

CIO Board Report

Arizona State Retirement System

September 27, 2019

Fiscal Year to Date

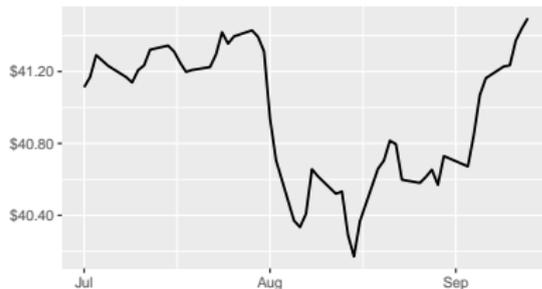
Summary

Total Fund Fiscal Year to Date through 9/13/2019

Return Fiscal Year to Date

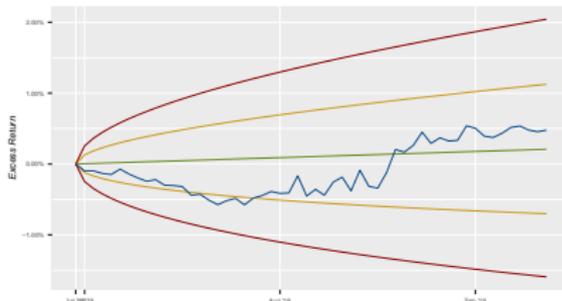


Total Fund Market Value (Billions)



Total Fund Performance versus Expectations

100 Basis Points Expected Excess Return with 200 Basis Points Tracking Error



Total Fund Current Positioning through 9/13/2019

Total Fund Positioning

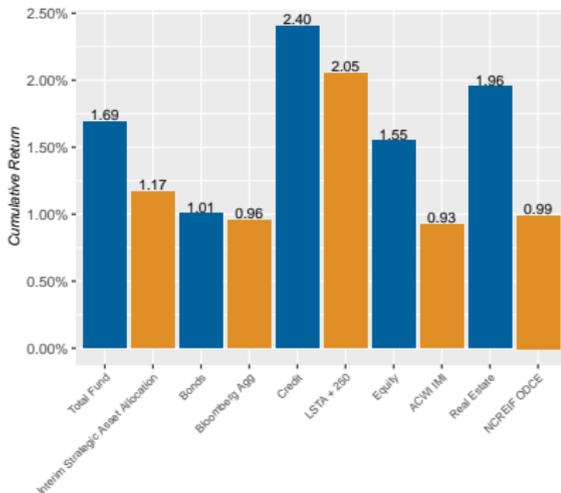
	NAV w/ Notional (\$ mm)	NAV Exposure (%)	Target (%)	Active Weight (%)	Active Weight (\$ mm)
Cash	521.0	1.3	0.0	1.3	521.0
Bonds	4199.9	10.1	11.3	-1.2	-489.2
Credit	7894.5	19.0	17.8	1.2	508.2
Equity	22558.0	54.4	56.3	-1.9	-804.4
Real Estate	6322.5	15.2	14.6	0.6	264.1
Other	0.3	0.0	0.0	0.0	0.3
Total Fund	41496.3	100.0	100.0	0.0	0.0

Total Fund Attribution

Fiscal Year to Date Total Fund Returns & Dollar Value Add through 9/13/2019

Asset Class and Benchmark

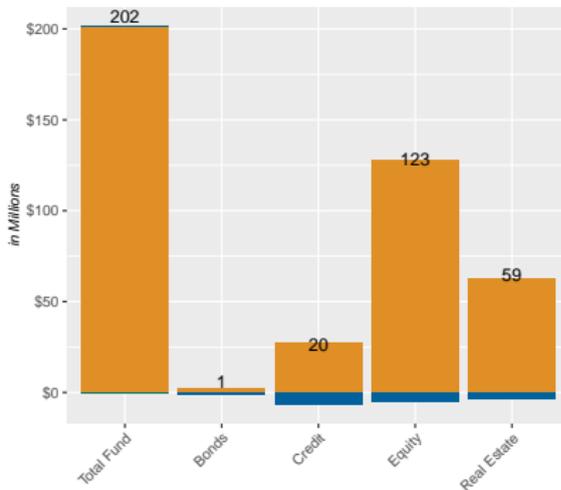
Fiscal Year to Date



Asset Class Benchmark

Dollar Value Add

Fiscal Year to Date Dollar Value Add

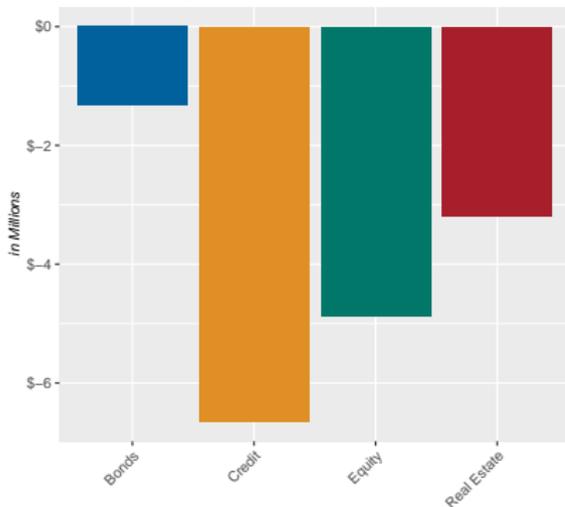


Allocation Excess Return Residual

Fiscal Year to Date Allocation Effect and Excess Return by Asset Class through 9/13/2019

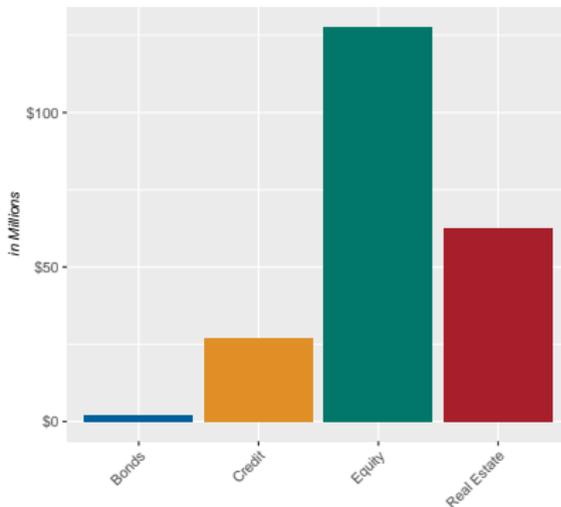
Allocation Effect by Asset Class

Relative to Strategic Asset Allocation Benchmark



Excess Return by Asset Class

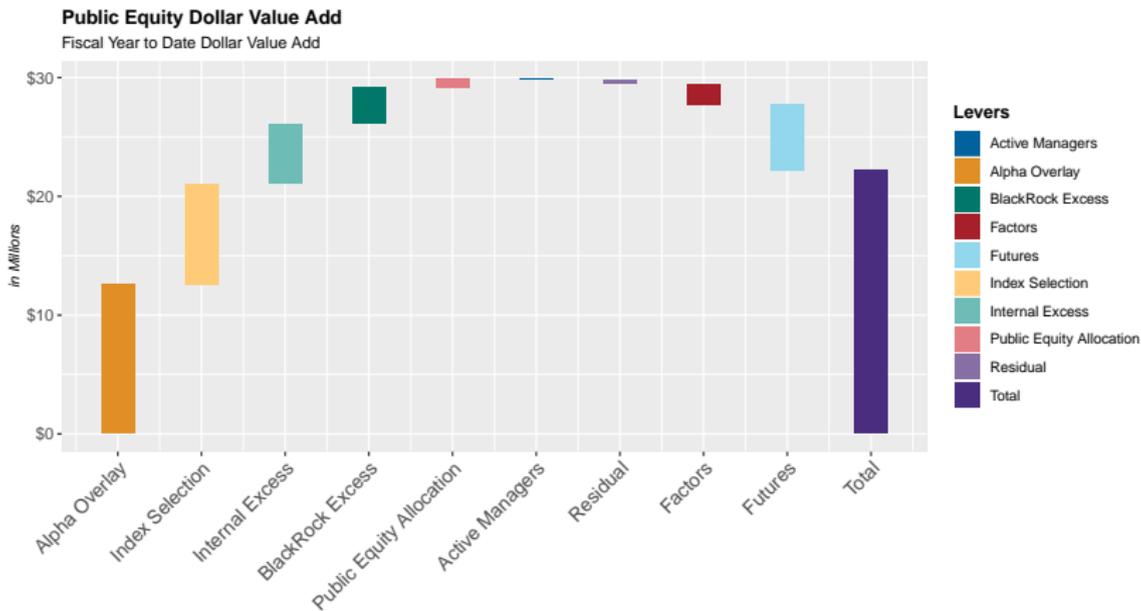
Relative to Benchmark



■ Bonds ■ Credit ■ Equity ■ Real Estate

Decomposition of Equity Excess Return

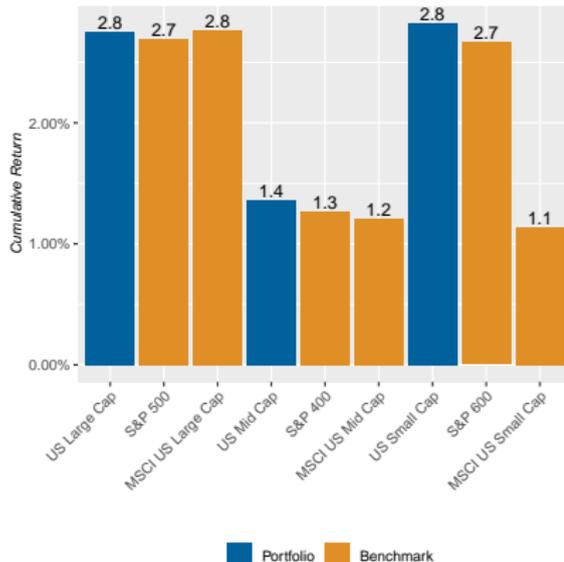
Public Equity Levers through 9/13/2019



Internally Managed Portfolios through 9/13/2019

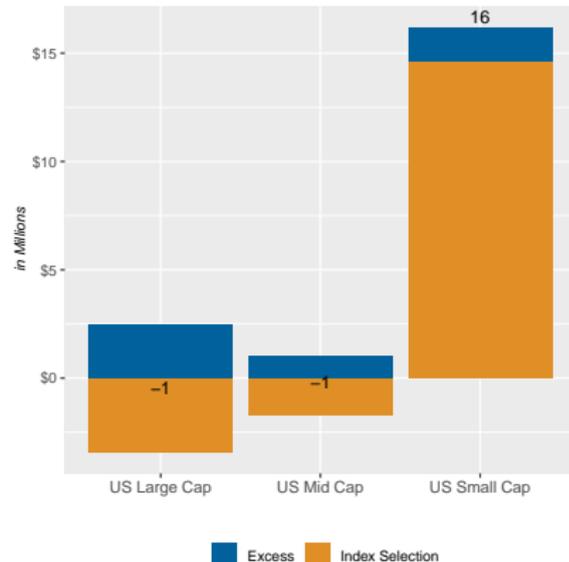
Internal Portfolios and Benchmarks

Fiscal Year to Date Returns



Internal Portfolio Dollar Value Add

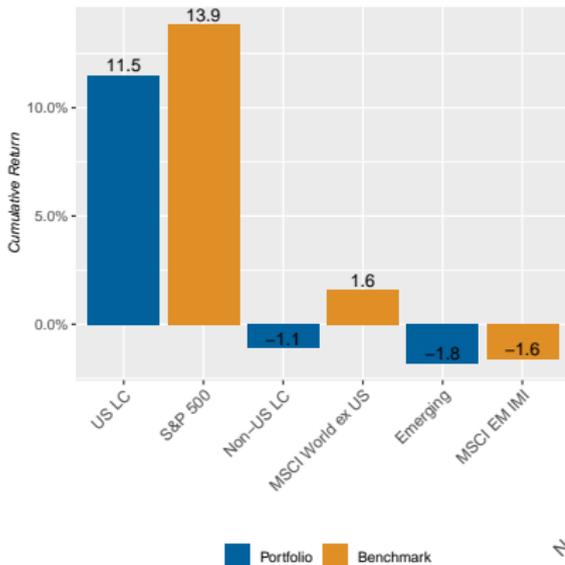
Fiscal Year to Date Dollar Value Add



Factor Portfolios through 9/13/2019

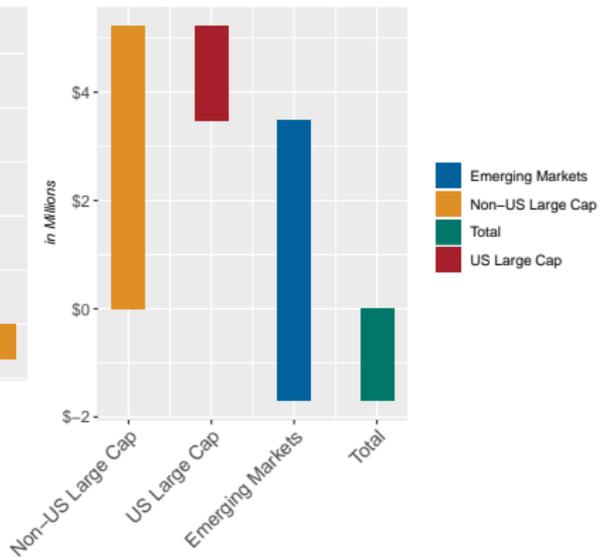
Factor Portfolios and Benchmark

Fiscal Year to Date



Factor Portfolio Dollar Value Add

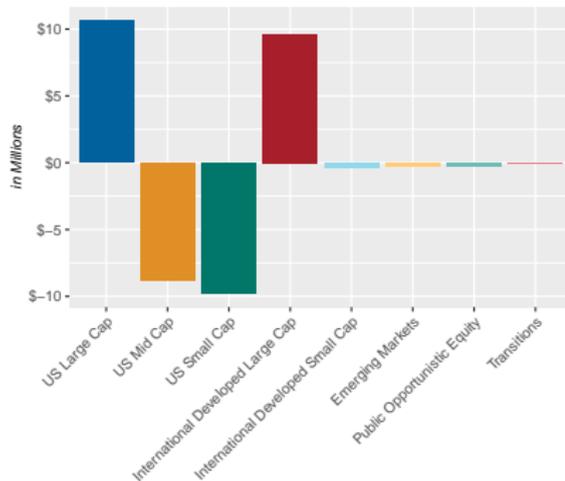
Fiscal Year to Date Dollar Value Add



Public Equity Allocation through 9/13/2019

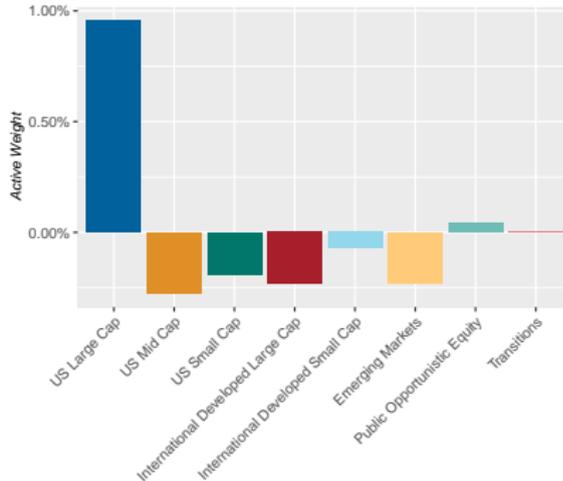
Allocation Effect by ACWI Subcomponents

Relative to ACWI IMI



Composite Average Active Weights

Relative to ACWI IMI



Quarterly Performance

External Reports

State Street Performance Summary for the period ended June 30, 2019

ARIZONA STATE RETIREMENT SYSTEM
 Investment Management Division
 Jun-30-2019
 Net Returns
 Final

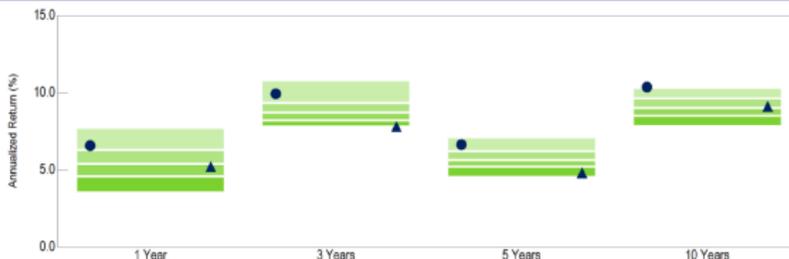
ASRS Performance Summary



	Benchmark	Market Value (\$mil.)	1 Mth	3 Mth	FYTD	1 Year	3 Year	5 Year	YTD	Inception Date
TOTAL PLAN	INTERIM SAA POLICY	41,253	3.08	3.07	6.56	6.56	9.92	6.63	9.66	07-01-1975
Excess			-0.26	-1.18	1.37	1.37	2.12	1.82	0.42	
TOTAL EQUITY	LEGACY Total Equity BM	23,325	5.28	3.54	5.56	5.56	11.79	7.16	9.62	07-01-2013
Excess			-0.18	-1.40	1.22	1.22	-0.31	0.16	-0.05	
US EQUITY	COMBINED DOMESTIC EQUITY INDEX	10,667	7.21	3.98	7.22	7.22	12.79	9.67	11.21	07-01-1975
Excess			0.21	-0.05	-1.74	-1.74	-1.33	-0.81	-0.16	
INTERNATIONAL EQUITY	INTERNATIONAL EQUITY INDEX	8,561	5.47	2.58	0.16	0.16	9.25	2.36	5.93	04-01-1987
Excess			-0.34	-0.17	-0.11	-0.11	-0.13	-0.13	0.25	
PRIVATE EQUITY	MSCI ACWI IMI w/USA GROSS (NET) LAGGED	4,098	0.19	4.47	14.48	14.48	15.22	12.20	7.83	09-01-2007
Excess			-0.87	-7.91	12.27	12.27	2.24	5.11	0.95	
INTEREST RATE SENSITIVE	BBG BARC Agg (Dly)	4,158	1.23	3.05	7.79	7.79	2.40	3.23	7.87	07-01-1975
Excess			-0.02	-0.03	-0.08	-0.08	0.09	0.28		
CREDIT	LEGACY Total Credit BM	7,354	0.92	2.27	9.05	9.05	10.15	7.22	7.47	07-01-2013
Excess			-0.01	-2.37	3.52	3.52	2.07	3.08		
PRIVATE DEBT	S&P LEVERAGED LOAN INDEX LAGGED + 250BPS	5,334	0.03	1.79	9.13	9.13	10.85	10.28	11.85	10-01-2012
Excess			-0.00	-2.85	3.59	3.59	2.95	4.08	4.87	
DISTRESSED DEBT	S&P LEVERAGED LOAN INDEX LAGGED + 250BPS	1,896	0.00	1.99	8.66	8.66			8.95	07-01-2018
Excess			-0.03	-2.65	3.12	3.12			3.12	
OTHER CREDIT	S&P LEVERAGED LOAN INDEX LAGGED + 250BPS	322	0.01	15.62	13.94	13.94			13.94	07-01-2018
Excess			-0.02	10.98	8.40	8.40			8.40	
REAL ESTATE	Custom ASRS ODCE (Net)	6,910	0.91	2.59	7.45	7.45	8.60	11.20	6.48	12-01-2005
Excess			-0.47							
CASH	CASH CUSTOM INDEX	311	0.18	0.63	1.39	1.39	5.31	2.74	4.02	04-01-1990
Excess			-0.04	-0.01	-0.92	-0.92	-0.14	-0.80	0.95	
OTHER	91 DAY TREASURY BILL (DAILY)	94	3.43	-1.74	-2.81	-2.81	4.13	-0.56	2.28	07-01-2013
Excess			3.20	-2.38	-5.13	-5.13	2.74	-1.43	1.54	

ASRS Returns Compared to Public Fund Universe for the period ended June 30, 2019

InvMetrics Public DB > \$1B Net Return Comparison
 Ending June 30, 2019



5th Percentile
 25th Percentile
 Median
 75th Percentile
 95th Percentile
 # of Portfolios

Return (Rank)	1 Year	3 Years	5 Years	10 Years
5th Percentile	7.7	10.8	7.1	10.3
25th Percentile	6.3	9.3	6.2	9.6
Median	5.4	8.7	5.6	9.0
75th Percentile	4.6	8.2	5.2	8.5
95th Percentile	3.5	7.8	4.5	7.9
# of Portfolios	77	77	73	65

	1 Year	3 Years	5 Years	10 Years
● Total Fund	6.6	9.9	6.6	10.4
Total Fund Percentile Rank	20	10	13	4
Total Fund Ordinal Rank	15	8	9	3
Number of Funds In Universe	77	77	73	65
▲ Interim SAA Policy	5.2	7.8	4.8	9.1



ASRS Goals Met for the period ended June 30, 2019

ASRS INVESTMENT OBJECTIVES

Goal #4: Design, implement, and maintain an investment management program that maximizes rates of return for acceptable of levels of risk.

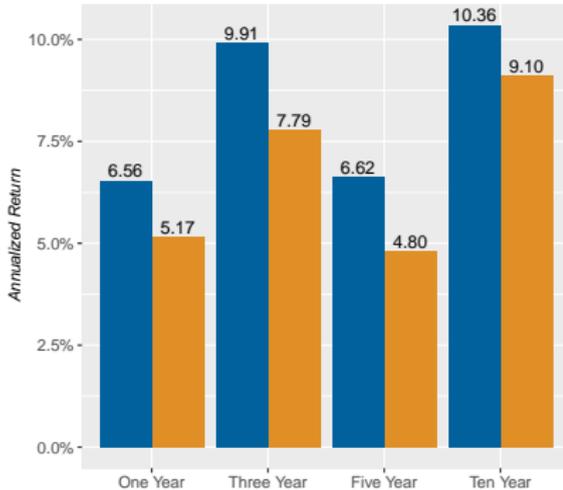
- a) Develop, approve and implement an Asset Allocation program that is expected to achieve a 20-year rolling average annual return at or above the actuarial assumed return
Goal met: Yes
- b) Achieve a total fund net return in the top quartile of the peer universe
Goal met: Yes
- c) Achieve a 1 year total fund net return greater than the Strategic Asset Allocation Benchmark
Goal met: Yes
- d) Achieve a 3-year total fund net return greater than the Strategic Asset Allocation Benchmark
Goal met: Yes
- e) Achieve 1 year asset class net returns greater than the respective Asset Allocation Benchmarks
Goal met: Partial
- f) Achieve 3 year asset class net returns greater than the respective Asset Allocation Benchmarks
Goal met: Partial
- g) Sufficient cash will be maintained to meet all payment requirements
Goal met: Yes

Total Fund

Trailing Returns & Dollar Value Add for the period ended 6/30/2019

Total Fund and Strategic Asset Allocation Benchmark

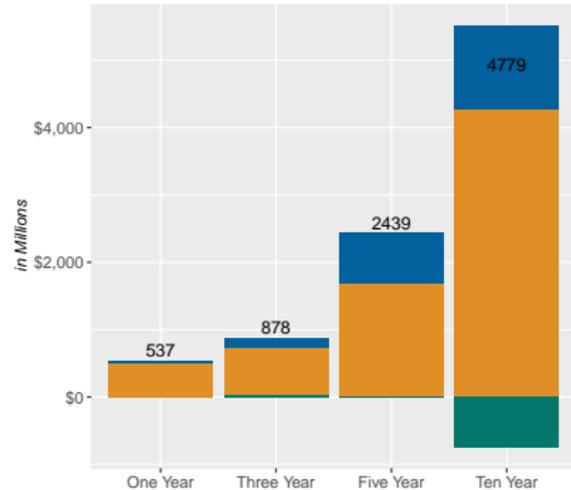
Trailing Period Returns



Total Fund Strategic Asset Allocation Benchmark

Total Fund Dollar Value Add

Relative to Strategic Asset Allocation Benchmark

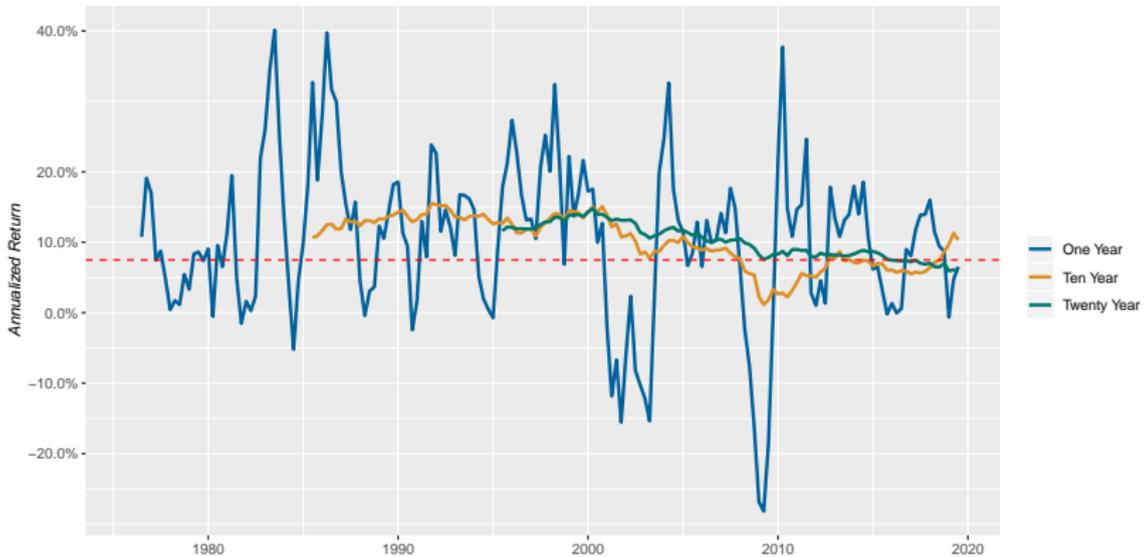


Allocation Excess Return Residual

Total Fund Returns for the period ended 6/30/2019

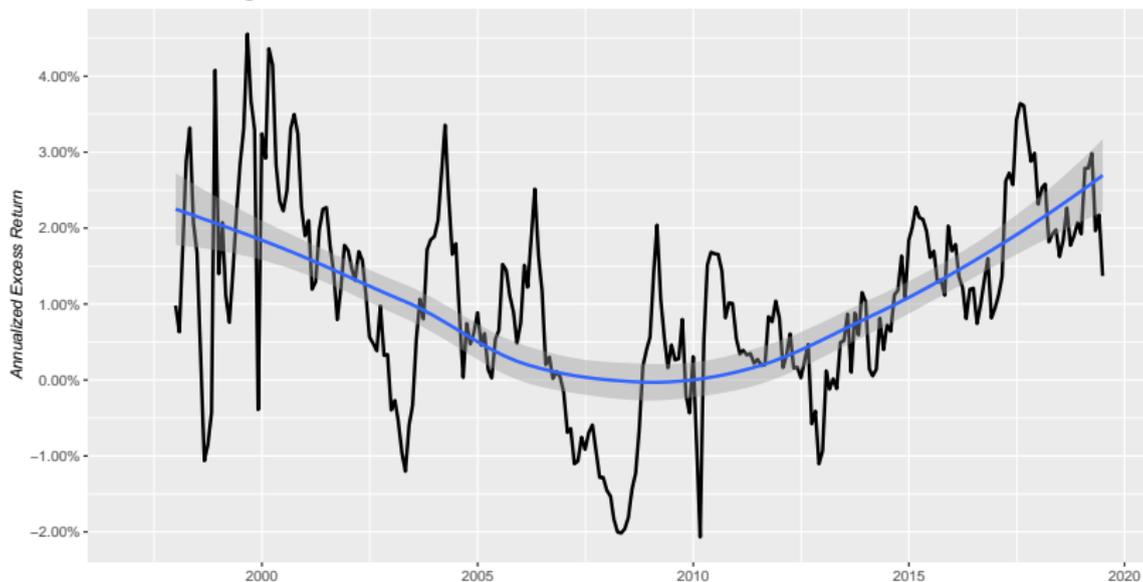
Total Fund Rolling Returns

Trailing Period Returns



Total Fund Rolling 1 Year Excess Return for the period ended 6/30/2019

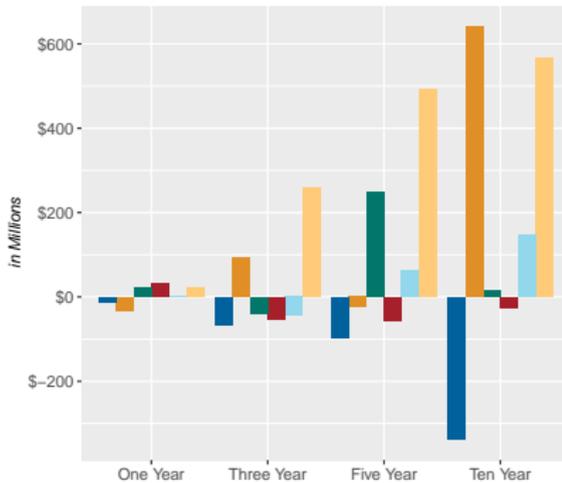
Total Fund Rolling 1 Year Excess



Allocation Effect for the period ended 6/30/2019

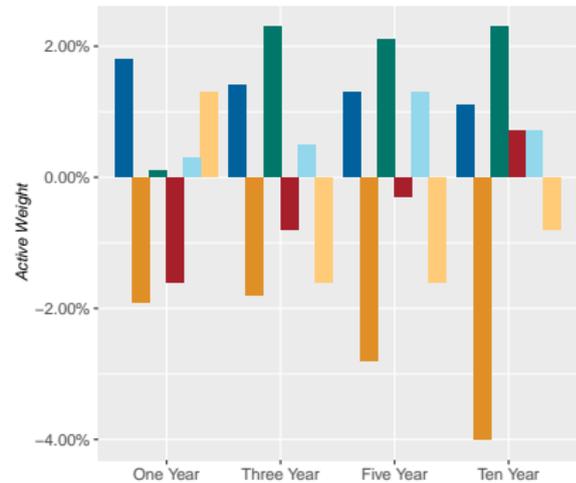
Allocation Effect by Asset Class

Relative to Strategic Asset Allocation Benchmark



Asset Class Average Active Weights

Relative to Strategic Asset Allocation Policy

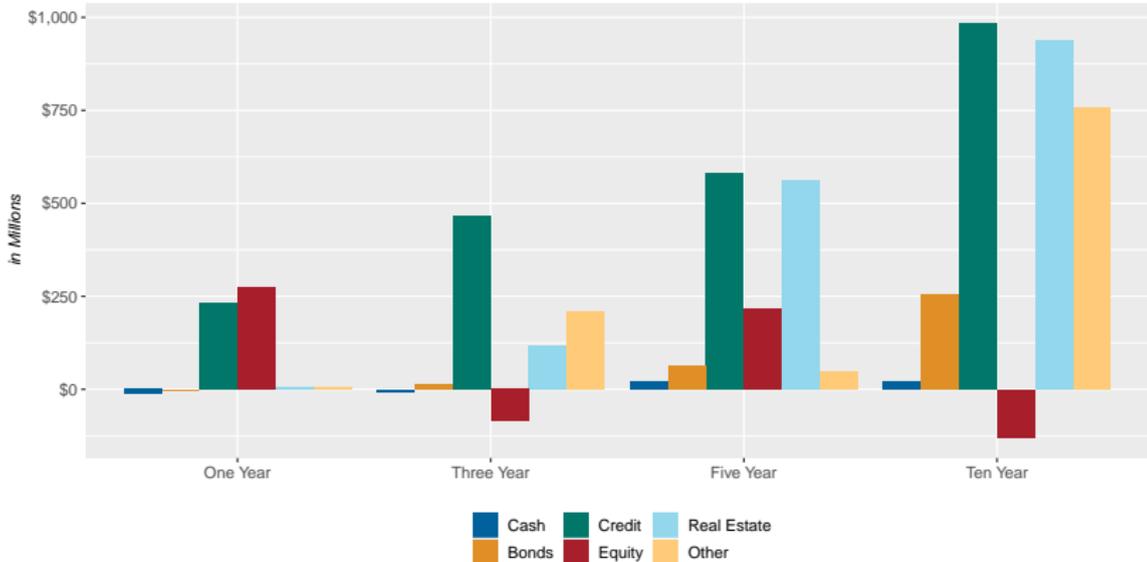


■ Cash ■ Credit ■ Real Estate
■ Bonds ■ Equity ■ Other

Excess Return by Asset Class for the period ended 6/30/2019

Excess Return by Asset Class

Relative to Strategic Asset Allocation Benchmark



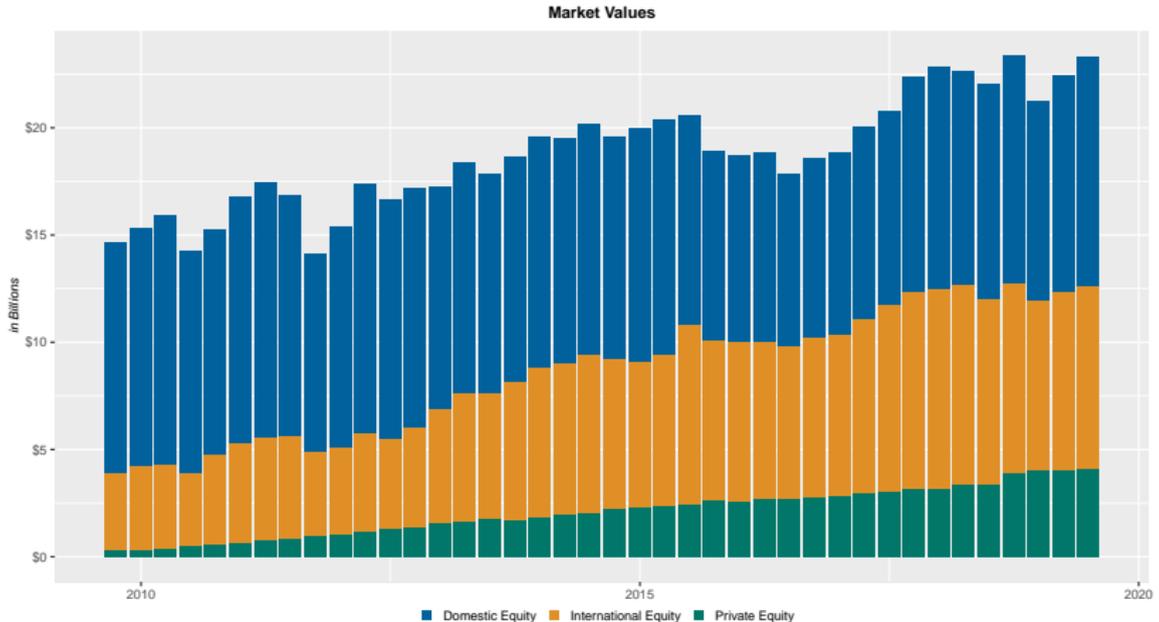
Equity

Total Equities for the period ended 6/30/2019

Returns for the period ended 6/30/2019

Composite	Quarter	One Year	Three Year	Five Year
Equity	3.54%	5.54%	11.78%	7.16%
Benchmark	4.94%	4.3%	12.09%	7%
Excess	-1.4%	1.23%	-0.31%	0.16%
Public Equity	3.34%	3.76%	11.06%	6.37%
Benchmark	3.45%	4.89%	11.95%	6.87%
Excess	-0.11%	-1.13%	-0.89%	-0.49%
US Equity	3.98%	7.3%	12.82%	9.69%
Benchmark	4.03%	8.96%	14.11%	10.48%
Excess	-0.05%	-1.65%	-1.3%	-0.79%
International Equity	2.58%	0.07%	9.21%	2.34%
Benchmark	2.74%	0.26%	9.37%	2.48%
Excess	-0.17%	-0.19%	-0.16%	-0.14%
Private Equity	4.89%	14.03%	14.97%	12.05%
Benchmark	13.2%	3.24%	12.65%	7.19%
Excess	-8.32%	10.79%	2.32%	4.86%

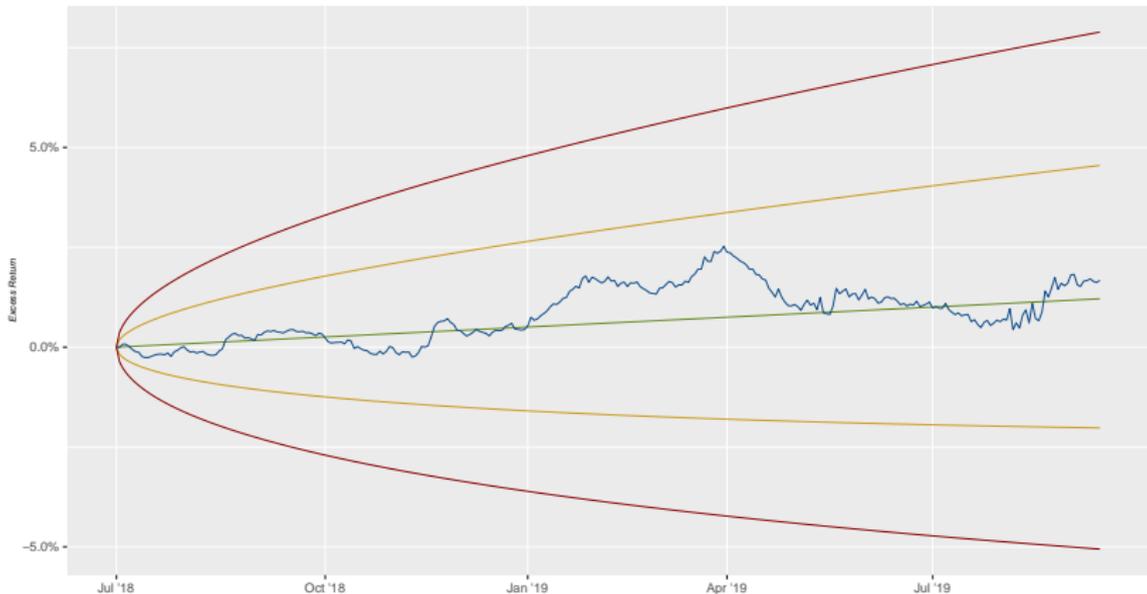
Total Equity Market Values for the period ended 6/30/2019



Total Equity Performance for the period ended 6/30/2019

Total Equity Portfolio Performance versus Expectations

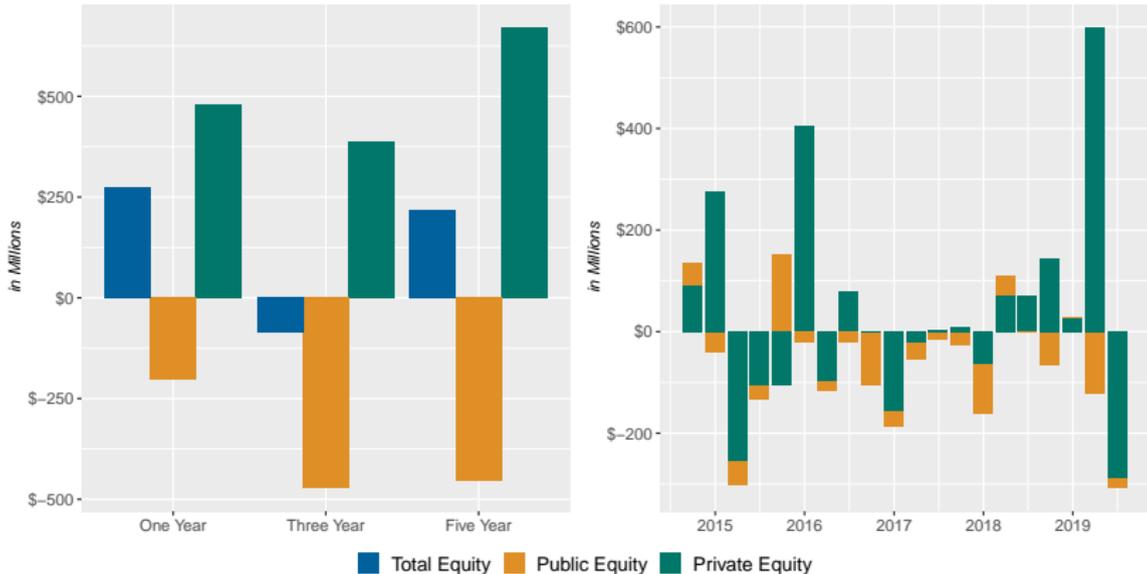
100 Basis Points Expected Excess Return with 300 Basis Points Tracking Error



Public Equity

Total Equity Returns and Dollar Value Add for the period ended 6/30/2019

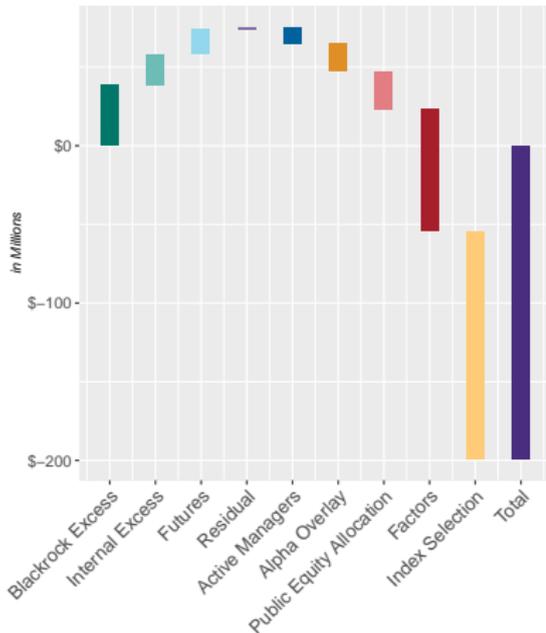
Total Equity Dollar Value Added



Public Equity “Levers” for the period ended 6/30/2019

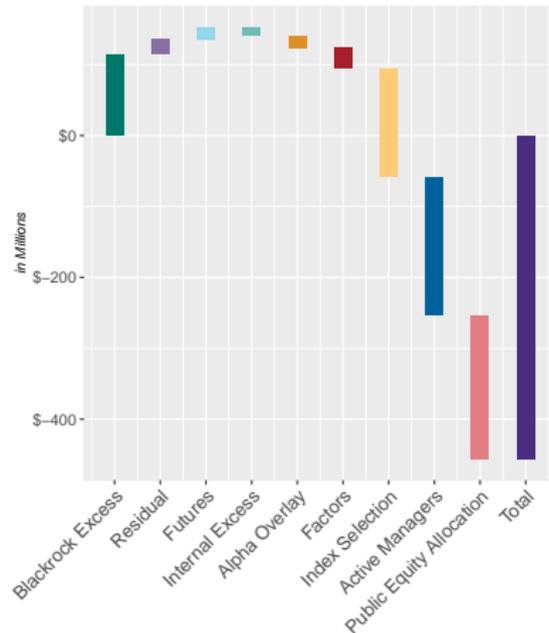
Public Equity Dollar Value Add

One Year



Public Equity Dollar Value Add

Trailing 5 Years



Private Equity

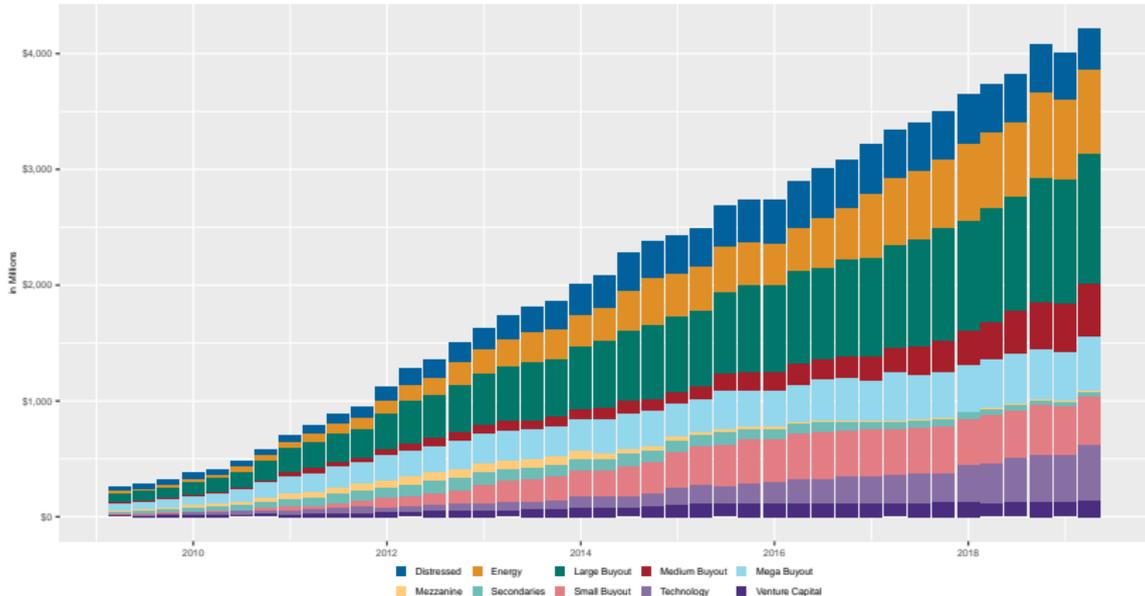
Private Equity Performance Overview & Allocation for the period ended 3/31/2019

Private Equity Internal Rate of Return

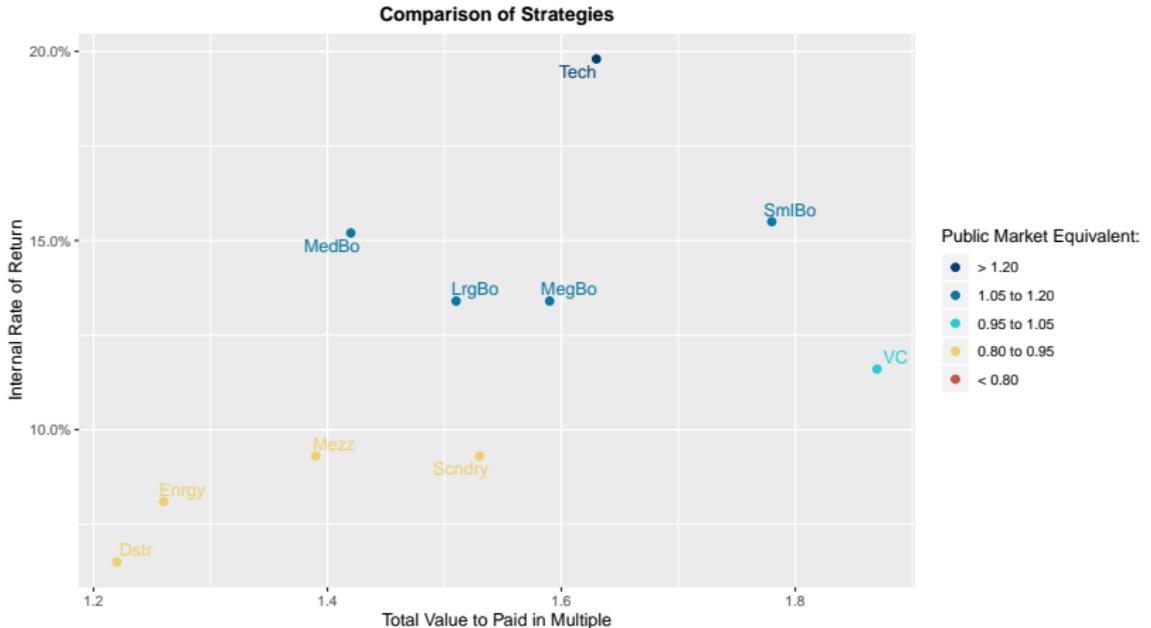
Category	Quarter	1 Year	3 Year	5 Year	Inception
Private Equity	4.9%	14%	15%	12.1%	12.5%
Benchmark	13.2%	3.2%	12.6%	7.2%	11.2%
Excess	-8.3%	10.8%	2.3%	4.9%	1.3%
Mega Buyout	8.4%	15.3%	18.7%	14.6%	13.4%
Small Buyout	3.4%	30.1%	21.6%	19.5%	15.5%
Distressed	-2.1%	-4.7%	2.6%	2.8%	6.5%
Technology	10.4%	30.9%	22.3%	22.2%	19.8%
Medium Buyout	2.8%	17%	16.4%	18.8%	15.2%
Energy	5.5%	7.3%	12.9%	5.1%	8.1%
Venture Capital	8.6%	17.2%	14.4%	13.7%	11.6%
Secondaries	4.3%	2.4%	6.8%	6.2%	9.3%
Large Buyout	4.2%	12.9%	15.3%	12.3%	13.4%
Mezzanine	-3.2%	-7.8%	6.6%	8%	9.3%

Private Equity Decomposition for the period ended 3/31/2019

Net Asset Value by Strategy



Private Equity Performance by Category for the period ended 3/31/2019



Real Estate

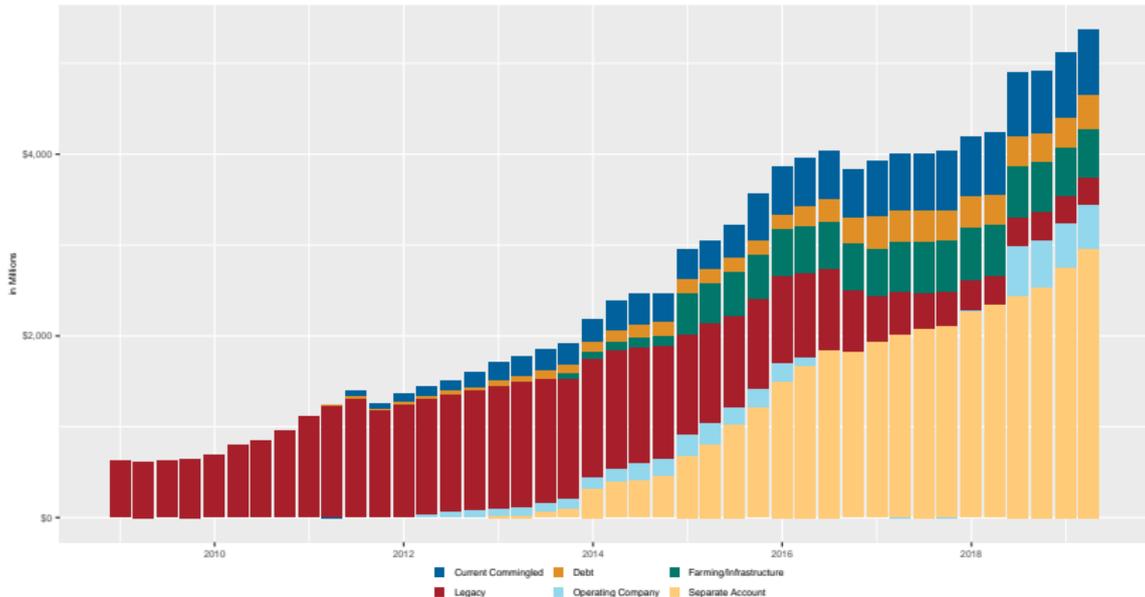
Real Estate Performance Overview & Allocation for the period ended 3/31/2019

Real Estate Internal Rate of Return

Category	Quarter	1 Year	3 Year	5 Year	Inception
Real Estate	1.92%	7.6%	8.9%	10.5%	8.8%
Benchmark	1.2%	6.7%	6.9%	8.7%	7.1%
Excess	0.72%	0.9%	2%	1.8%	1.7%
Separate Account	1.39%	9.2%	10.6%	12.4%	13.4%
Operating Company	4.13%	5%	4.8%	15.7%	17.1%
Farming/Infrastructure	2.51%	6.3%	9.3%	7.9%	7.8%
Legacy	1.02%	3.1%	2.5%	7.8%	5.8%
Current Commingled	2.04%	7.8%	8.6%	10.6%	11.2%
Debt	2.89%	4.8%	10.3%	9.5%	11.7%

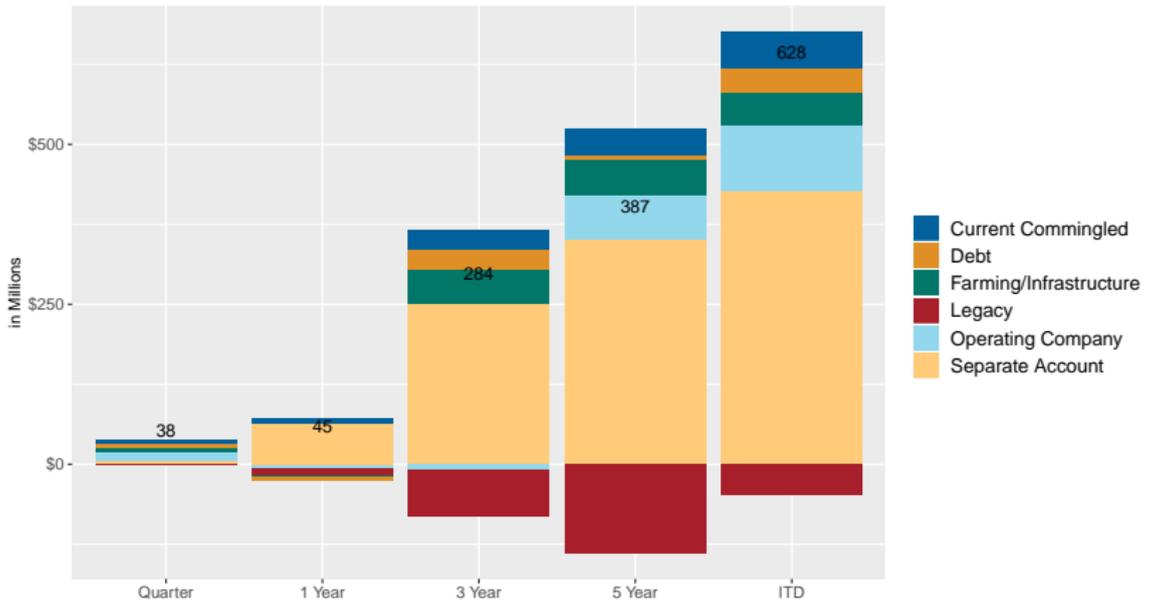
Real Estate Net Asset Value by Strategy for the period ended 3/31/2019

Net Asset Value by Strategy

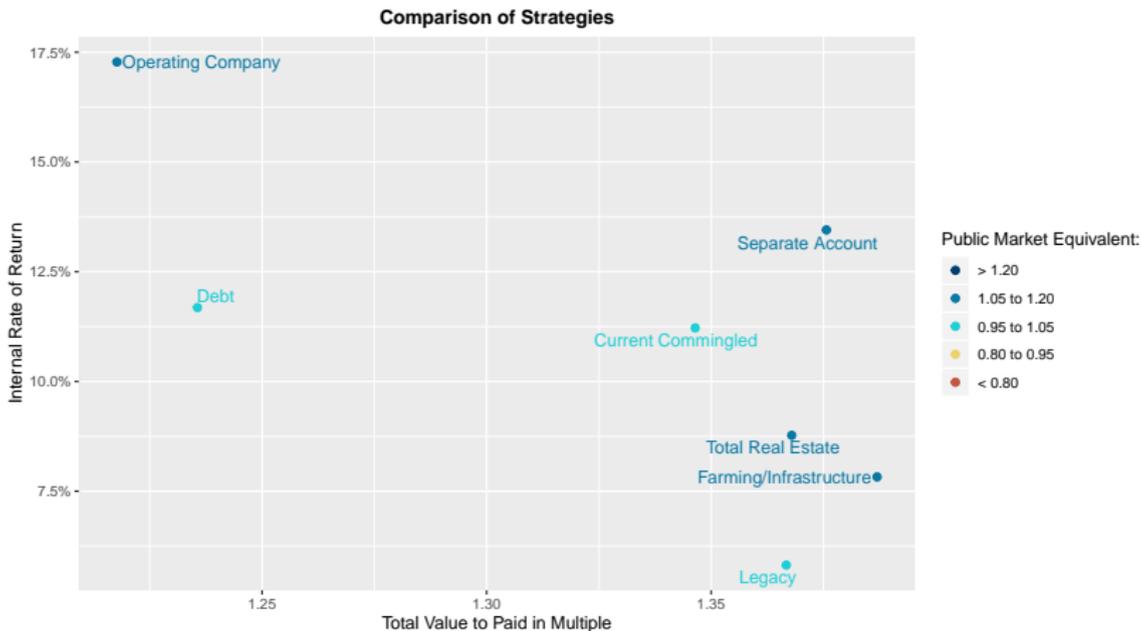


Real Estate Dollar Value Add for the period ended 3/31/2019

Real Estate Dollar Value Add



Real Estate Performance Summary for the period ended 3/31/2019



Credit

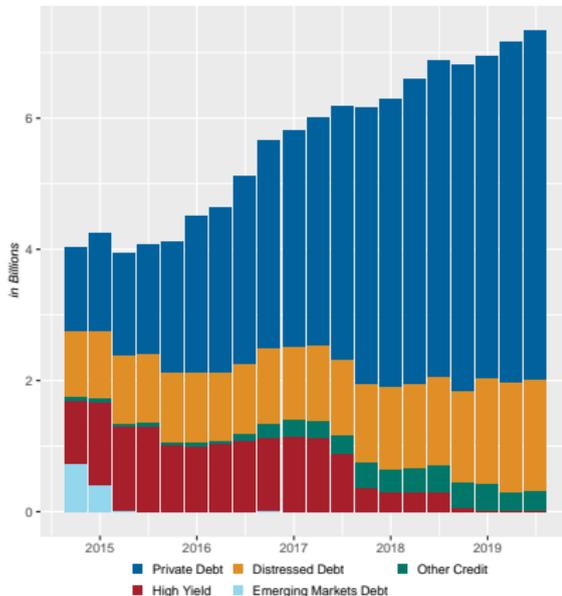
Total Credit for the period ended 6/30/2019

Credit Annualized Time-Weighted Returns

	Quarter	One Year	Three Year	Five Year
Total Credit	2.27	9.05	10.15	7.22
Blended Benchmark	4.64	5.54	8.08	4.14
Total Credit Excess	-2.37	3.52	2.07	3.08
Private Debt	2.12	9.77	10.90	10.41
S&P/LSTA Leveraged Loan + 250 Basis Points	4.63	5.53	7.96	6.63
Private Debt Excess	-2.51	4.24	2.94	3.78
Distressed Debt	2.06	8.63	10.62	6.46
Fixed 8% Return/LSTA Blend	4.65	5.43	7.08	7.43
Distressed Debt Excess	-2.59	3.20	3.54	-0.97
Other Credit	8.44	10.66	8.29	6.46
Fixed 8% Return/LSTA Blend	4.95	5.92	7.12	7.43
Other Credit Excess	3.49	4.74	1.17	-0.97

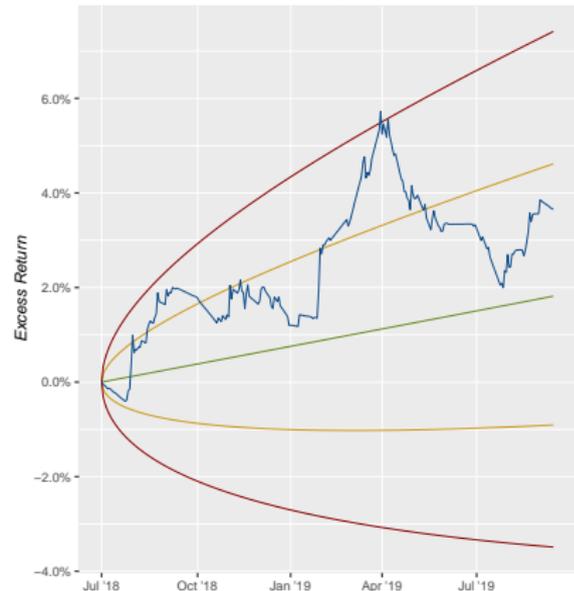
Credit Market Values and Performance for the period ended 6/30/2019

Total Credit Market Values



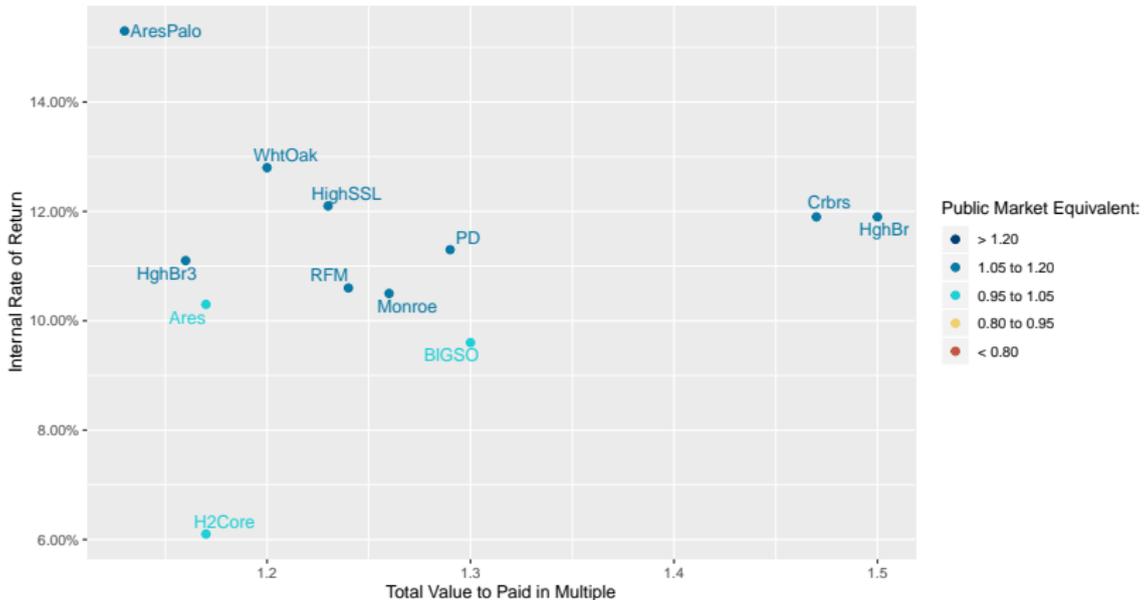
Total Credit Portfolio Performance versus Expectations

150 Basis Points Expected Excess Return with 250 Basis Points Tracking Error

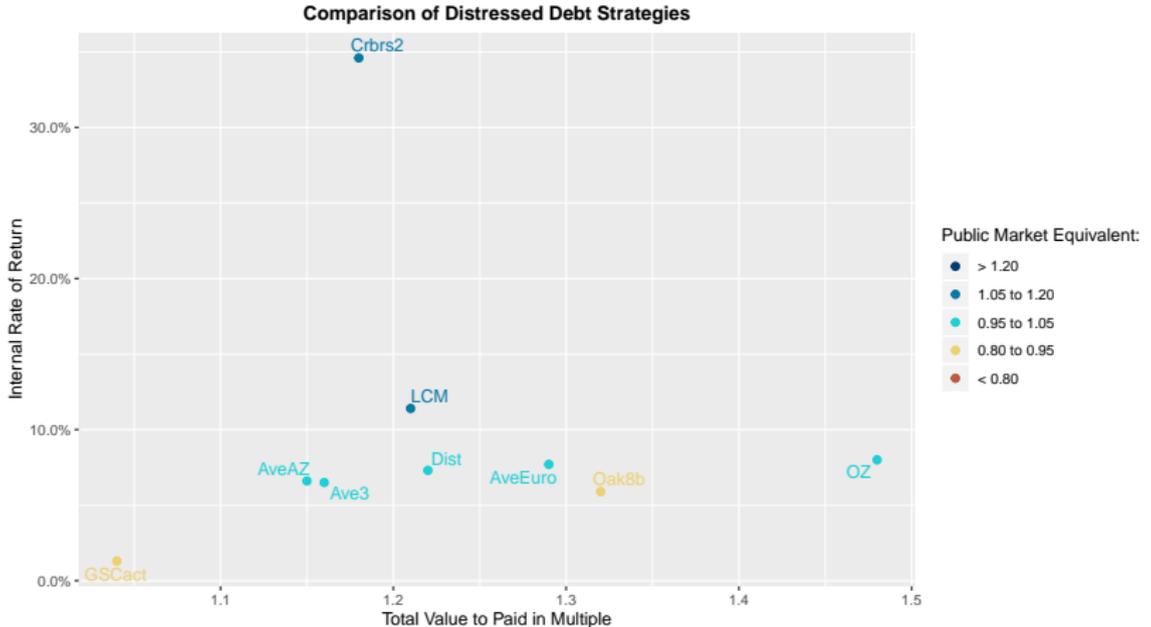


Private Debt: Total Value to Paid in Multiple & Public Market Equivalent for the period ended 3/31/2019

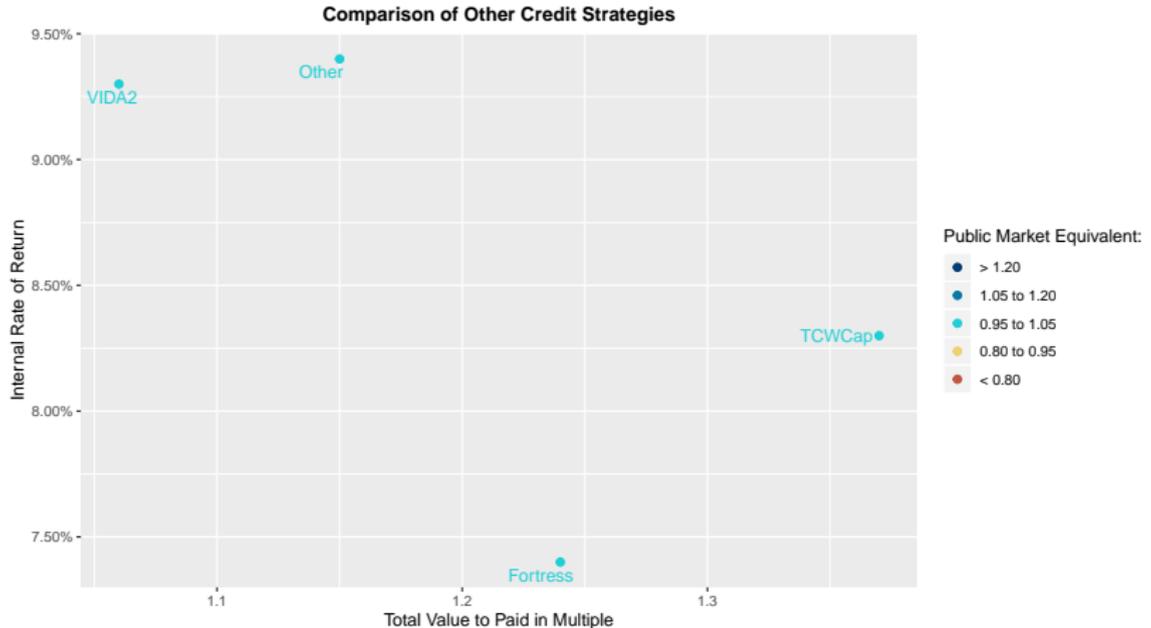
Comparison of Private Debt Strategies



Distressed Debt: Total Value to Paid in Multiple & Public Market Equivalent for the period ended 3/31/2019



Other Credit: Total Value to Paid in Multiple & Public Market Equivalent for the period ended 3/31/2019



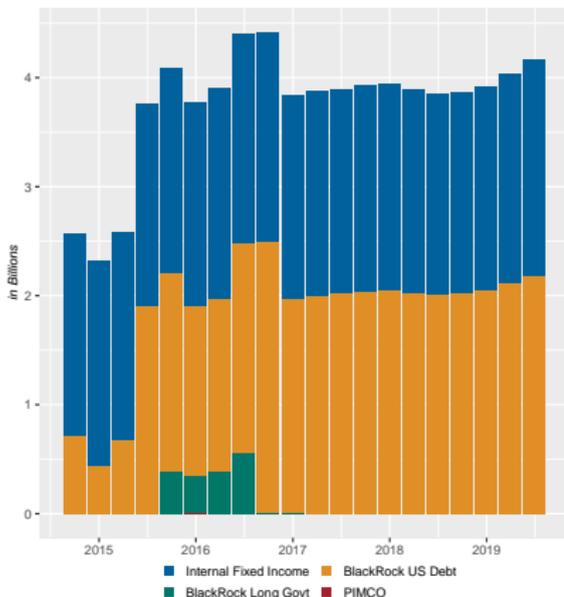
Core Fixed Income for the period ended 6/30/2019

Annualized Time-Weighted Returns

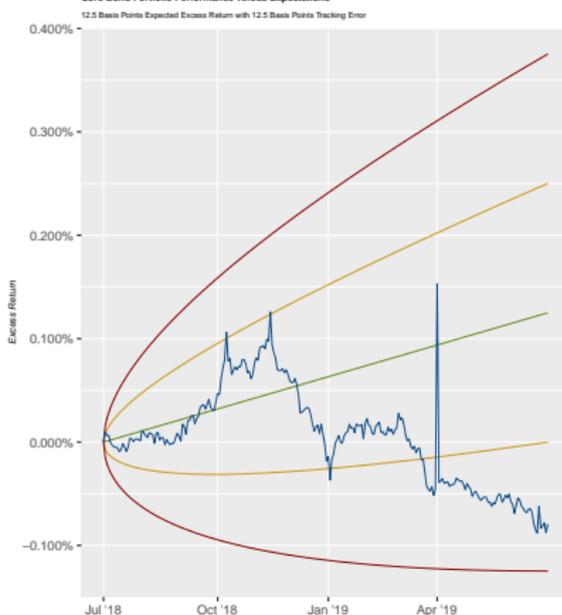
	FYTD	1 Year	3 Year	5 Year
Core Bond Composite	7.79	7.79	2.40	3.23
Barclay's Aggregate	7.87	7.87	2.31	2.95
Core Composite Excess	-0.08	-0.08	0.09	0.28
Internal Fixed Income	7.59	7.59	2.35	3.08
Barclay's Aggregate	7.87	7.87	2.31	2.95
Internal Fixed Income Excess	-0.28	-0.28	0.03	0.13
BlackRock US Debt Fund	7.96	7.96	2.40	3.05
Barclay's Aggregate	7.87	7.87	2.31	2.95
BlackRock Excess	0.09	0.09	0.09	0.10

Core Fixed Income Decomposition for the period ended 6/30/2019

Core Bonds Market Values

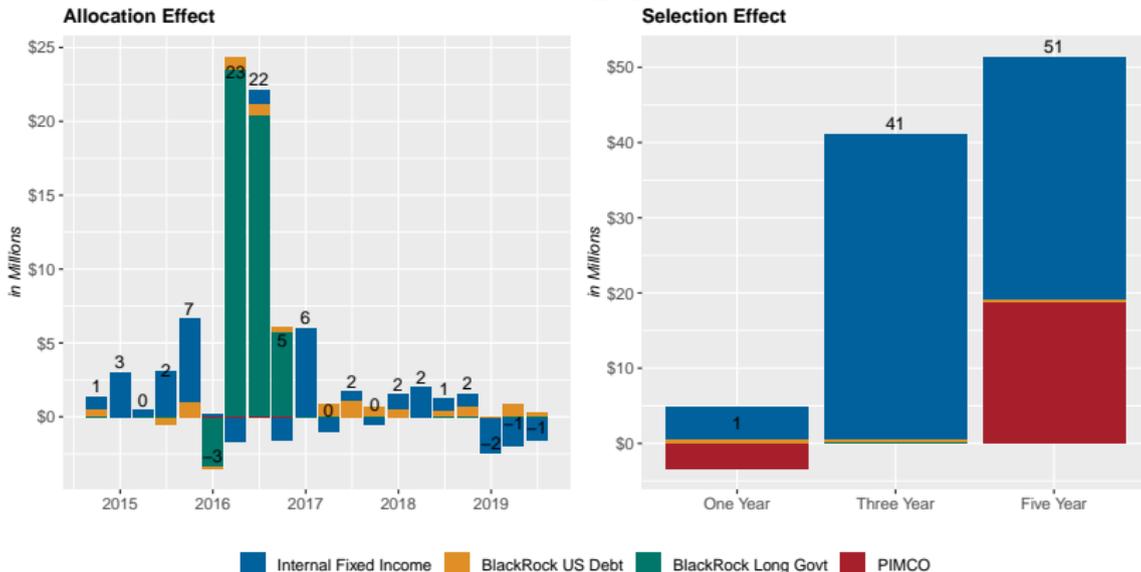


Core Bond Portfolio Performance versus Expectations



Core Fixed Income Dollar Value Added for the period ended 6/30/2019

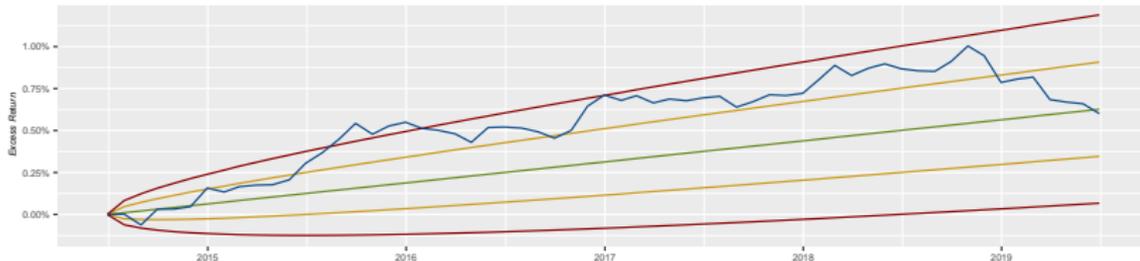
**Core Fixed Income Dollar Value Added
 Relative to Barclay's Aggregate Benchmark**



Core Fixed Income Performance for the period ended 6/30/2019

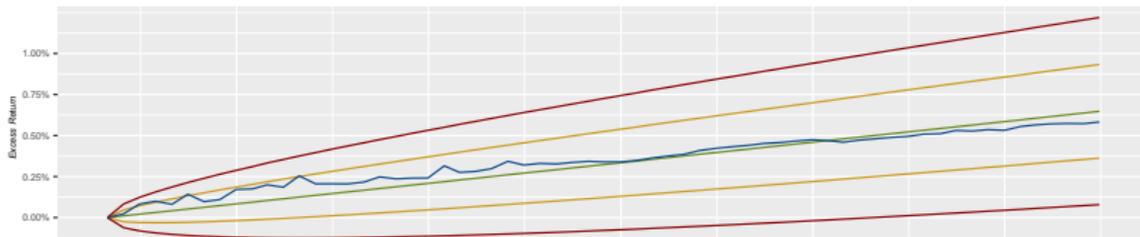
Internal Fixed Income Portfolio Performance versus Expectations

12.5 Basis Points Expected Excess Return with 12.5 Basis Points Expected Tracking Error



Blackrock US Debt Portfolio Performance versus Expectations

12.5 Basis Points Expected Excess Return with 12.5 Basis Points Expected Tracking Error



MSCI Risk Report

Total Portfolio Value-at-Risk at 6/30/2019

TOTAL PORTFOLIO VALUE-AT-RISK (VAR)

As of June 30th, 2019 Total VaR for ASRS Portfolio was 14.22%, indicating that there is a 5% chance that portfolio could lose ~\$5.56B in a given year. Note that a 5% event is expected to occur every 20 years

