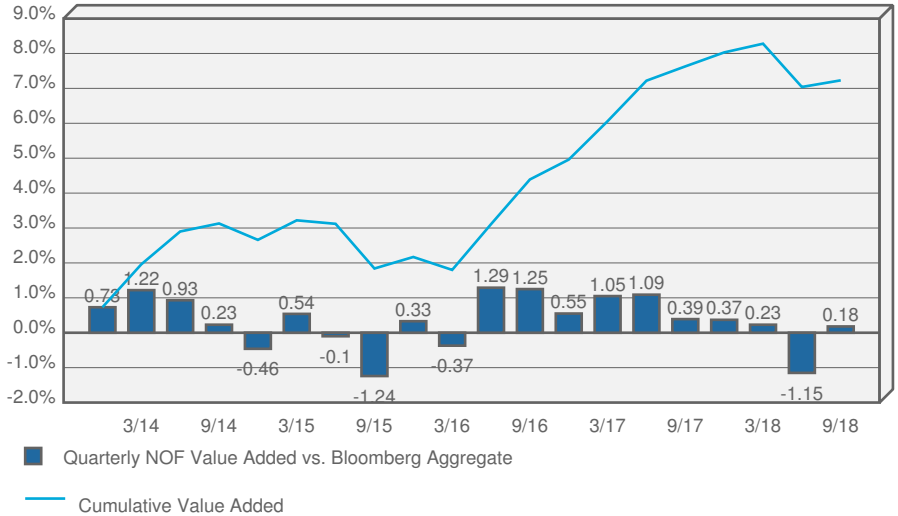
September 30, 2018

Cumulative Skill Analysis vs Benchmark

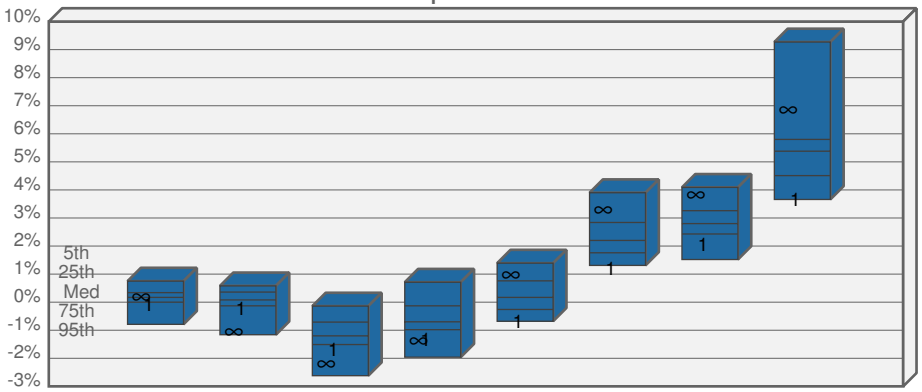


Excess Return:	1.39	Information Ratio:	0.96
Excess Risk:	1.45	T-Stat:	2.15

Value-Added Analysis vs Benchmark

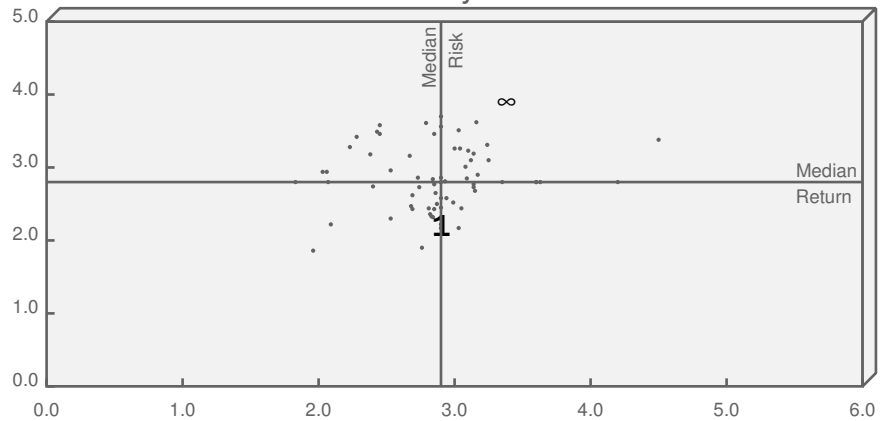


Performance Comparison vs Peer Universe*



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
∞ Western Asset	0.27 (37)	-0.97 (94)	-2.11 (91)	-1.30 (86)	1.06 (14)	3.37 (9)	3.89 (5)	6.93 (7)
1 Bloomberg Aggr	0.02 (72)	-0.14 (77)	-1.60 (83)	-1.22 (84)	-0.57 (93)	1.31 (95)	2.16 (89)	3.77 (94)
Median	0.17	0.08	-1.20	-0.70	0.17	2.20	2.80	5.38
Number of Funds	88	88	87	86	83	82	72	46

Five Year Risk/Return Analysis vs Peer Universe*



Description	Legend	Gross Fee Ret		Standard Deviation	
		Value	Rank	Value	Rank
Western Asset Management	∞	3.89	5	3.42	19
Bloomberg Aggregate	1	2.16	89	2.94	47
Median		2.80		2.90	

*TUCS Total Returns of Fixed Income Portfolios - Core Universe - Gross of Fees

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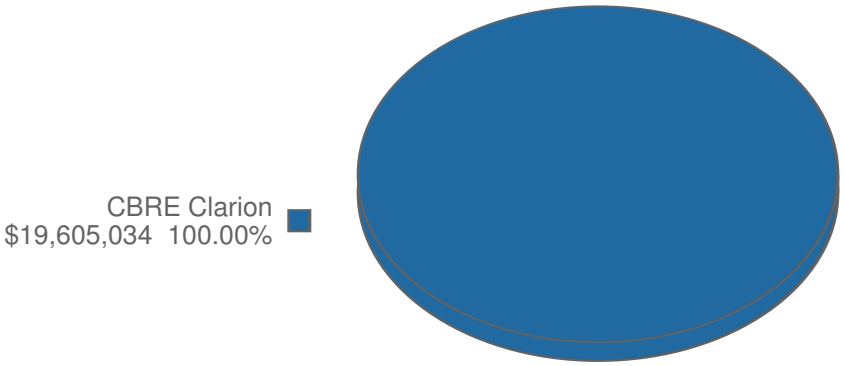
REAL ESTATE

Wilshire Consulting

MANAGER ALLOCATION

Real Estate Composite

As of September 30, 2018



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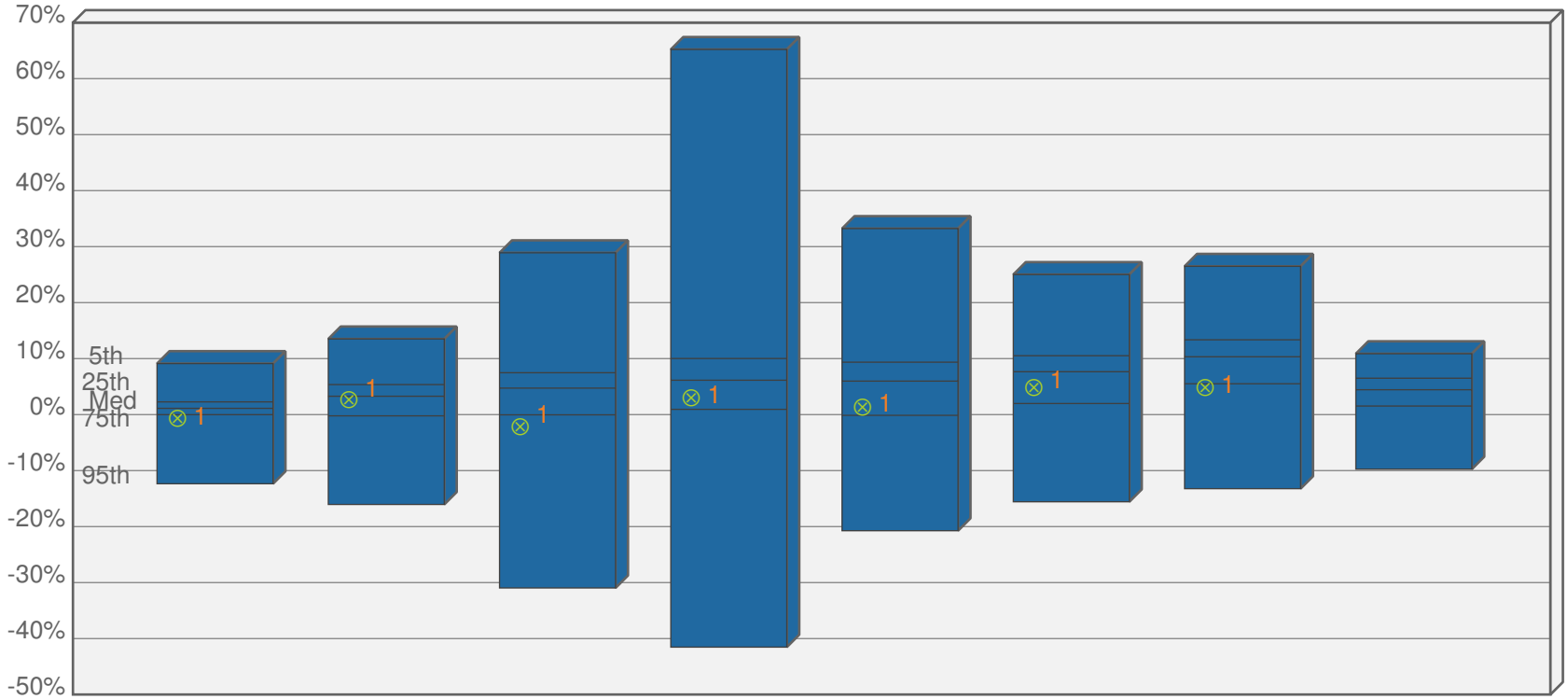
PERFORMANCE COMPARISON

Real Estate Composite

Periods Ended September 30, 2018



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
⊗ Real Estate Composite	-0.57 (80)	2.71 (56)	-2.11 (81)	3.03 (66)	1.34 (67)	4.87 (66)	4.95 (78)	
1 FTSE EPRA/NAREIT	-0.30 (79)	4.81 (29)	0.06 (74)	3.66 (63)	2.10 (66)	6.19 (60)	5.43 (75)	
5th %tile	9.10	13.50	28.89	65.20	33.21	25.00	26.47	10.86
25th %tile	2.26	5.35	7.47	10.01	9.35	10.51	13.35	6.49
Median	1.11	3.27	4.72	6.13	5.97	7.65	10.32	4.43
75th %tile	-0.02	-0.23	-0.05	0.93	-0.14	1.97	5.50	1.52
95th %tile	-12.36	-16.06	-30.97	-41.54	-20.75	-15.58	-13.24	-9.75
Number of Funds	136	142	145	145	138	134	126	68

*TUCS Total Ret of Real Estate Portfolios Universe - Gross of Fees

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PERFORMANCE COMPARISON

Trailing Returns

Periods Ended September 30, 2018

	1 Qtr	YTD	1 Year	3 Yrs	5 Yrs	7 Yrs	10 Yrs	Incept Date	Incept Ret
CBRE Clarion									
Net of Fee Return	**-0.75**	**-2.65**	**2.27**	**4.09**	**4.18**	**7.89**		**6/30/09**	**9.24**
FTSE EPRA/NAREIT Dev (N)	-0.30	0.06	3.66	6.19	5.43	9.28		6/30/09	10.56
Value Added	-0.45	-2.71	-1.39	-2.09	-1.25	-1.39		6/30/09	-1.31
Real Estate Composite									
Net of Fee Return	**-0.57**	**-2.47**	**2.46**	**4.16**	**4.21**	**7.91**		**6/30/09**	**9.26**
FTSE EPRA/NAREIT Dev (N)	-0.30	0.06	3.66	6.19	5.43	9.28		6/30/09	10.56
Value Added	-0.27	-2.53	-1.20	-2.03	-1.23	-1.37		6/30/09	-1.30

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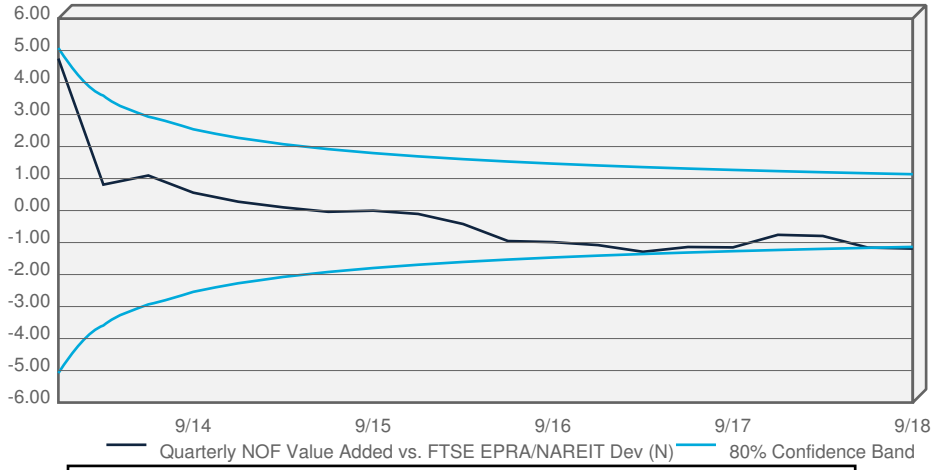
INVESTMENT MANAGER ANALYSIS

CBRE Clarion

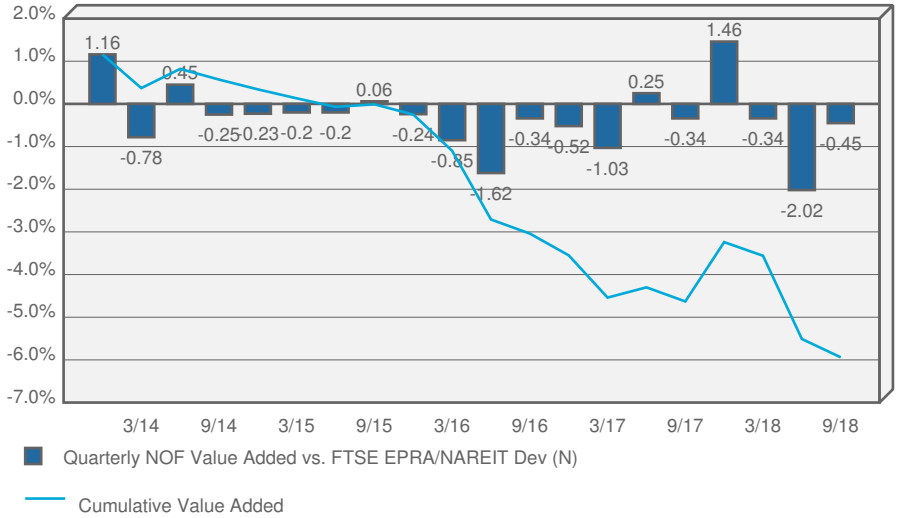
September 30, 2018

Cumulative Skill Analysis vs Benchmark

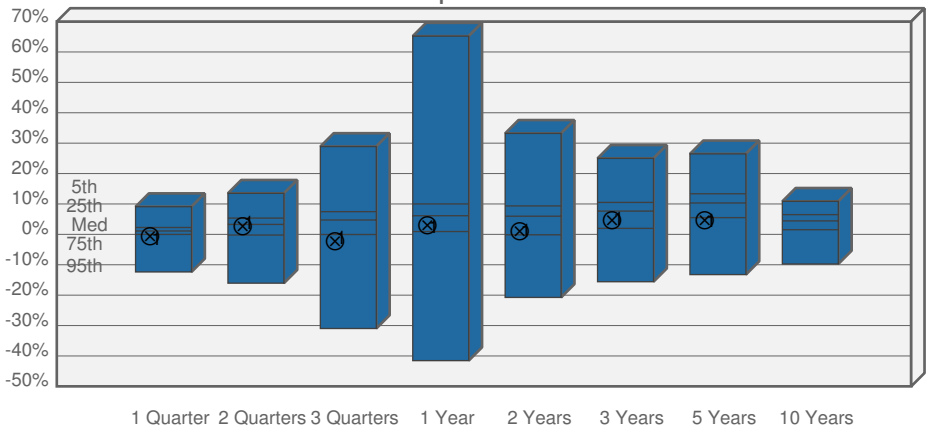


Excess Return:	-1.19	Information Ratio:	-0.77
Excess Risk:	1.54	T-Stat:	-1.72

Value-Added Analysis vs Benchmark

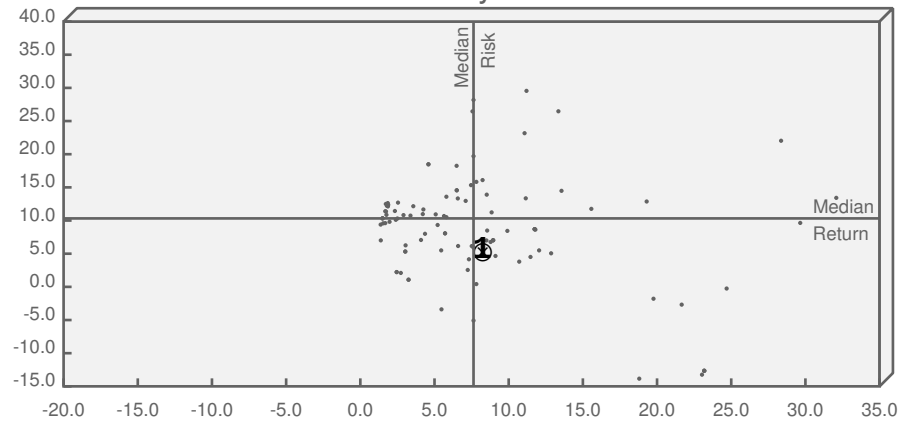


Performance Comparison vs Peer Universe*



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
⊗ CBRE Clarion	-0.57 (80)	2.71 (56)	-2.11 (81)	3.03 (66)	1.34 (67)	4.87 (66)	4.96 (78)	
1 FTSE EPRA/NAREIT	0.30 (79)	4.81 (29)	0.06 (74)	3.66 (63)	2.10 (66)	6.19 (60)	5.43 (75)	
Median	1.11	3.27	4.72	6.13	5.97	7.65	10.32	4.43
Number of Funds	136	142	145	145	138	134	126	68

Five Year Risk/Return Analysis vs Peer Universe*



Description	Legend	Gross Fee Ret		Standard Deviation	
		Value	Rank	Value	Rank
CBRE Clarion	⊗	4.96	78	8.54	45
FTSE EPRA/NAREIT Dev (N)	1	5.43	75	8.54	45
Median		10.32		7.63	

*TUCS Total Returns of Real Estate Portfolios Universe - Gross of Fees

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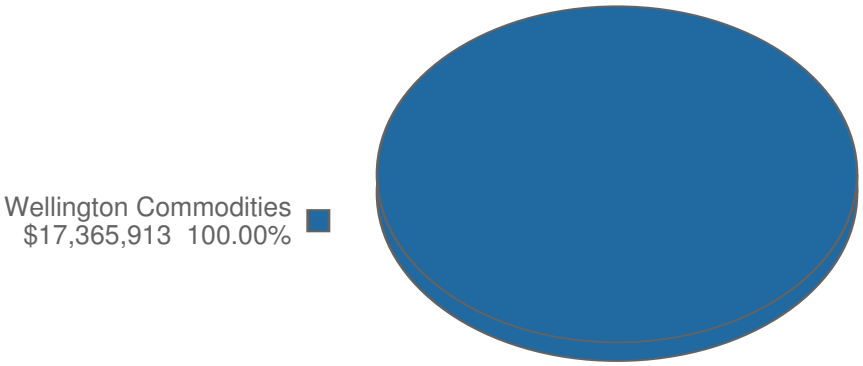
COMMODITIES

Wilshire Consulting

MANAGER ALLOCATION

Commodities Composite

As of September 30, 2018



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PERFORMANCE COMPARISON

Trailing Returns

Periods Ended September 30, 2018

	1 Qtr	YTD	1 Year	3 Yrs	5 Yrs	7 Yrs	10 Yrs	Incept Date	Incept Ret
Wellington Commodities									
Net of Fee Return	**-3.23**	**-2.80**	**4.47**	**2.43**	**-5.66**			**3/31/13**	**-6.55**
Bloomberg Commodity Index	-2.02	-2.03	2.59	-0.11	-7.18			3/31/13	-7.87
Value Added	-1.21	-0.77	1.88	2.55	1.51			3/31/13	1.32
Commodities Composite									
Net of Fee Return	**-3.04**	**-2.60**	**4.68**	**2.50**	**-5.63**			**3/31/13**	**-6.51**
Bloomberg Commodity Index	-2.02	-2.03	2.59	-0.11	-7.18			3/31/13	-7.87
Value Added	-1.01	-0.58	2.09	2.62	1.55			3/31/13	1.35

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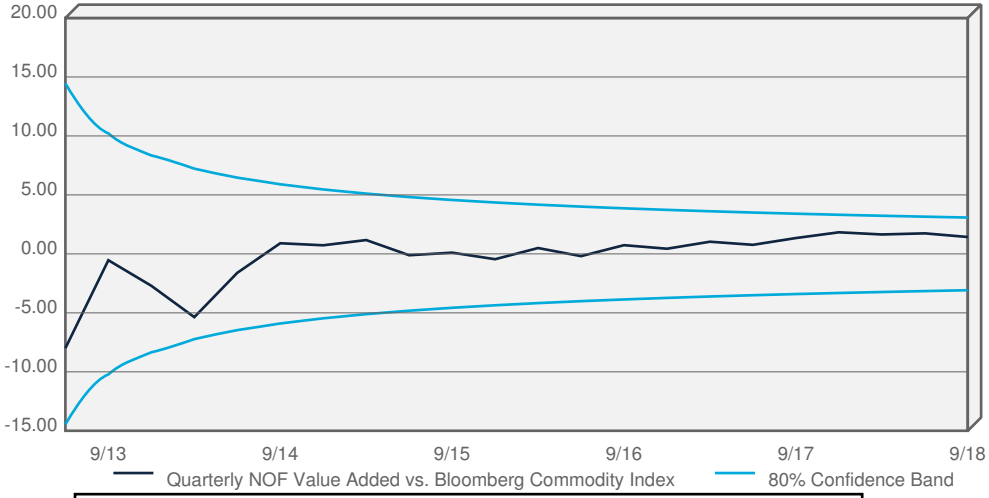
INVESTMENT MANAGER ANALYSIS

Wellington Commodities

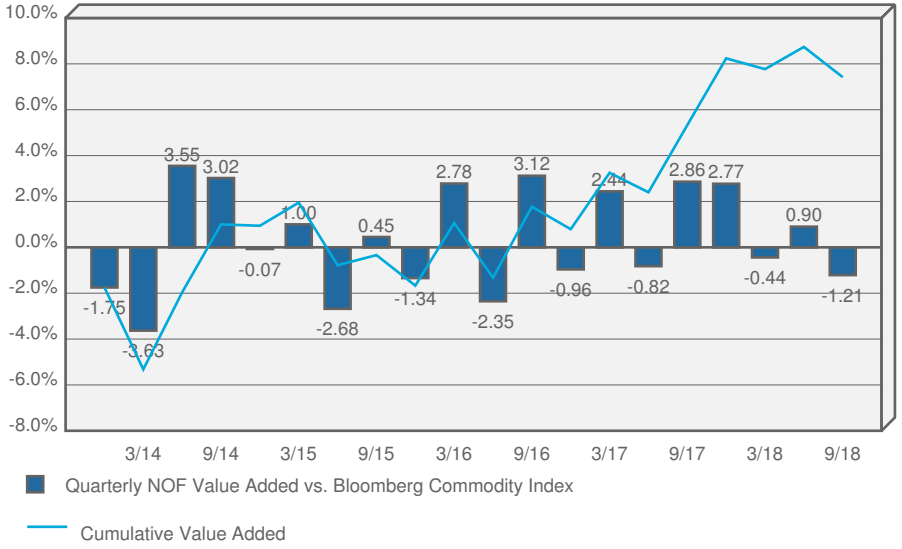
September 30, 2018

Cumulative Skill Analysis vs Benchmark



Excess Return:	1.43	Information Ratio:	0.33
Excess Risk:	4.39	T-Stat:	0.73

Value-Added Analysis vs Benchmark



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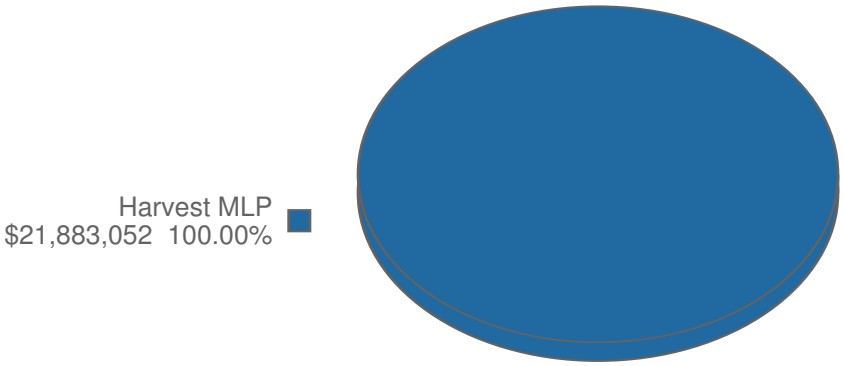
MLP

Wilshire Consulting

MANAGER ALLOCATION

MLP Composite

As of September 30, 2018



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PERFORMANCE COMPARISON

Trailing Returns

Periods Ended September 30, 2018

	1 Qtr	YTD	1 Year	3 Yrs	5 Yrs	7 Yrs	10 Yrs	Incept Date	Incept Ret
Harvest MLP									
Net of Fee Return	**5.99**	**8.82**	**8.30**	**5.34**				**3/31/15**	**-4.13**
Alerian MLP Index	6.57	7.65	7.34	4.96				3/31/15	-5.16
Value Added	-0.58	1.17	0.96	0.37				3/31/15	1.02
MLP Composite									
Net of Fee Return	**5.99**	**8.82**	**8.30**	**5.34**				**3/31/15**	**-4.13**
Alerian MLP Index	6.57	7.65	7.34	4.96				3/31/15	-5.16
Value Added	-0.58	1.17	0.96	0.37				3/31/15	1.02

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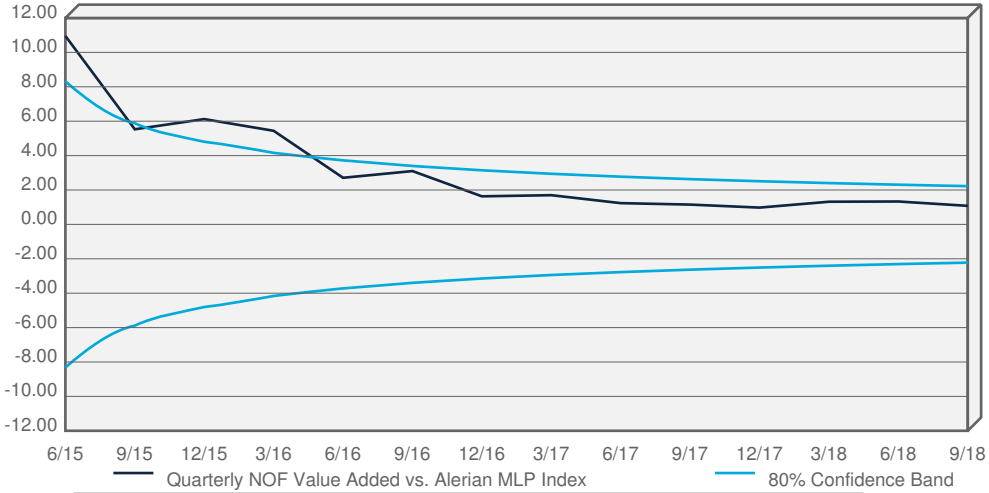
INVESTMENT MANAGER ANALYSIS

Harvest MLP

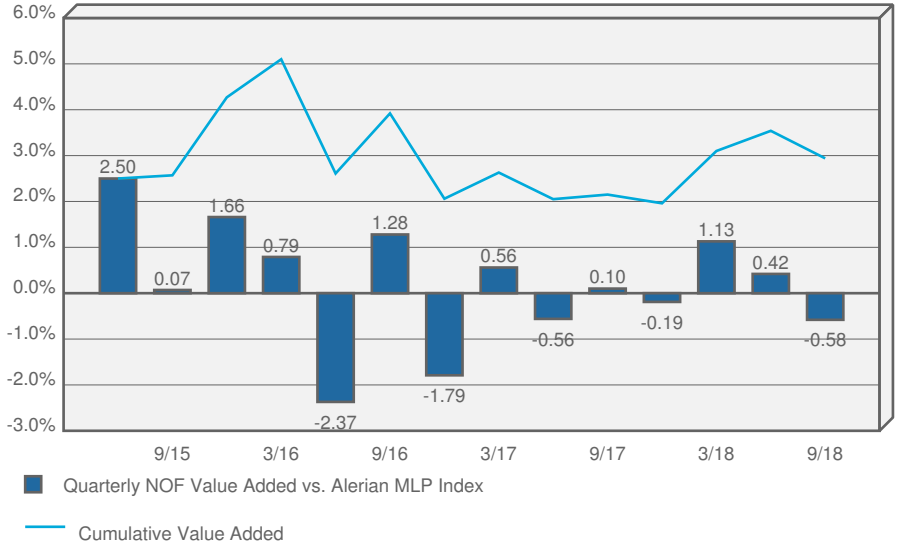
September 30, 2018

Cumulative Skill Analysis vs Benchmark



Excess Return:	1.08	Information Ratio:	0.43
Excess Risk:	2.53	T-Stat:	0.74

Value-Added Analysis vs Benchmark



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TIPS

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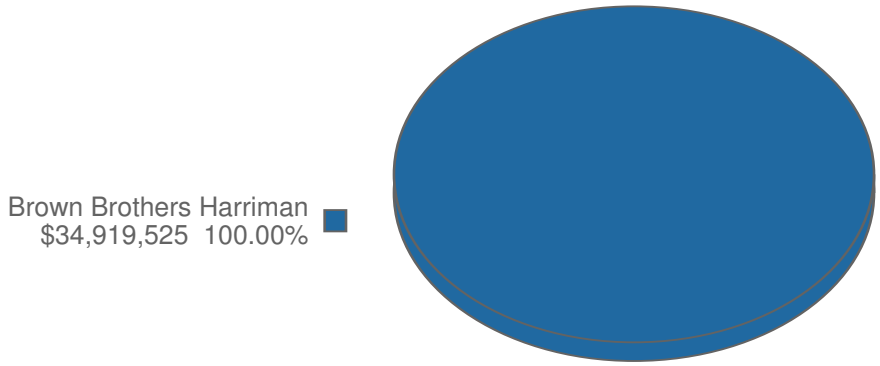
MANAGER ALLOCATION

TIPS Composite

As of September 30, 2018



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PERFORMANCE COMPARISON

Trailing Returns

Periods Ended September 30, 2018

	1 Qtr	YTD	1 Year	3 Yrs	5 Yrs	7 Yrs	10 Yrs	Incept Date	Incept Ret
Brown Brothers Harriman									
Net of Fee Return	**-0.81**	**-1.05**	**0.24**	**2.01**				**6/30/15**	**1.45**
Barclays U.S. TIPS	-0.82	-0.84	0.41	2.04				6/30/15	1.52
Value Added	0.01	-0.21	-0.17	-0.03				6/30/15	-0.07
TIPS Composite									
Net of Fee Return	**-0.81**	**-1.05**	**0.24**	**2.01**				**6/30/15**	**1.45**
Barclays U.S. TIPS	-0.82	-0.84	0.41	2.04				6/30/15	1.52
Value Added	0.01	-0.21	-0.17	-0.03				6/30/15	-0.07

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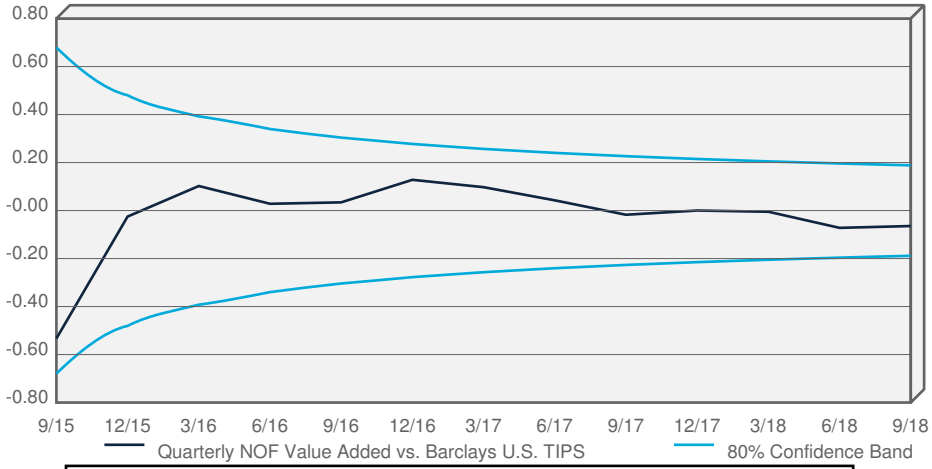
INVESTMENT MANAGER ANALYSIS

Brown Brothers Harriman

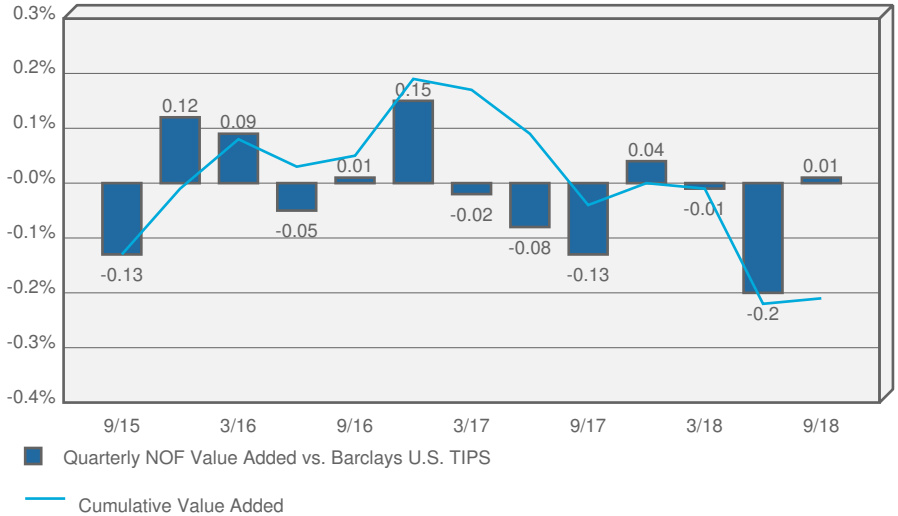
September 30, 2018

Cumulative Skill Analysis vs Benchmark

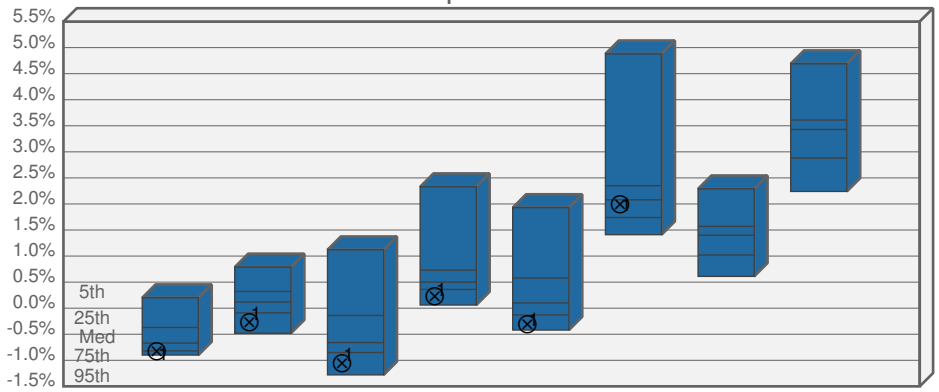


Excess Return:	-0.06	Information Ratio:	-0.31
Excess Risk:	0.21	T-Stat:	-0.54

Value-Added Analysis vs Benchmark



Performance Comparison vs Peer Universe*



	1 Quarter	2 Quarters	3 Quarters	1 Year	2 Years	3 Years	5 Years	10 Years
⊗Brown Brothers	-0.81 (69)	-0.25 (92)	-1.05 (92)	0.24 (92)	-0.29 (92)	2.01 (63)		
1 Barclays U.S.	-0.82 (79)	-0.05 (66)	-0.84 (71)	0.41 (61)	-0.16 (87)	2.04 (57)		
Median	-0.67	0.12	-0.66	0.50	0.10	2.08	1.40	3.43
Number of Funds	39	39	39	39	39	38	38	32

*Compass Total Returns of Active TIPS Portfolios Universe - Gross of Fees Police & Fire

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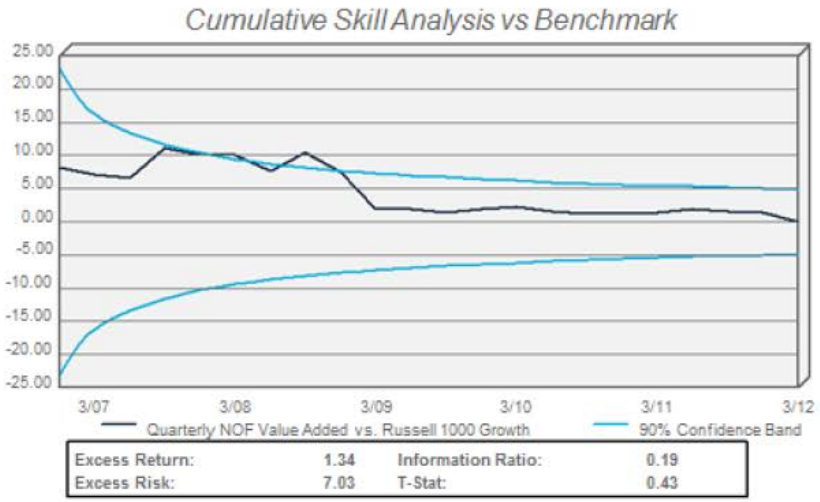
APPENDIX

Glossary

Cumulative Skill Graph

- Graphical representation of the statistical significance of excess returns over a specified benchmark for the cumulative time period being analyzed.
- Positive cumulative excess performance is shown when the dark blue line is above the "0.00" line measured on the left Y axis.
- The light blue lines that form a channel, or the shape of a trumpet horn, represent the boundaries of the statistical significance test.
- The width of the channel is calculated based on the amount of "Excess Risk" that the manager takes over the benchmark.



Data Source: Wilshire Compass

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