CIO Board Report

Arizona State Retirement System

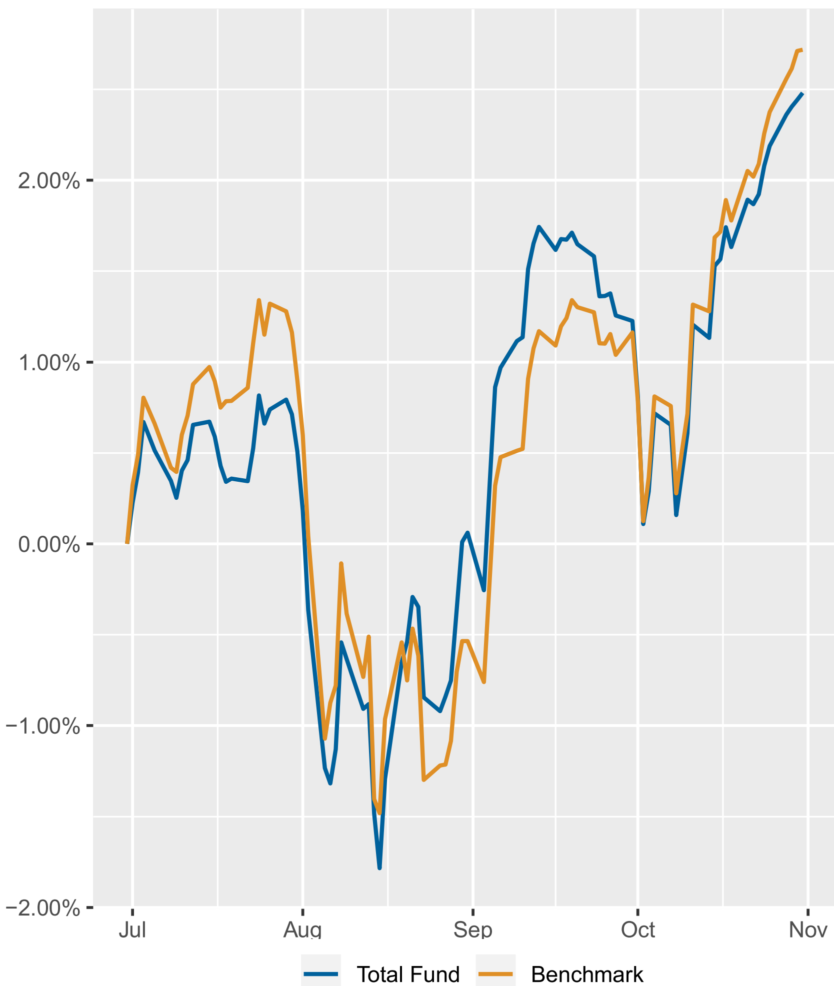
November 15, 2019

Fiscal Year to Date

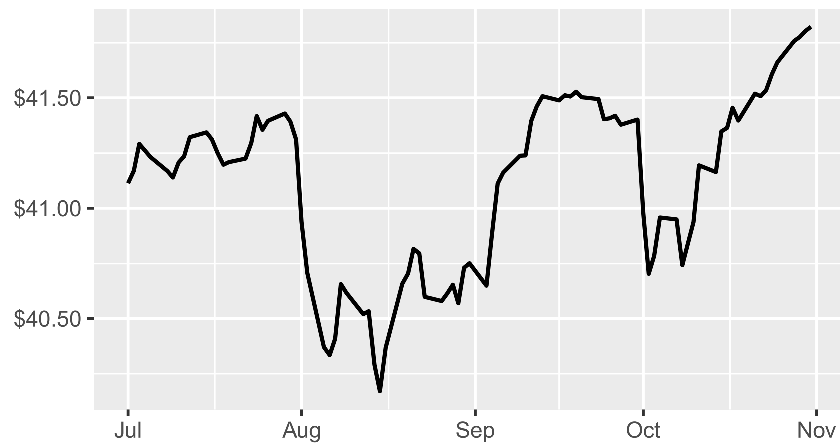
Summary

Total Fund Fiscal Year to Date through 10/30/2019

Return Fiscal Year to Date

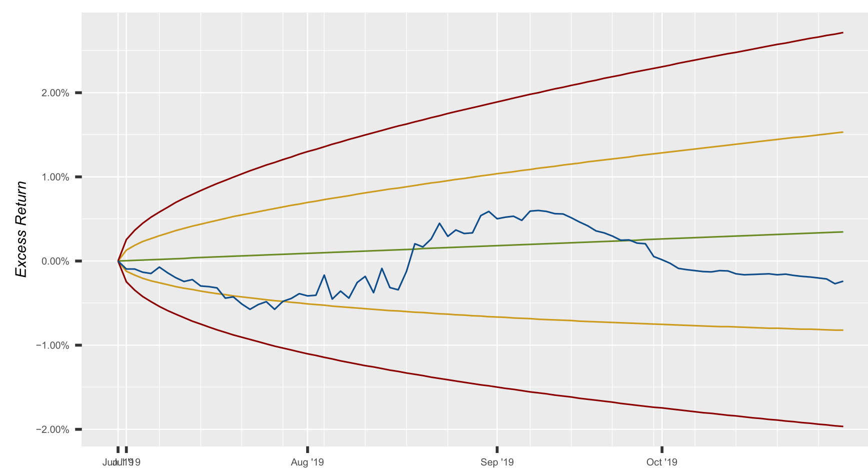


Total Fund Market Value (Billions)



Total Fund Performance versus Expectations

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



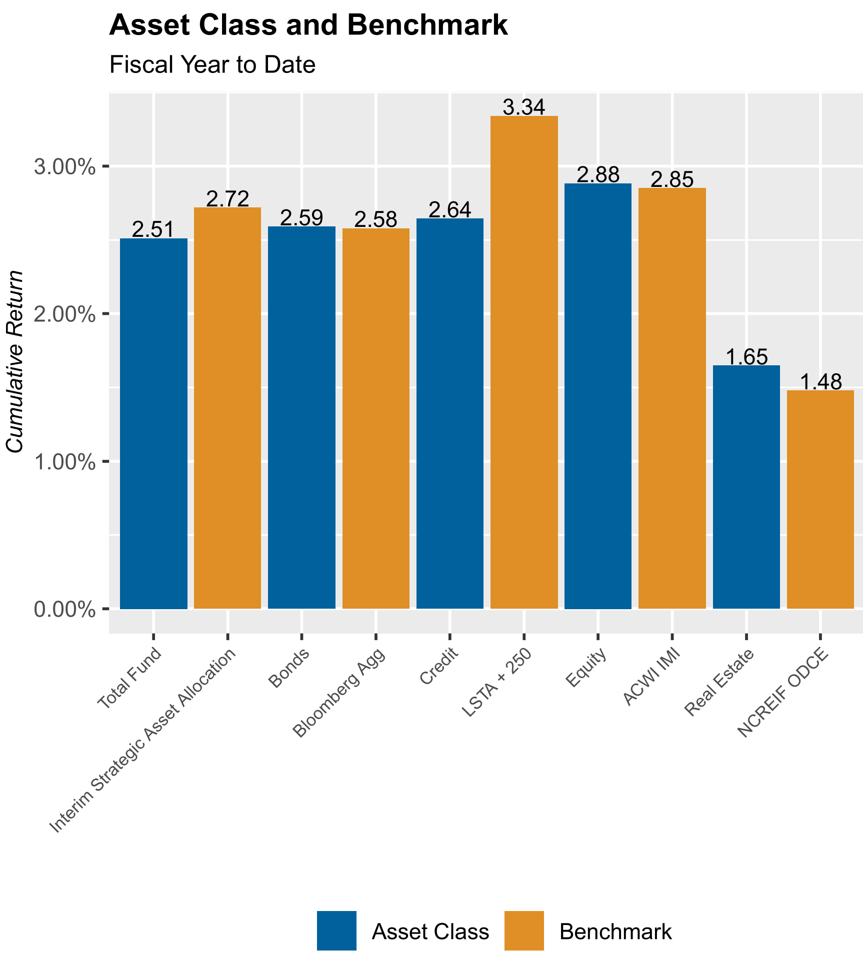
Total Fund Current Positioning through 10/30/2019

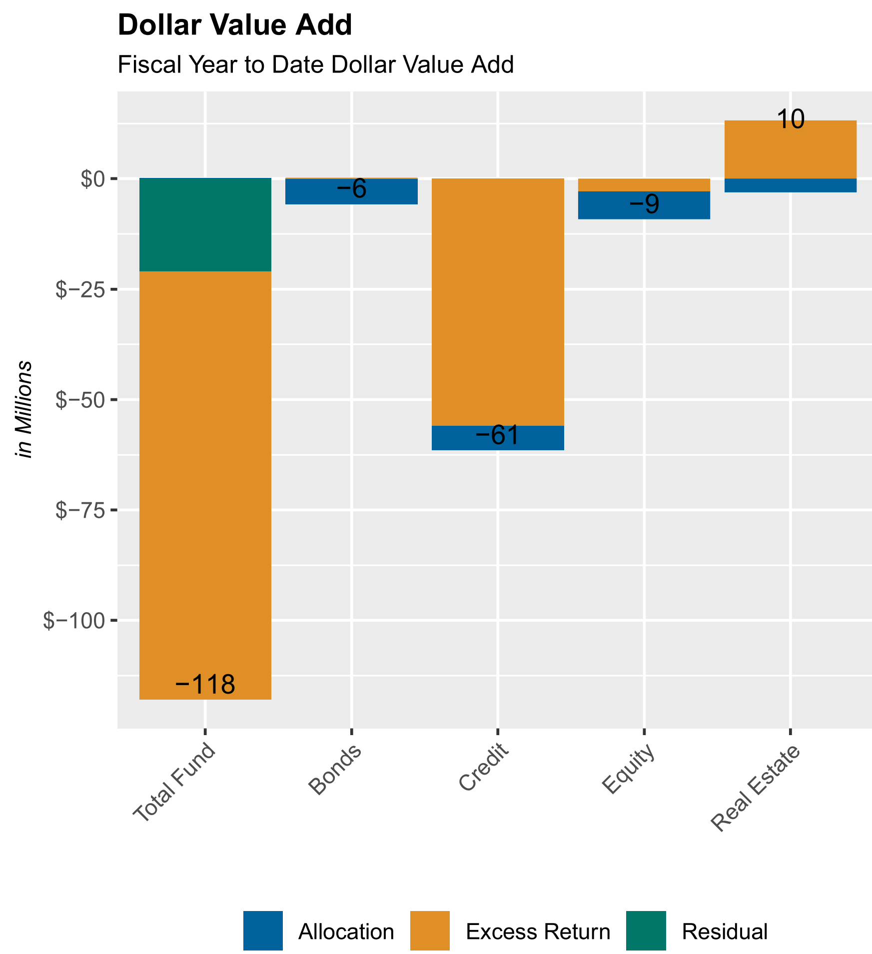
Total Fund Positioning

	NAV w/ Notional ($ mm)	NAV Exposure (%)	Target (%)	Active Weight (%)	Active Weight ($ mm)
Cash	870.6	2.1	0.0	2.1	870.6
Bonds	4265.6	10.2	10.8	-0.6	-251.2
Credit	8135.5	19.5	19.6	-0.1	-61.5
Equity	22224.7	53.1	54.3	-1.2	-484.4
Real Estate	6345.9	15.2	15.3	-0.1	-52.8
Other	0.4	0.0	0.0	0.0	0.4
Total Fund	41821.6	100.0	100.0	0.0	0.0

Total Fund Attribution

Fiscal Year to Date Total Fund Returns & Dollar Value Add through 10/30/2019

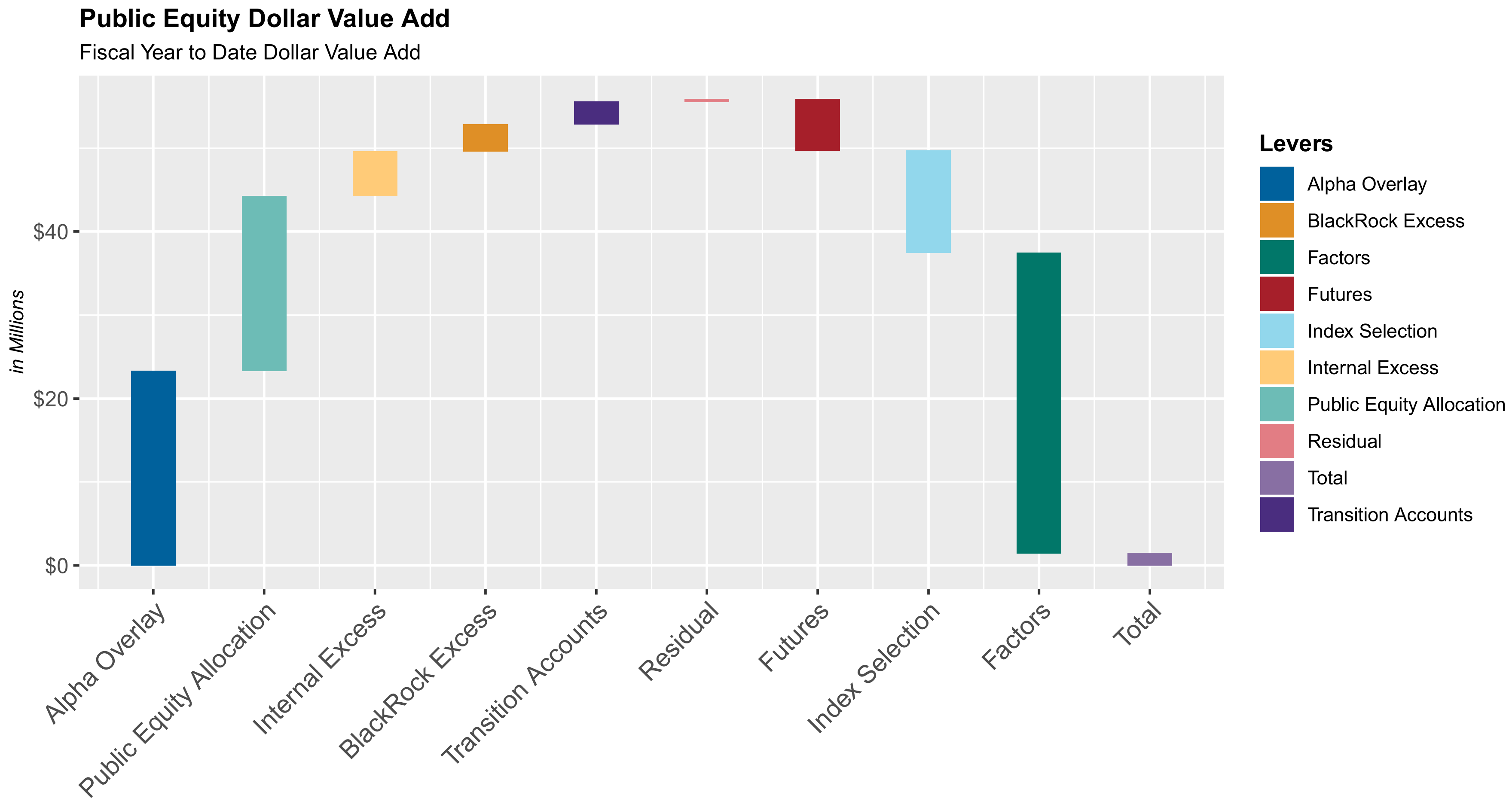




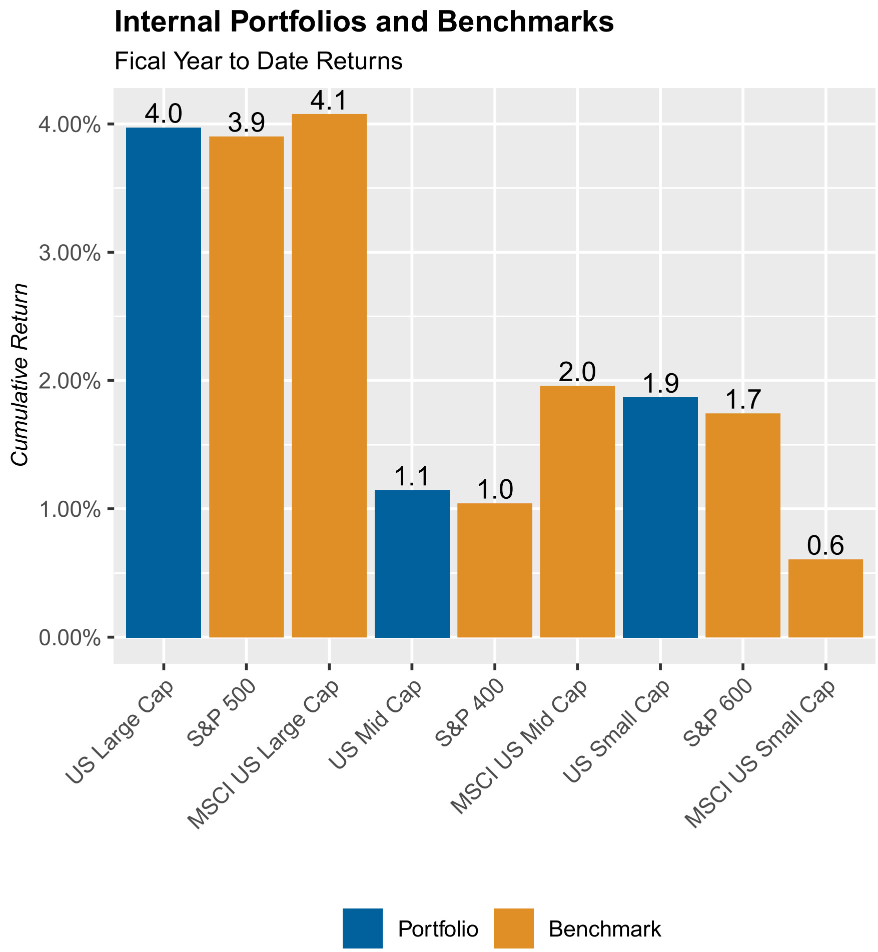
Fiscal Year to Date Allocation Effect and Excess Return by Asset Class through 10/30/2019

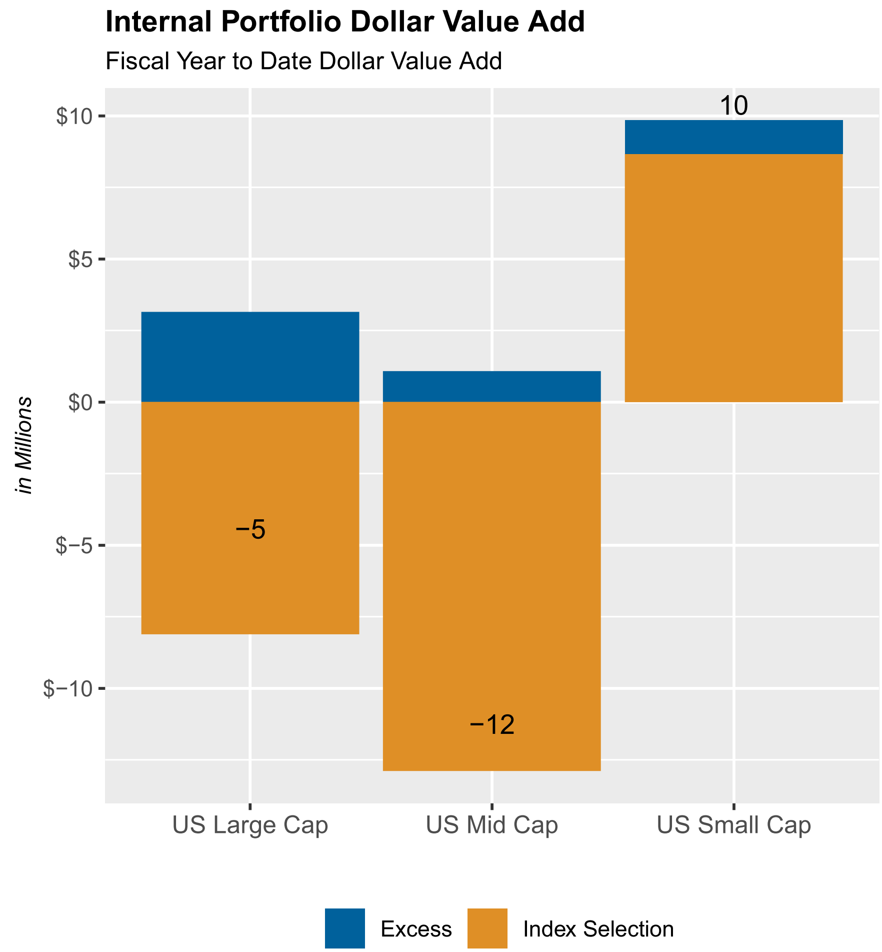
Decomposition of Equity Excess Return

Public Equity Levers through 10/30/2019

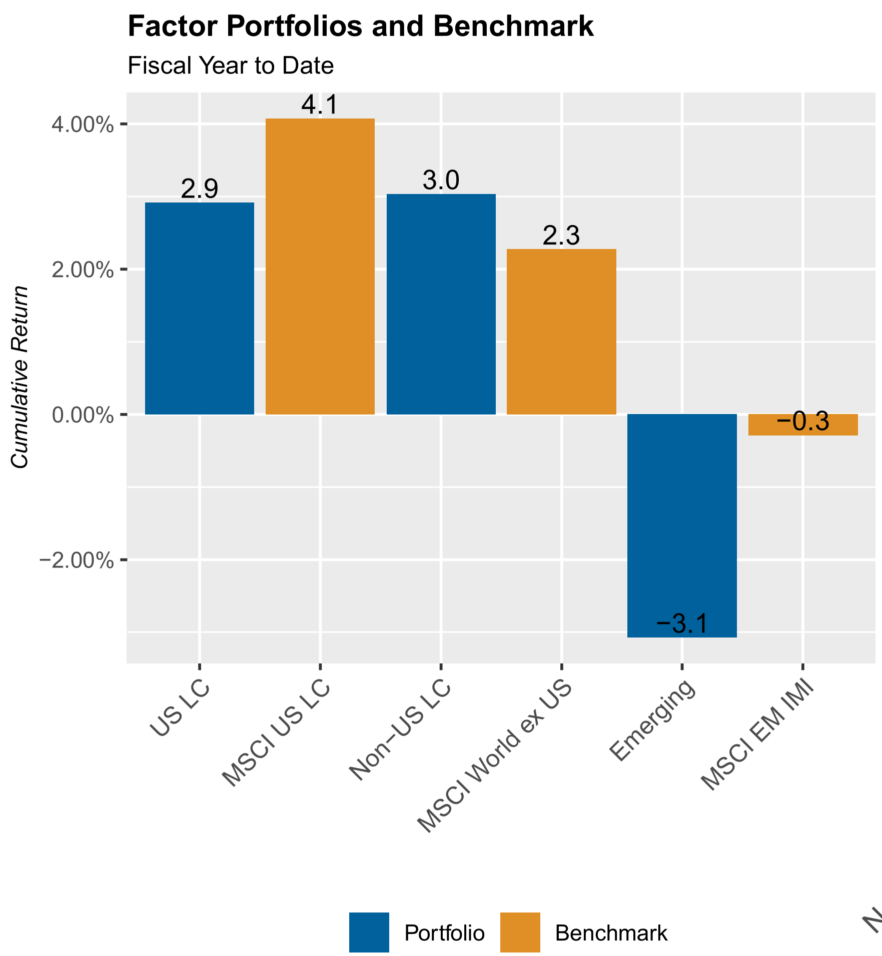


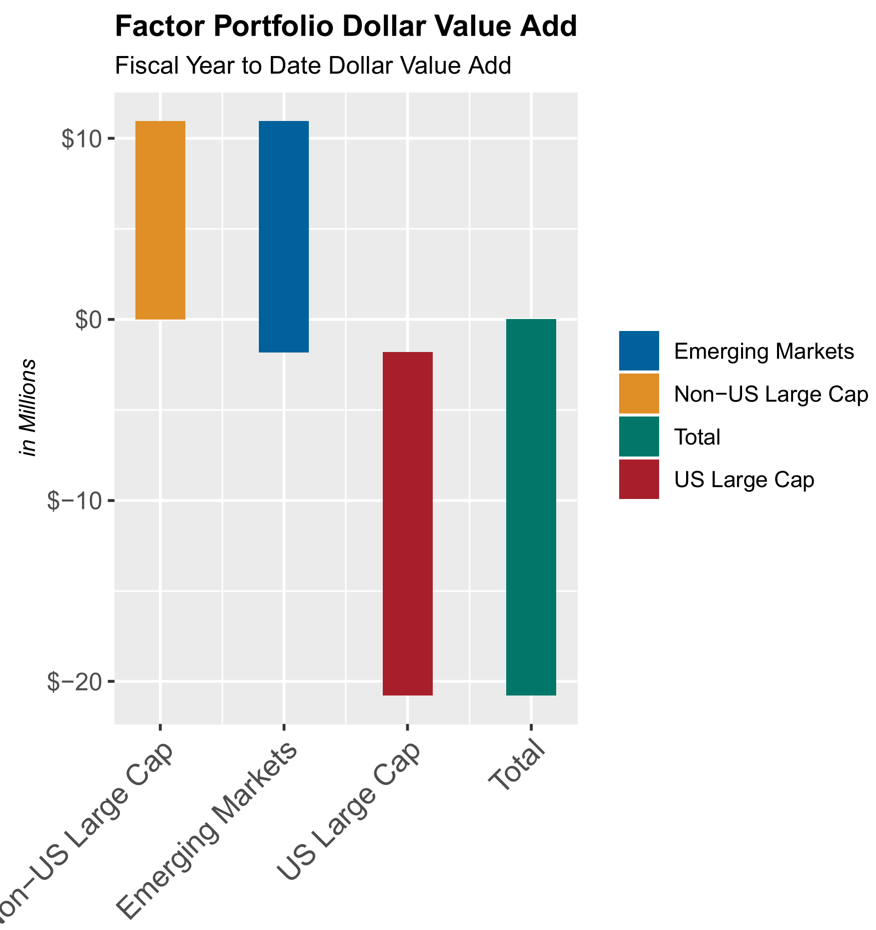
Internally Managed Portfolios through 10/30/2019



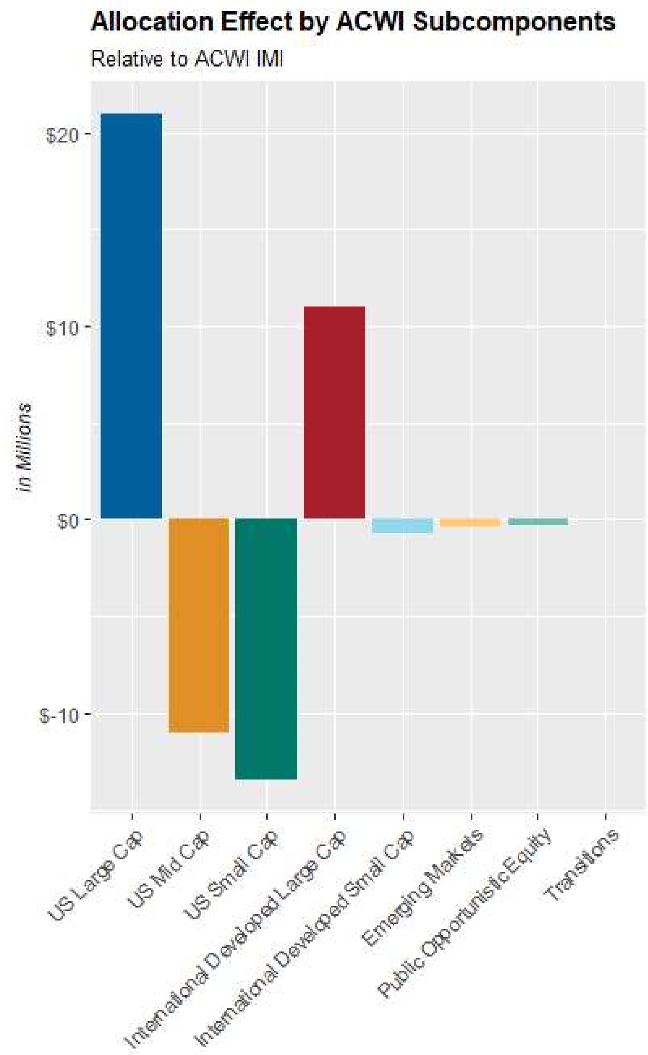


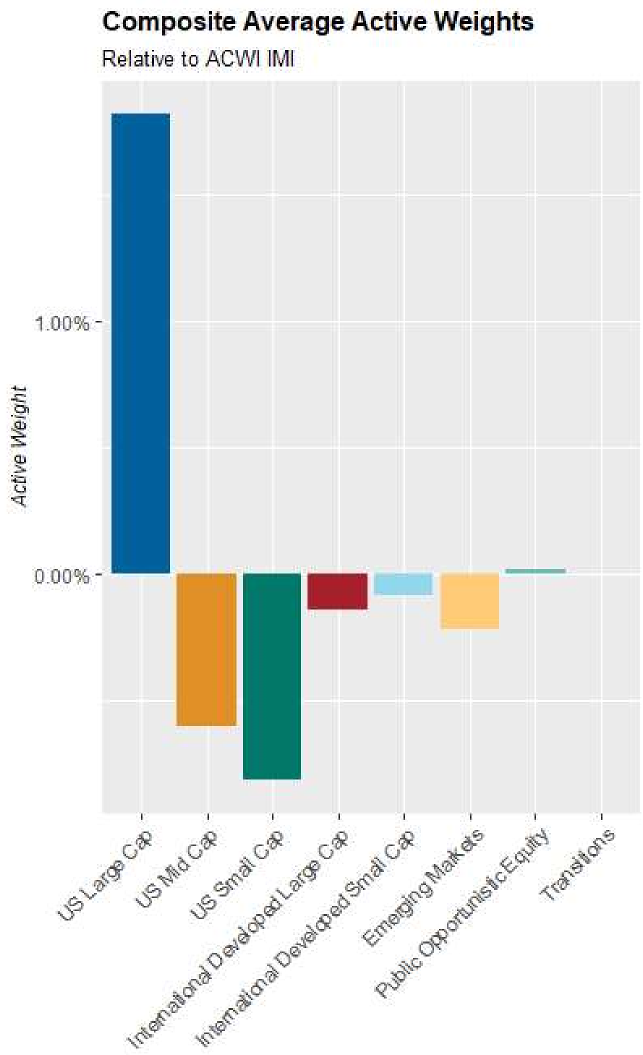
Factor Portfolios through 10/30/2019





Public Equity Allocation through 10/30/2019

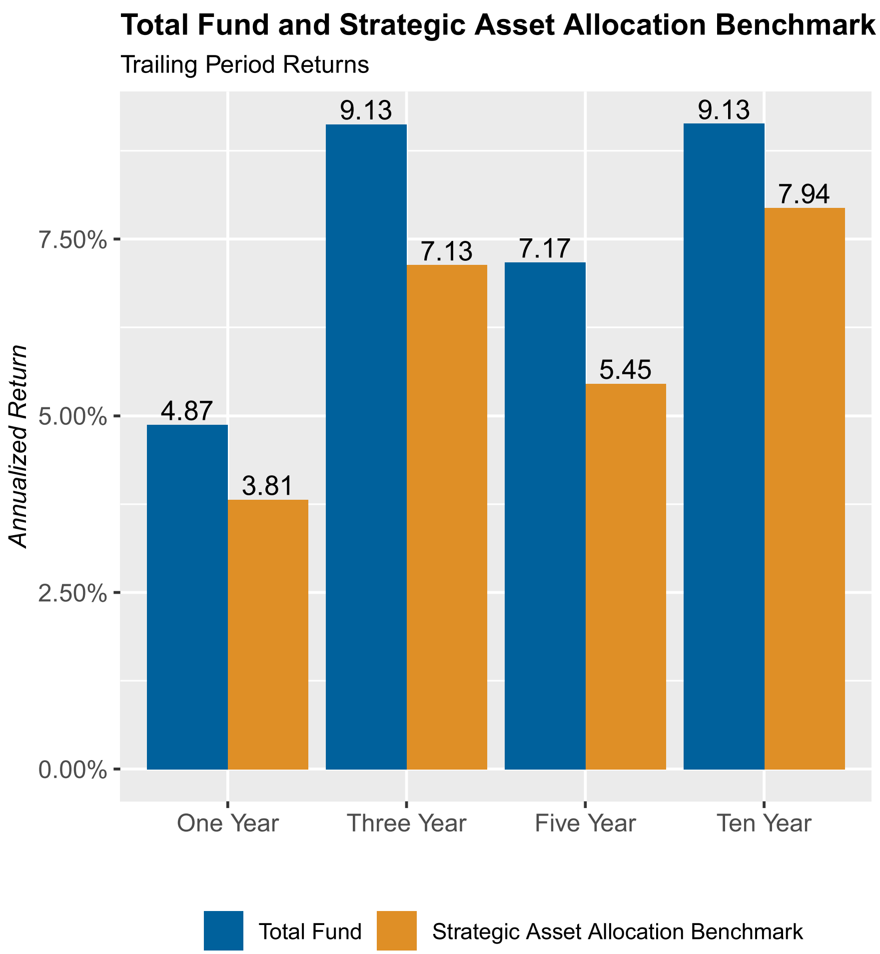


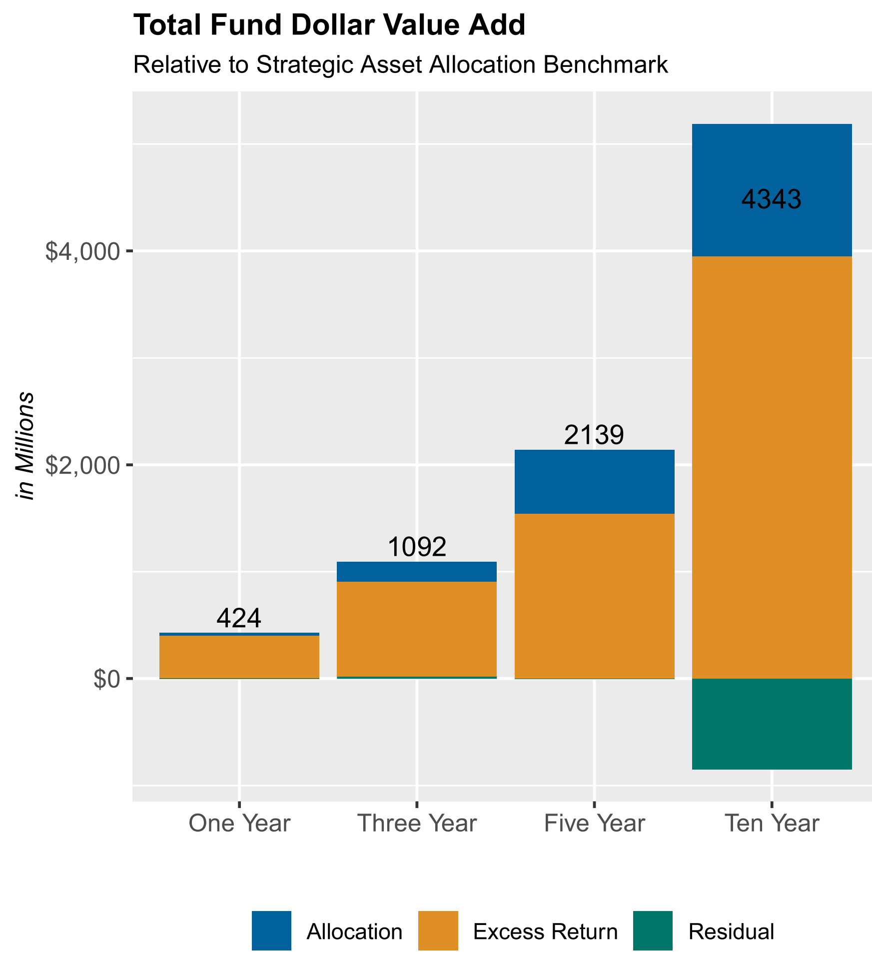


Quarterly Performance

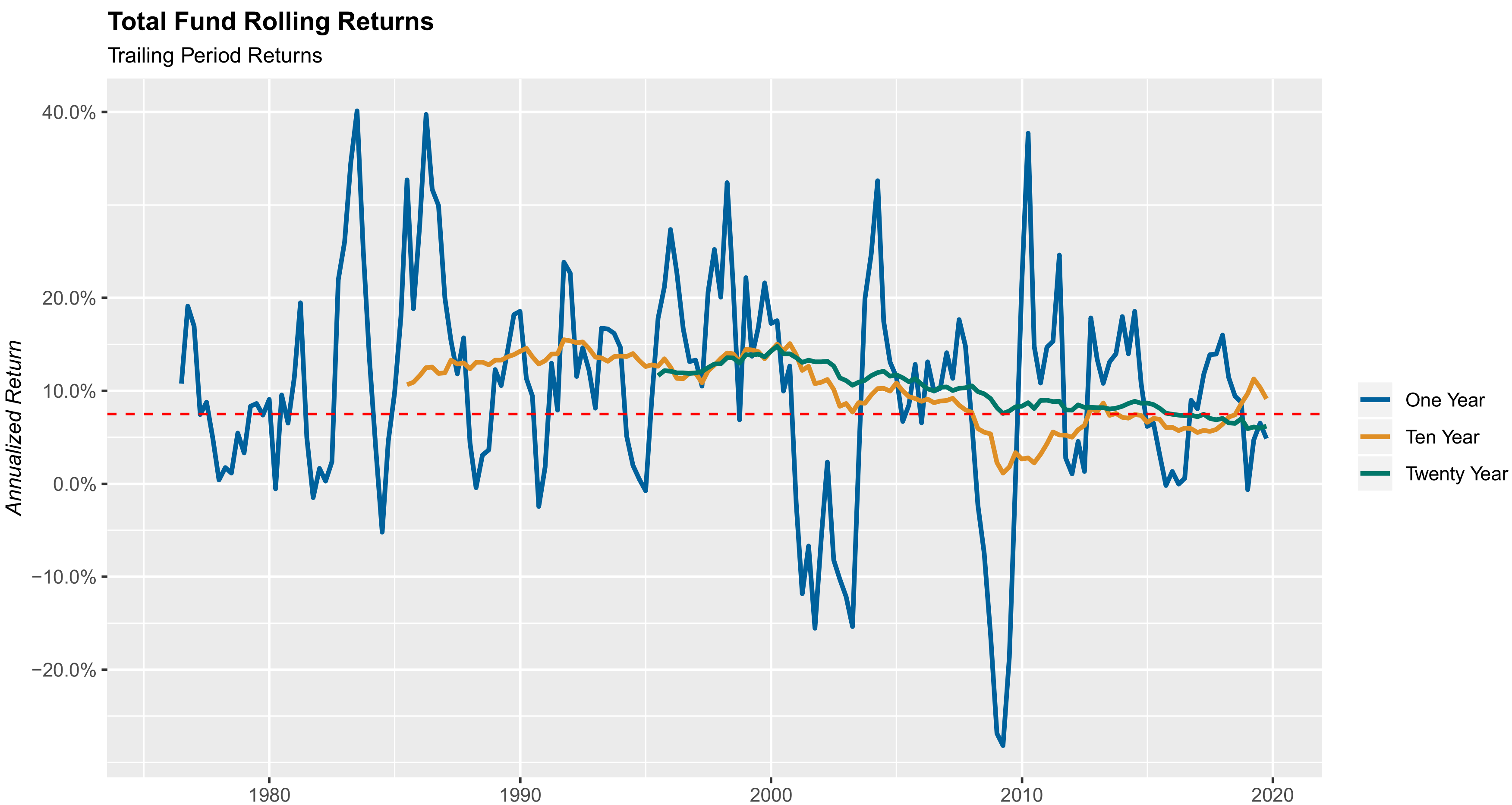
Total Fund

Trailing Returns & Dollar Value Add for the period ended 9/30/2019 - Preliminary

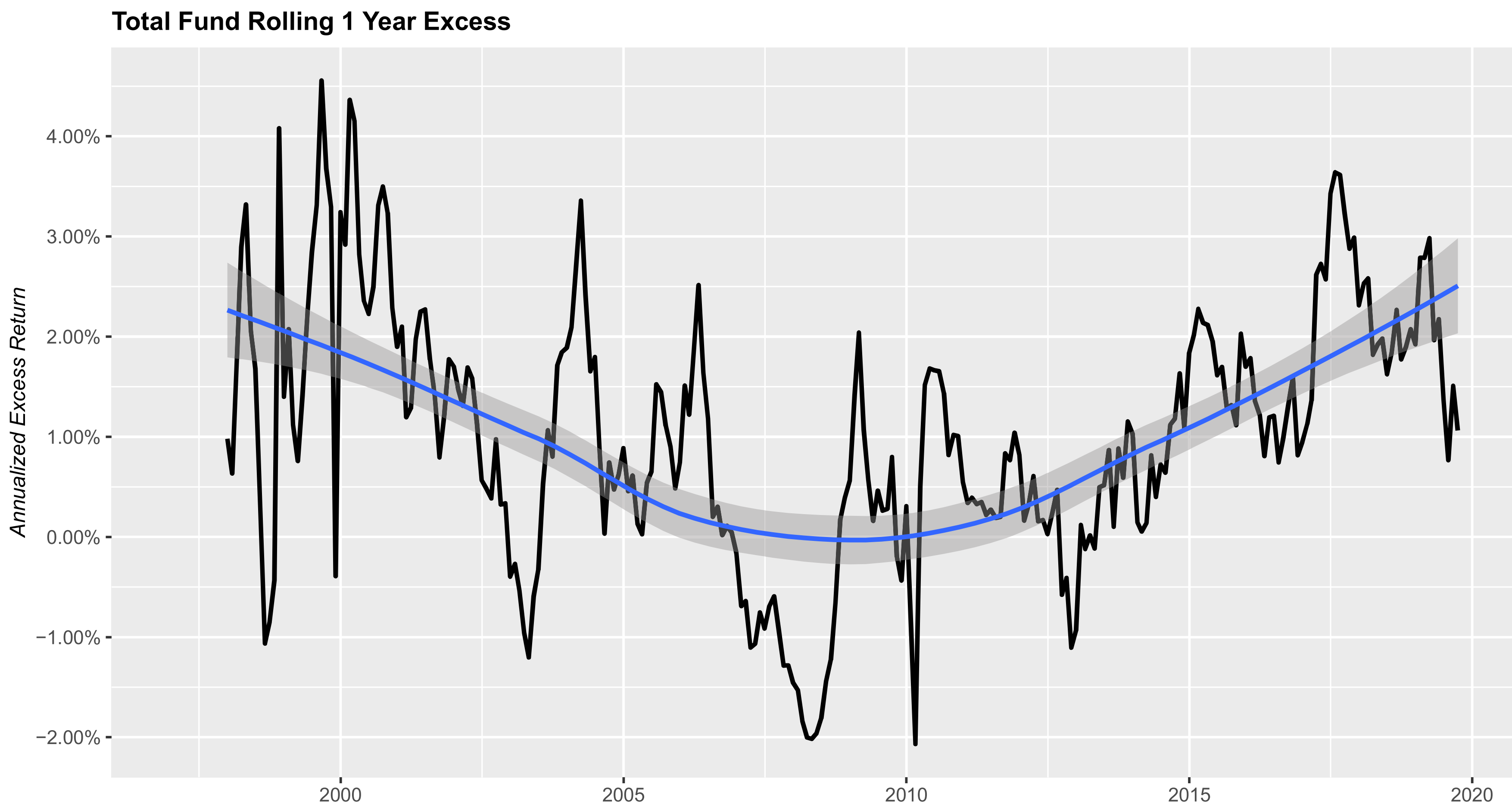




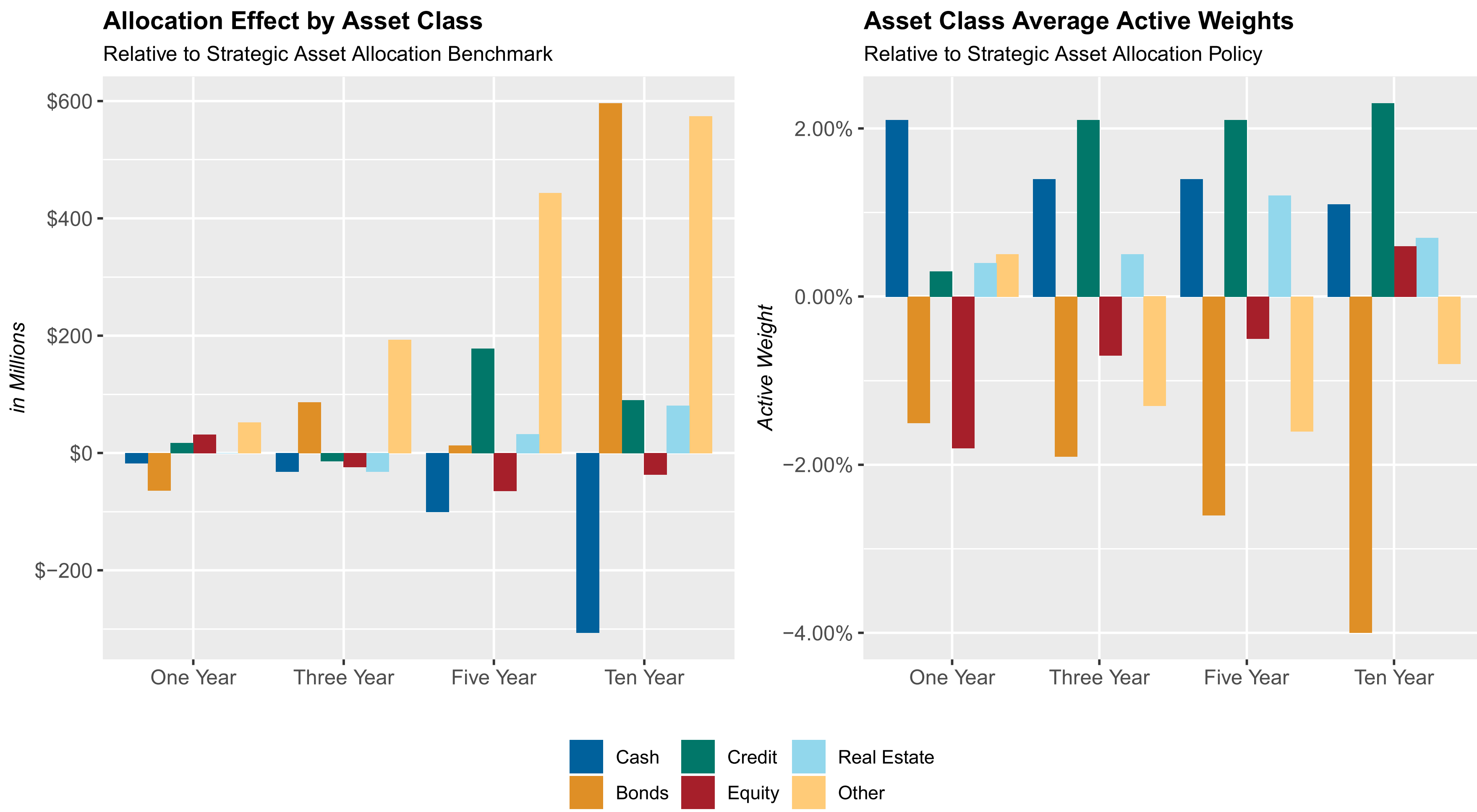
Total Fund Returns for the period ended 9/30/2019 - Preliminary



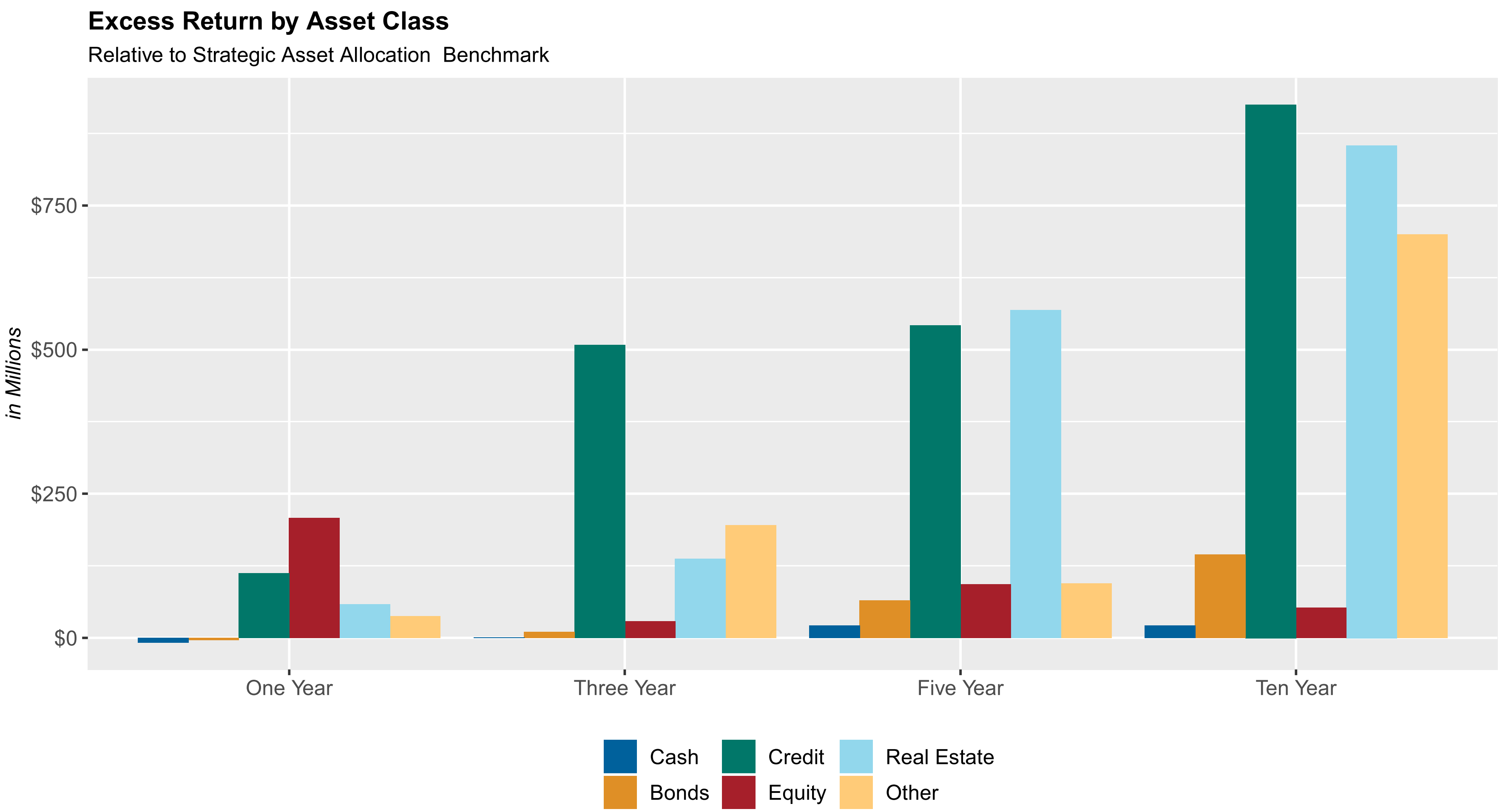
Total Fund Rolling 1 Year Excess Return for the period ended 9/30/2019 - Preliminary



Allocation Effect for the period ended 9/30/2019 - Preliminary



Excess Return by Asset Class for the period ended 9/30/2019 - Preliminary



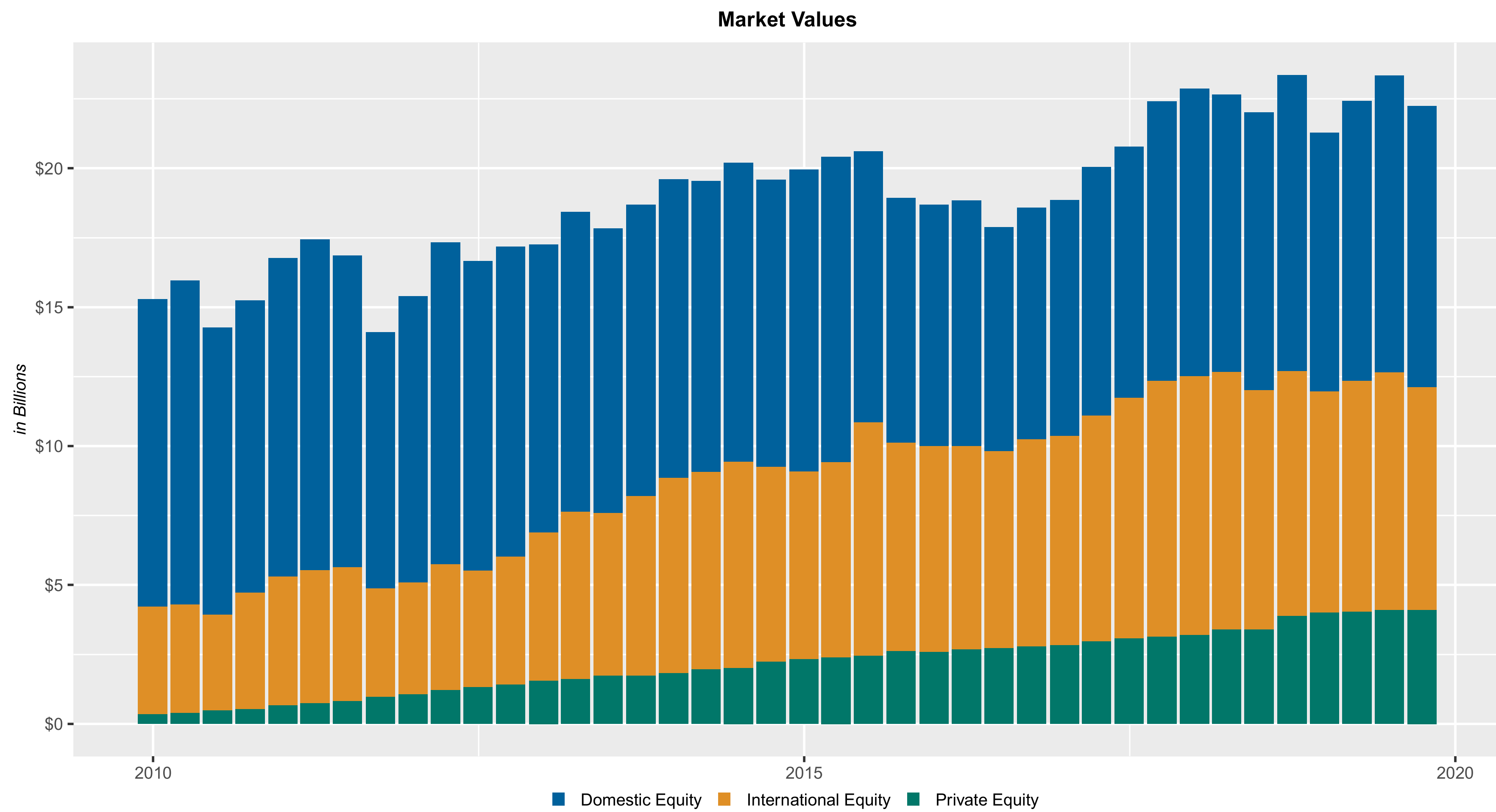
Equity

Total Equities for the period ended 9/30/2019 - Preliminary

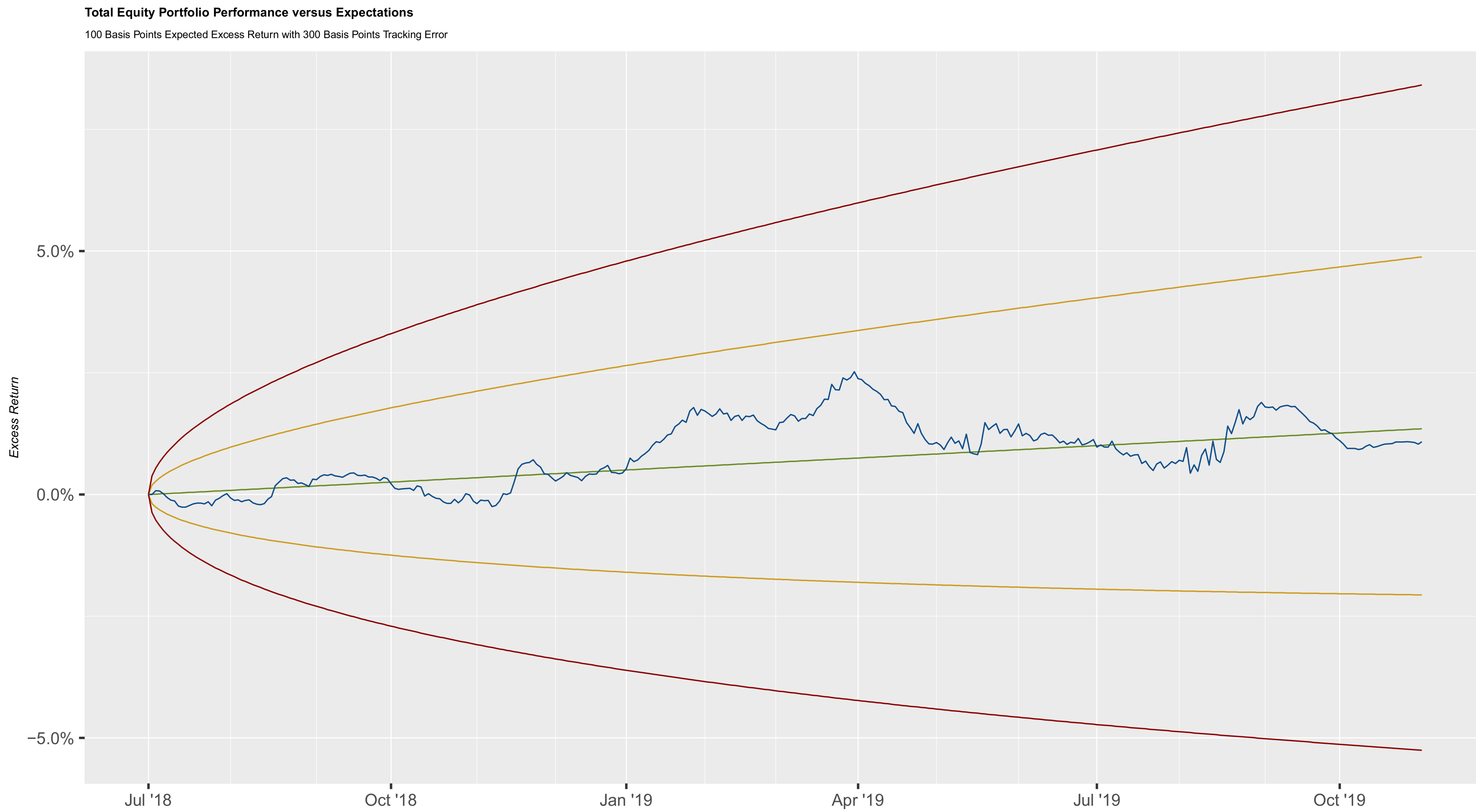
Returns for the period ended 9/30/2019

Composite	Quarter	One Year	Three Year	Five Year
Equity	0.58%	2.28%	10.2%	7.65%
Benchmark	0.52%	1.37%	10.33%	7.57%
Excess	0.06%	0.9%	-0.13%	0.08%
Public Equity	0.03%	0.16%	9.24%	6.93%
Benchmark	-0.1%	0.8%	9.88%	7.44%
Excess	0.12%	-0.64%	-0.64%	-0.51%
US Equity	1.45%	2.26%	11.95%	10.15%
Benchmark	1.23%	3.01%	12.99%	10.94%
Excess	0.22%	-0.75%	-1.05%	-0.79%
International Equity	-1.71%	-2.28%	6.25%	3.17%
Benchmark	-1.72%	-1.85%	6.27%	3.29%
Excess	0.01%	-0.43%	-0.02%	-0.12%
Private Equity	3.28%	12.85%	14.82%	11.6%
Benchmark	3.12%	5.27%	12.43%	7.4%
Excess	0.16%	7.58%	2.38%	4.2%

Total Equity Market Values for the period ended 9/30/2019 - Preliminary

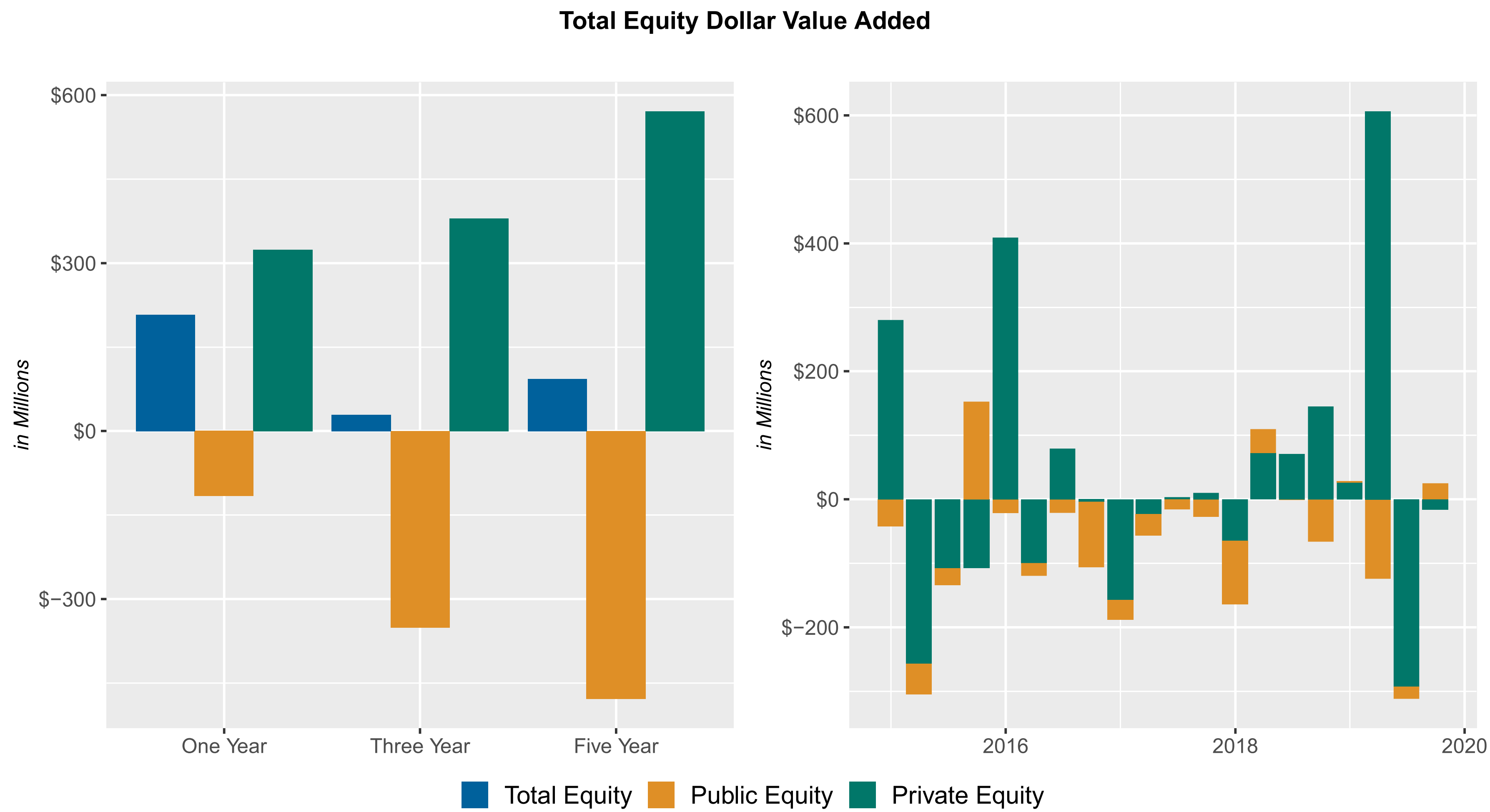


Total Equity Performance for the period ended 9/30/2019 - Preliminary

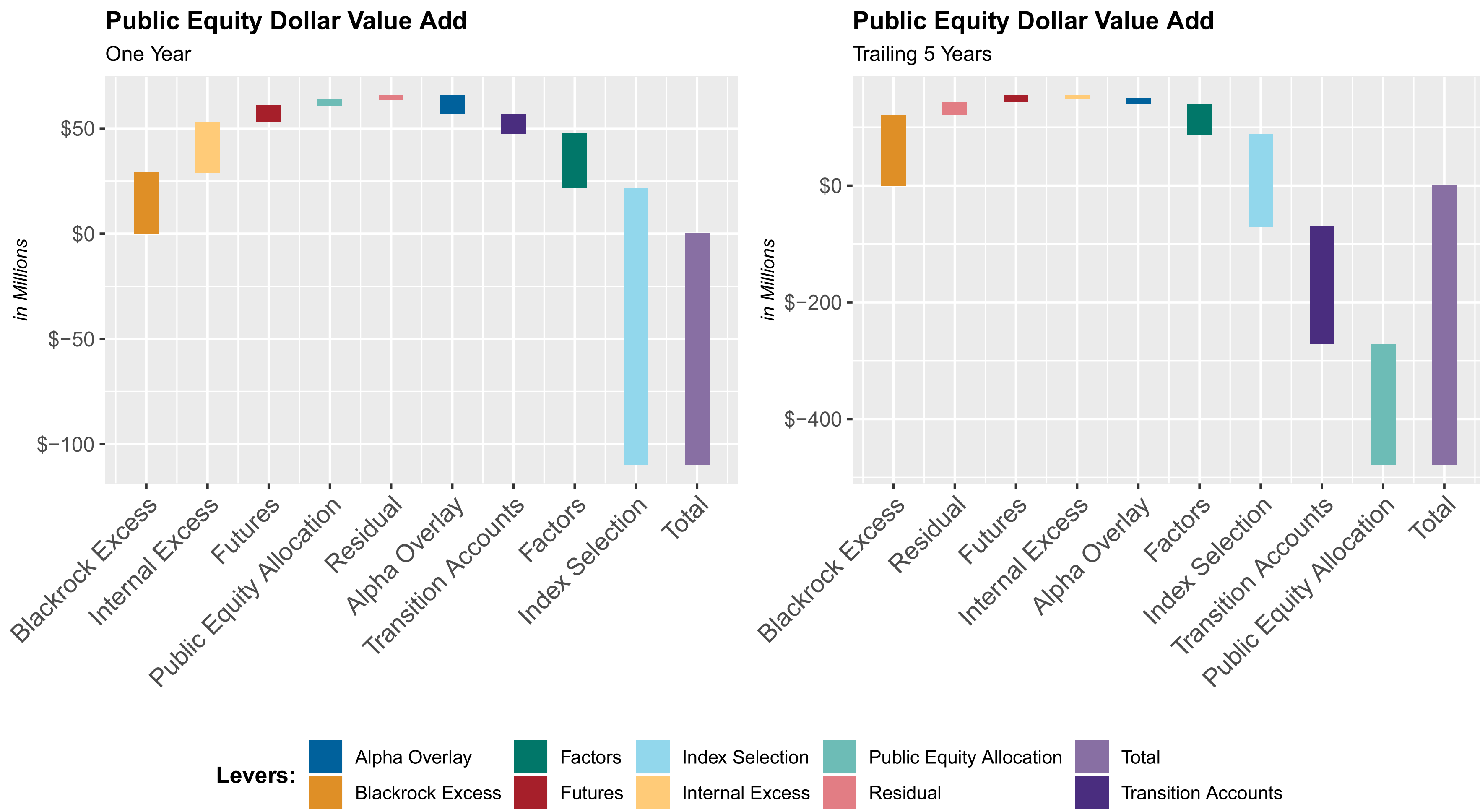


Public Equity

Total Equity Returns and Dollar Value Add for the period ended 9/30/2019 - Preliminary



Public Equity "Levers" for the period ended 9/30/2019 - Preliminary



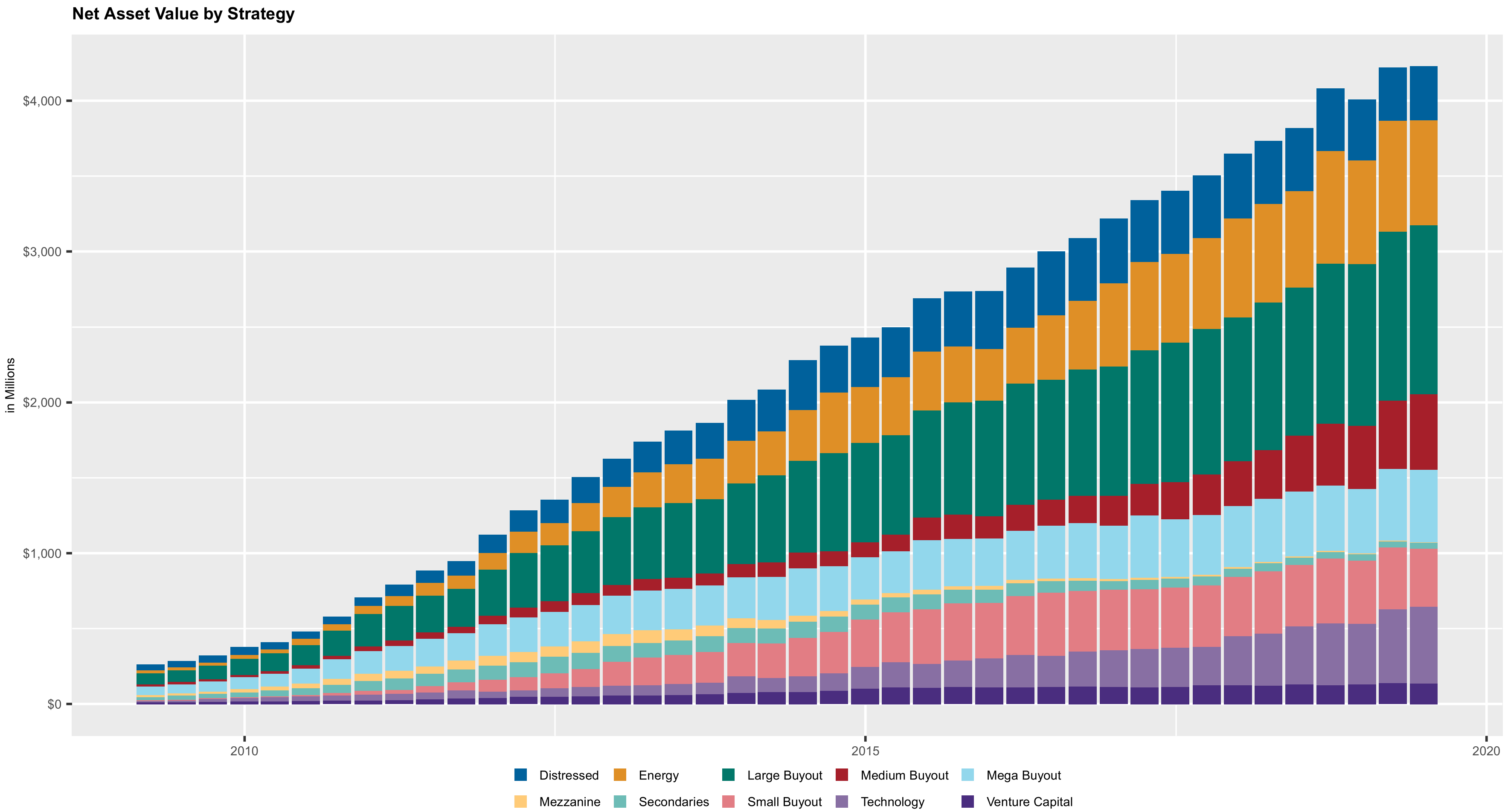
Private Equity

Private Equity Performance Overview & Allocation for the period ended 6/30/2019 - Preliminary

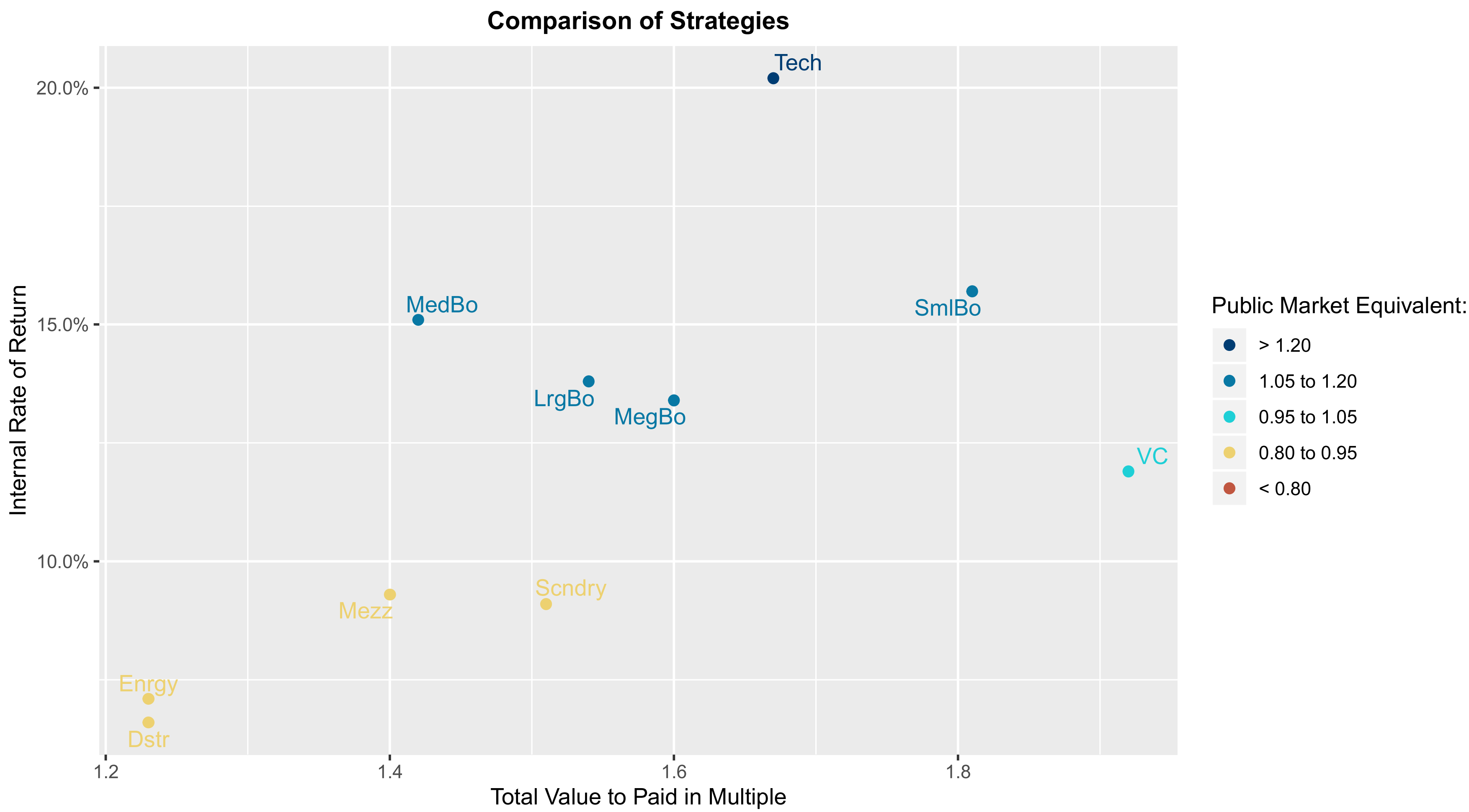
Private Equity Internal Rate of Return

Category	Quarter	1 Year	3 Year	5 Year	Inception
Private Equity	3.3%	12.8%	14.8%	11.6%	12.5%
Benchmark	3.1%	5.3%	12.4%	7.4%	11.2%
Excess	0.2%	7.6%	2.4%	4.2%	1.2%
Distressed	2.5%	-5.4%	3.2%	1.5%	6.6%
Energy	-3.6%	1.4%	8.4%	2.8%	7.1%
Large Buyout	6%	15.6%	16.2%	12.7%	13.8%
Medium Buyout	3%	16%	16.3%	18.5%	15.1%
Mega Buyout	3.2%	11.5%	18.6%	14%	13.4%
Mezzanine	3.2%	-11.8%	5.9%	8.4%	9.3%
Secondaries	-4%	-0.3%	6.9%	4%	9.1%
Small Buyout	5.4%	26.5%	21.6%	20.3%	15.7%
Technology	6.9%	31.4%	24.5%	22.7%	20.2%
Venture Capital	5.2%	17%	15.5%	15.1%	11.9%

Private Equity Decomposition for the period ended 6/30/2019 - Preliminary



Private Equity Performance by Category for the period ended 6/30/2019 - Preliminary



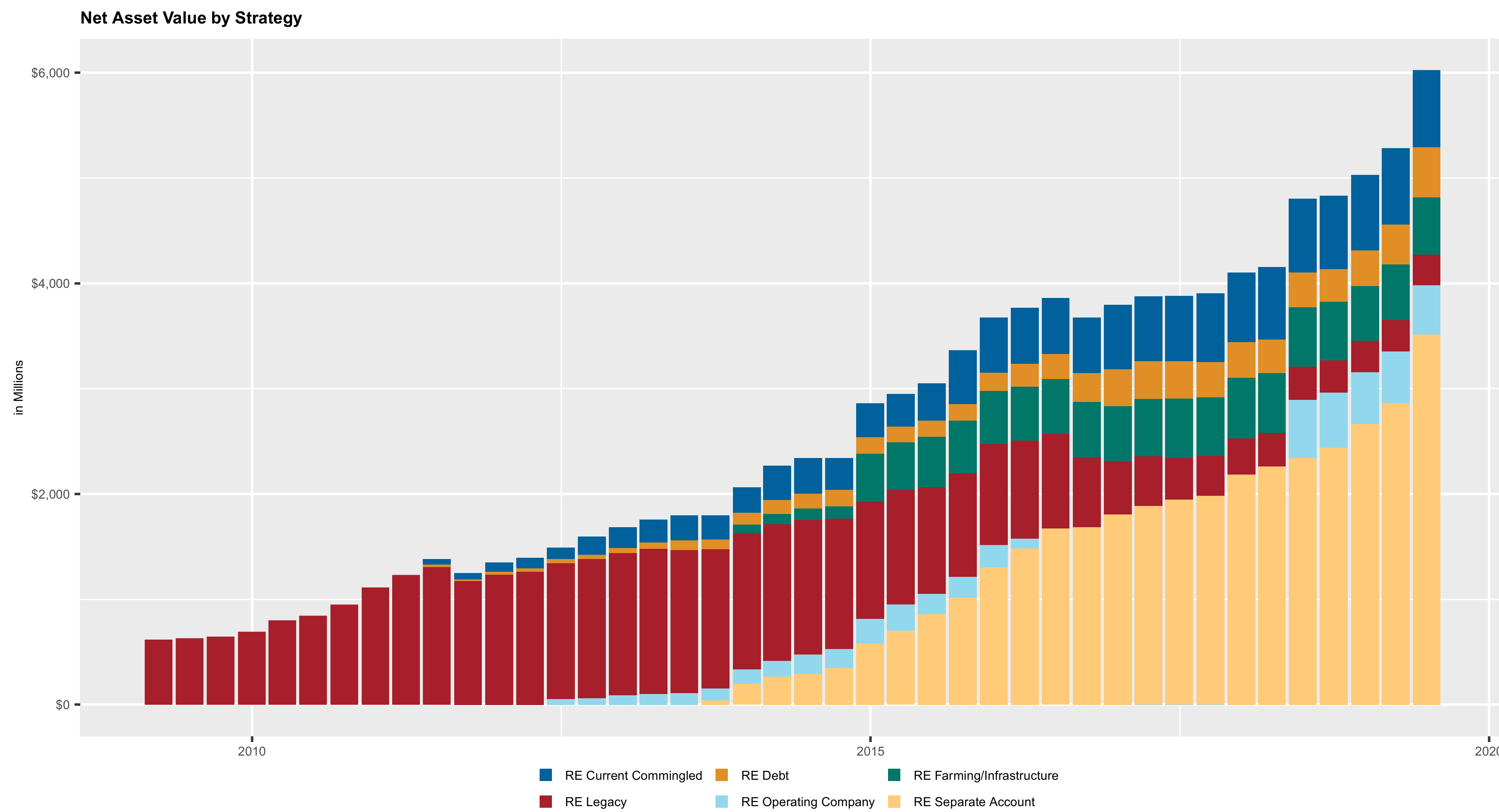
Real Estate

Real Estate Performance Overview & Allocation for the period ended 6/30/2019 - Preliminary

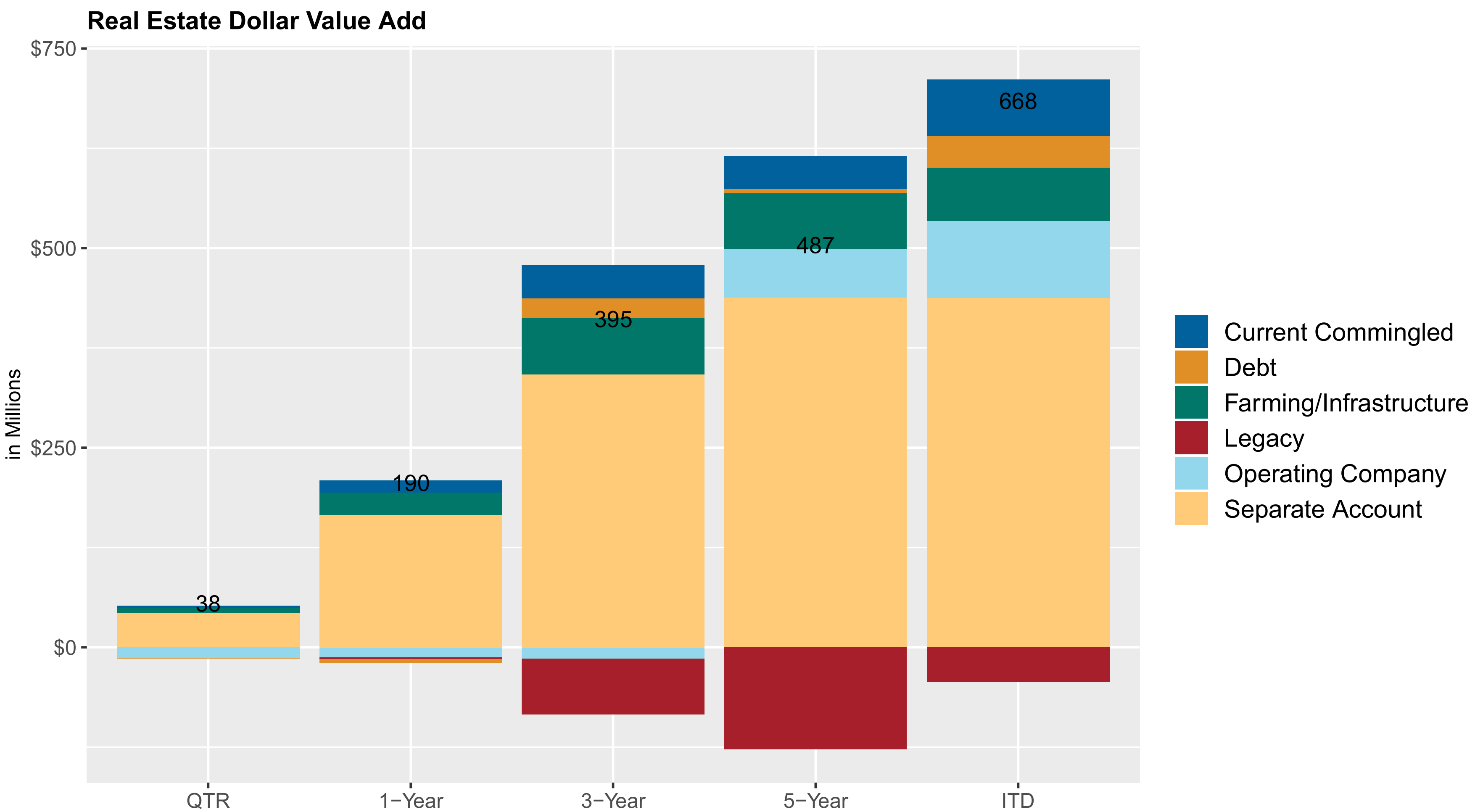
Real Estate Internal Rate of Return

ID	Quarter	1-Year	3-Year	5-Year	Inception to Date
Real Estate	1.80	8.10	8.77	10.16	8.73
Benchmark	1.20	4.44	6.13	8.12	6.84
Excess	0.61	3.66	2.65	2.05	1.89
RE Current Commingled	1.52	6.58	8.39	9.87	11.00
RE Debt	1.17	3.22	8.87	8.60	11.28
RE Farming/Infrastructure	2.38	9.92	9.69	8.12	7.91
RE Legacy	1.48	3.64	1.45	7.53	5.82
RE Operating Company	-1.59	1.84	2.68	13.20	15.20
RE Separate Account	2.59	10.95	11.42	12.89	12.84

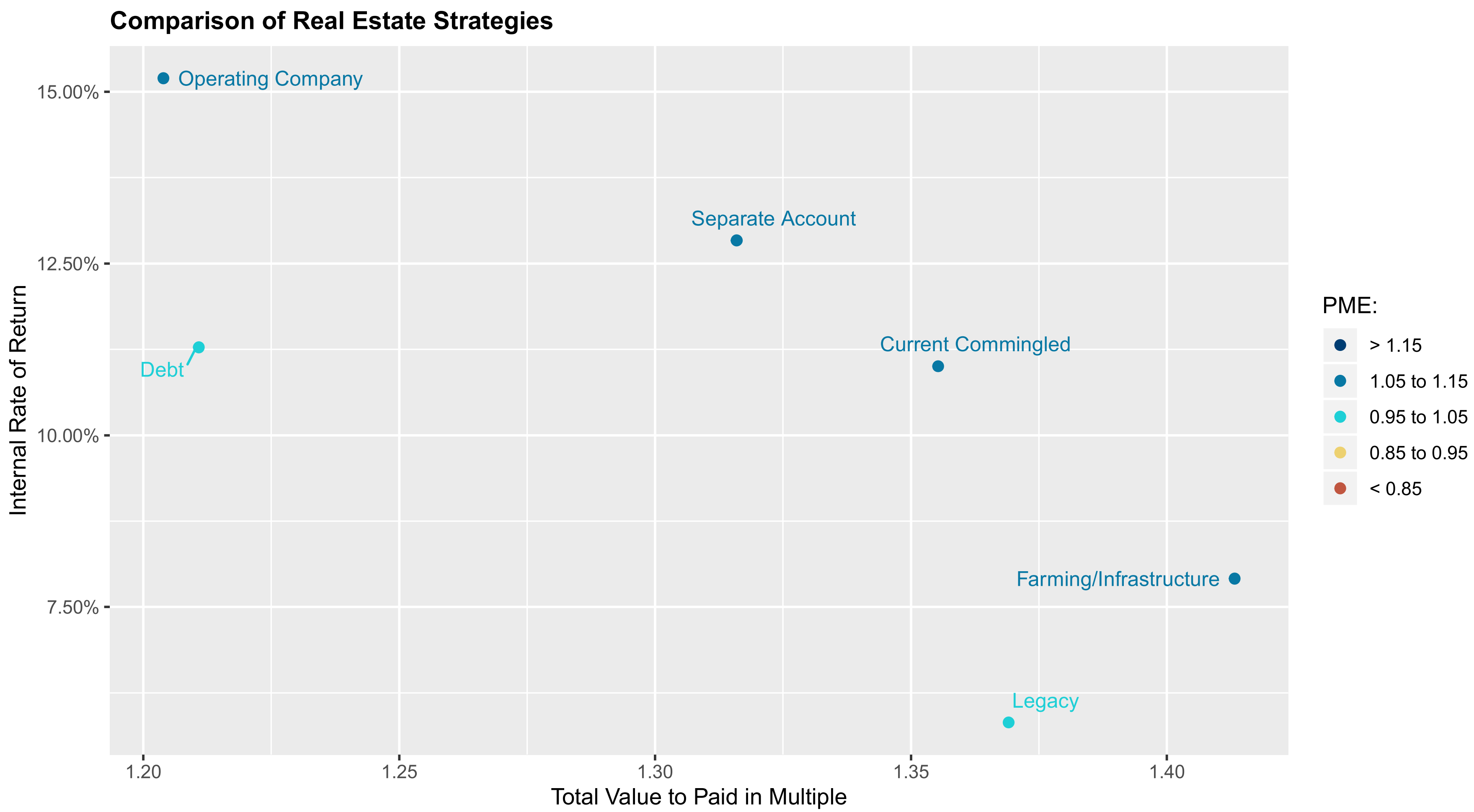
Real Estate Net Asset Value by Strategy for the period ended 6/30/2019 - Preliminary



Real Estate Dollar Value Add for the period ended 6/30/2019 - Preliminary



Real Estate Performance Summary for the period ended 6/30/2019 - Preliminary



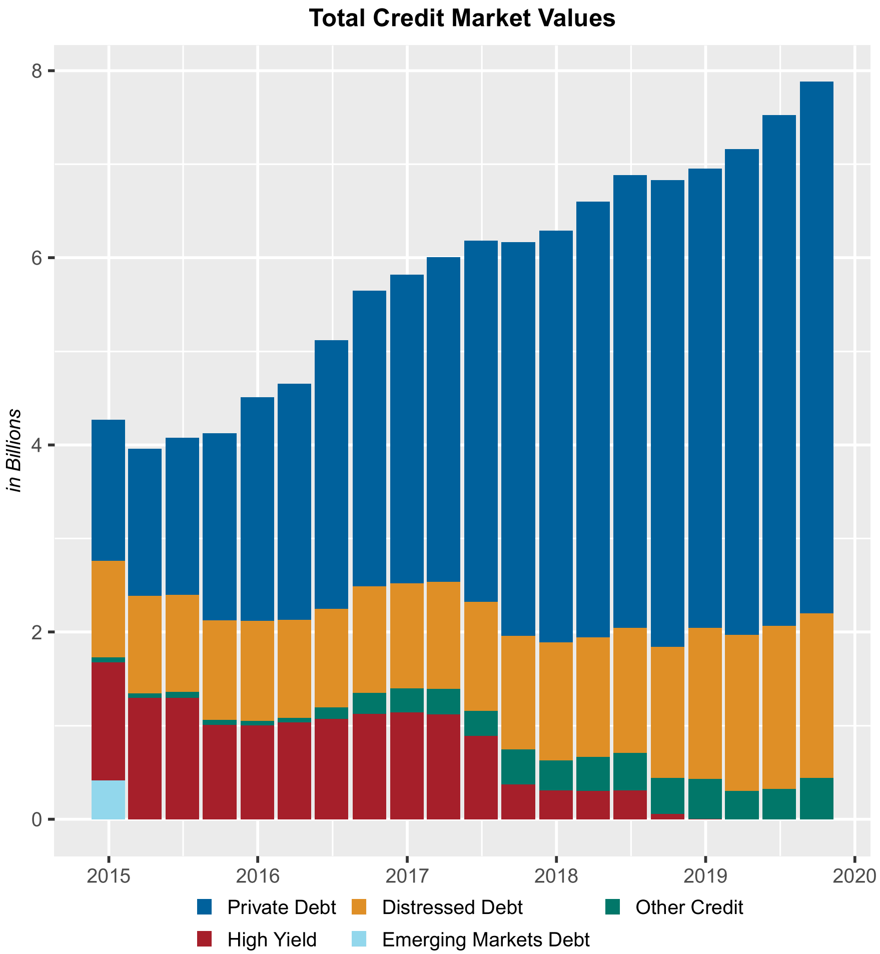
Credit

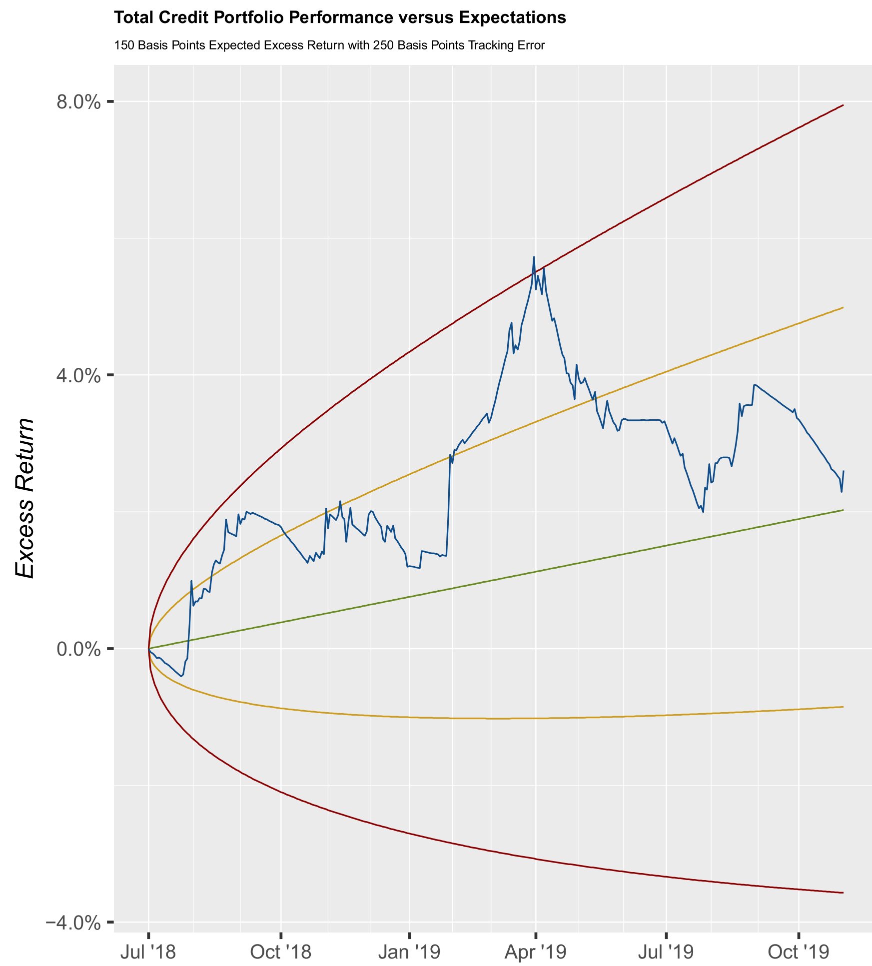
Total Credit for the period ended 9/30/2019 - Preliminary

Credit Annualized Returns

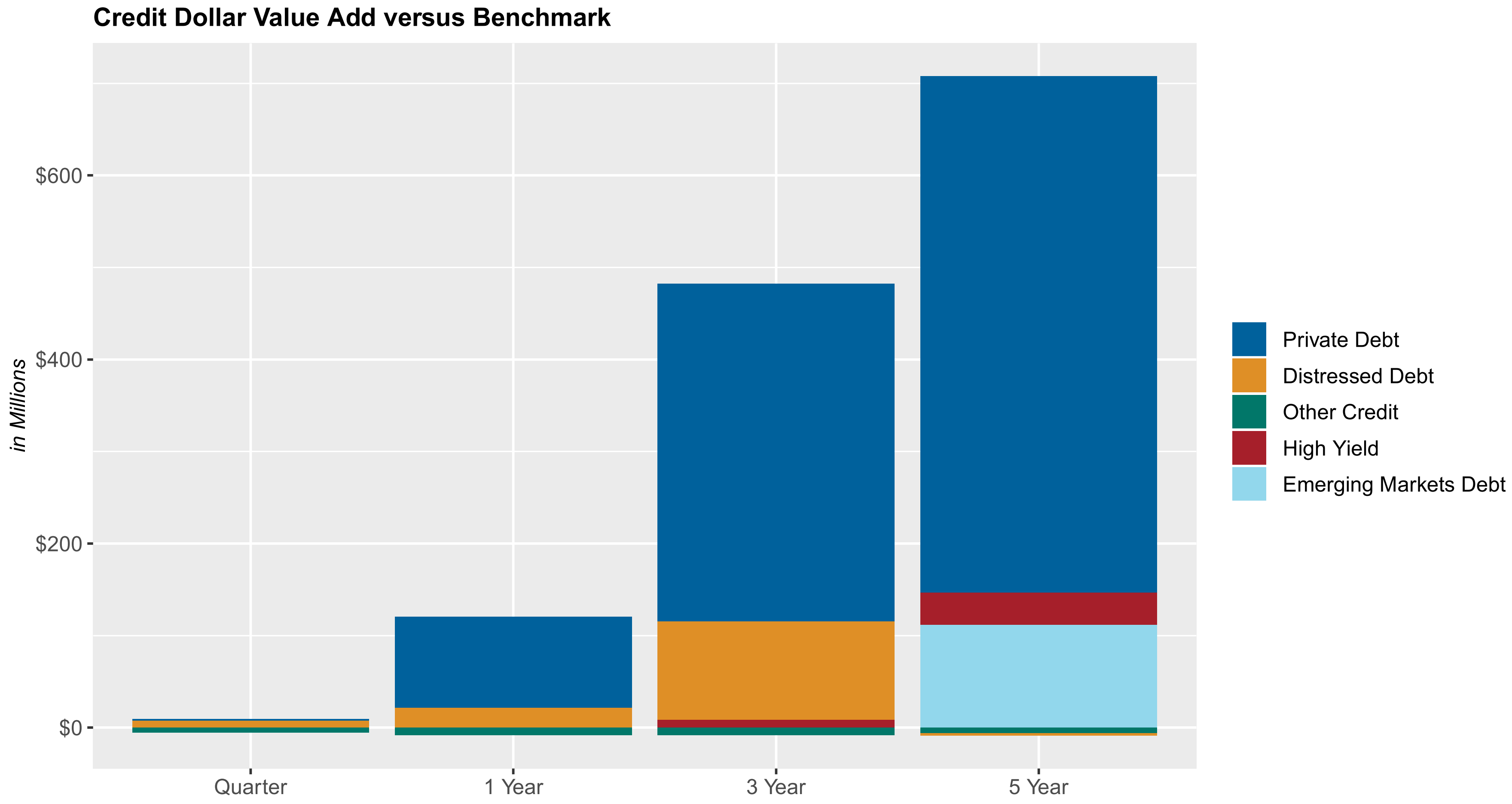
	Quarter	One Year	Three Year	Five Year
Total Credit (TWR)	2.44	8.87	10.66	9.11
Blended Benchmark	2.30	6.57	7.56	7.09
Total Credit Excess	0.14	2.30	3.10	2.02
Private Debt (IRR)	2.39	9.26	10.79	10.31
S&P/LSTA Leveraged Loan + 250 Basis Points	2.30	6.58	7.68	6.87
Private Debt Excess	0.09	2.68	3.11	3.44
Distressed Debt (IRR)	2.76	8.26	10.87	6.36
Fixed 8% Return/LSTA Blend	2.28	6.50	7.24	7.53
Distressed Debt Excess	0.48	1.76	3.63	-1.17
Other Credit (IRR)	1.40	6.19	8.10	7.69
Fixed 8% Return/LSTA Blend	2.32	6.71	7.27	7.37
Other Credit Excess	-0.92	-0.52	0.83	0.32

Credit Market Values and Performance for the period ended 9/30/2019 - Preliminary

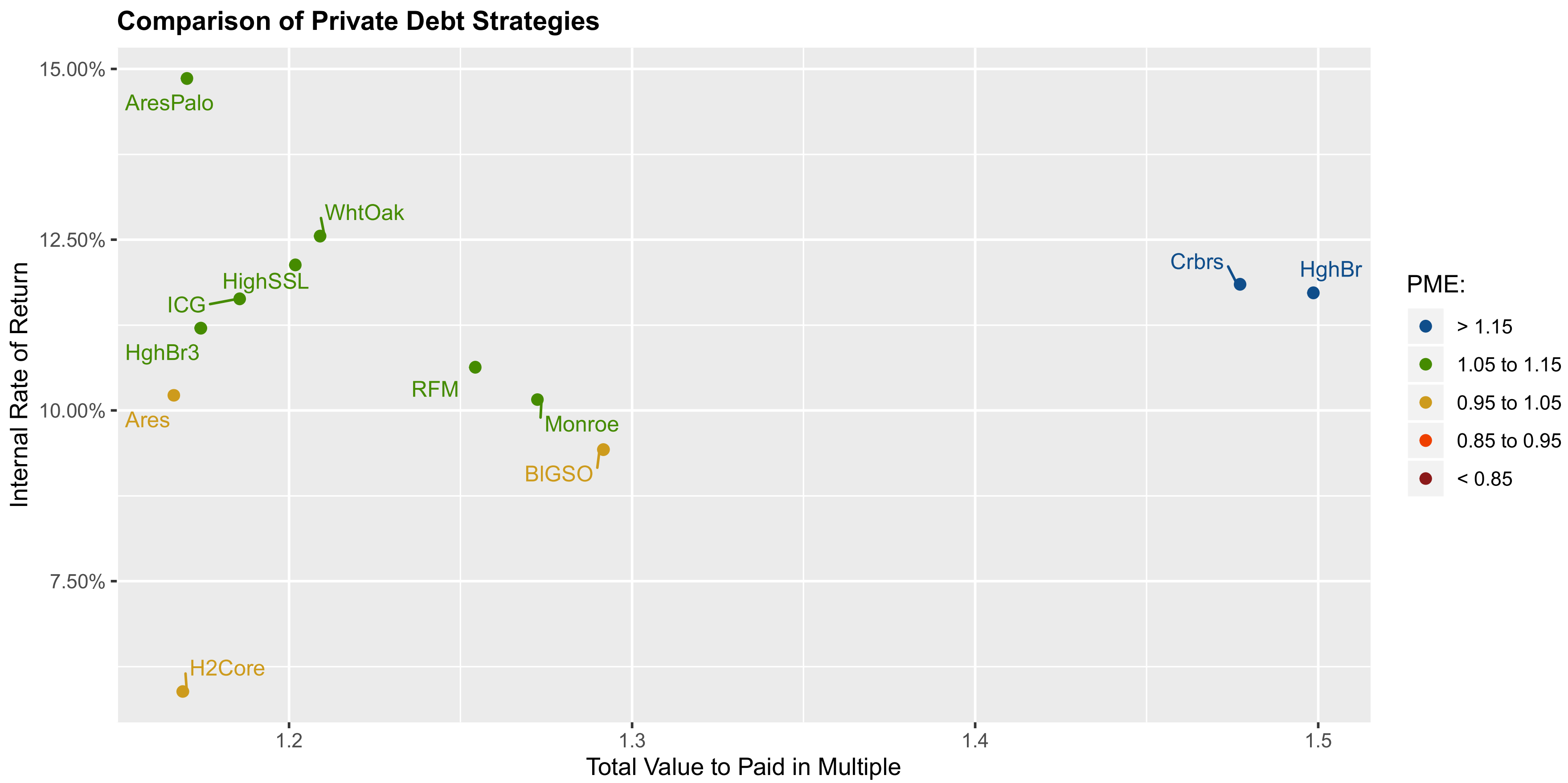




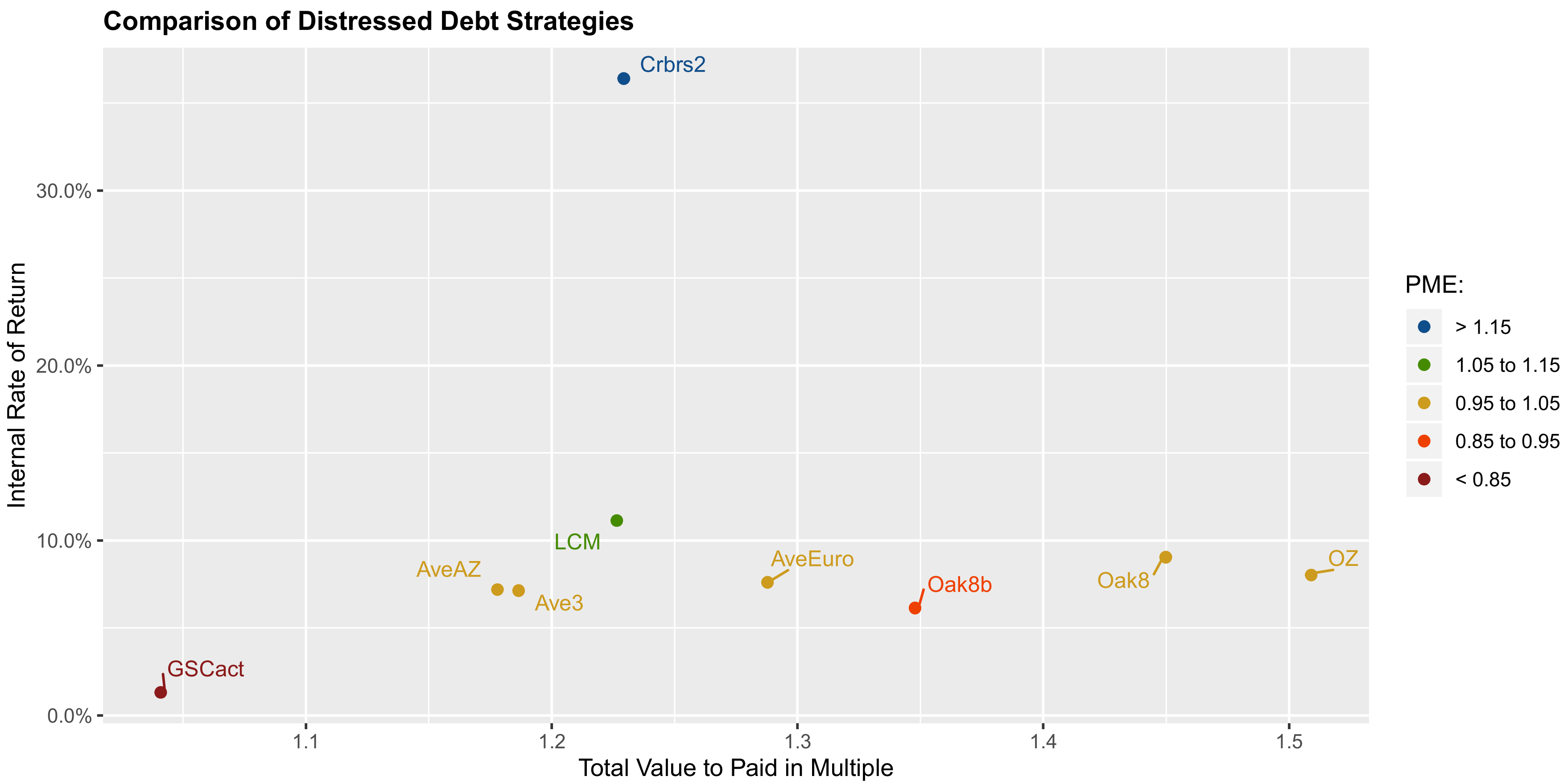
Credit Dollar Value Add for the period ended 6/30/2019 - Preliminary



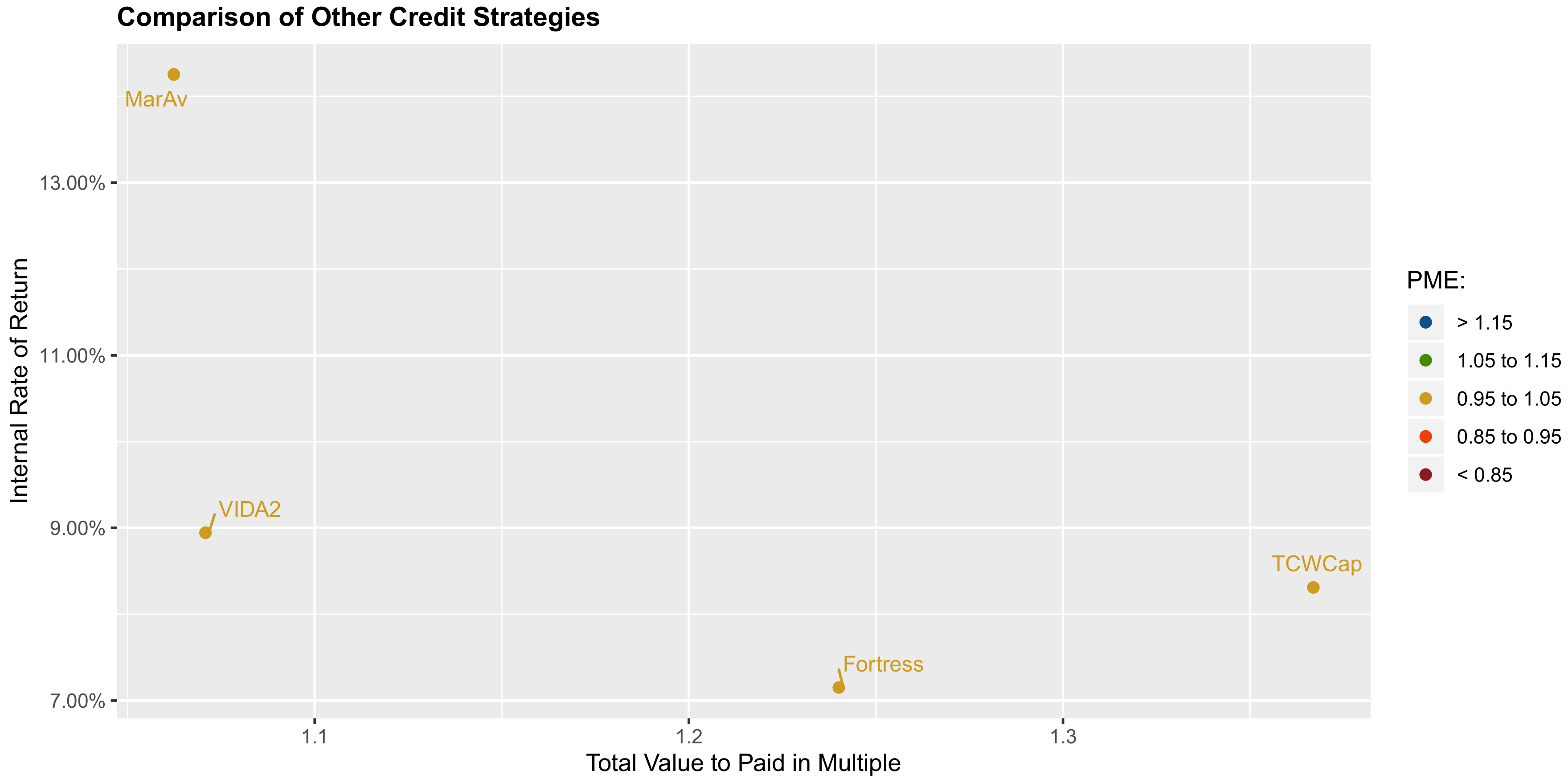
Private Debt: Total Value to Paid in Multiple & Public Market Equivalent for the period ended 6/30/2019 - Preliminary



Distressed Debt: Total Value to Paid in Multiple & Public Market Equivalent for the period ended 6/30/2019 - Preliminary



Other Credit: Total Value to Paid in Multiple & Public Market Equivalent for the period ended 6/30/2019 - Preliminary

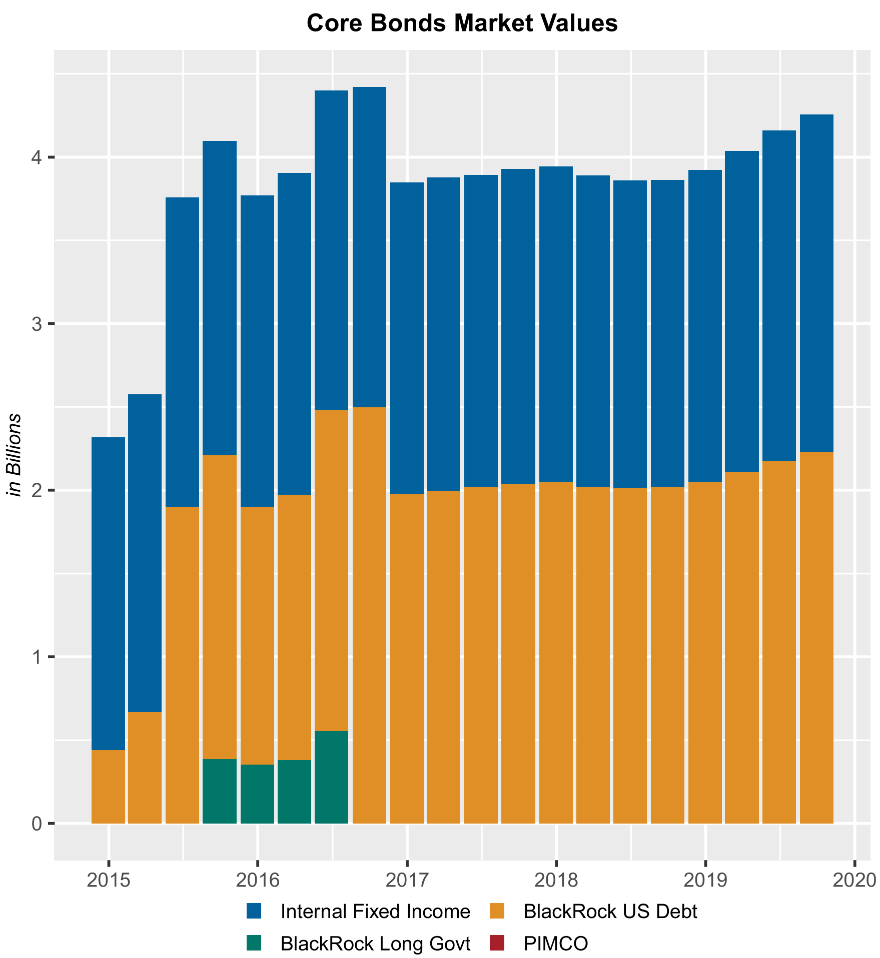


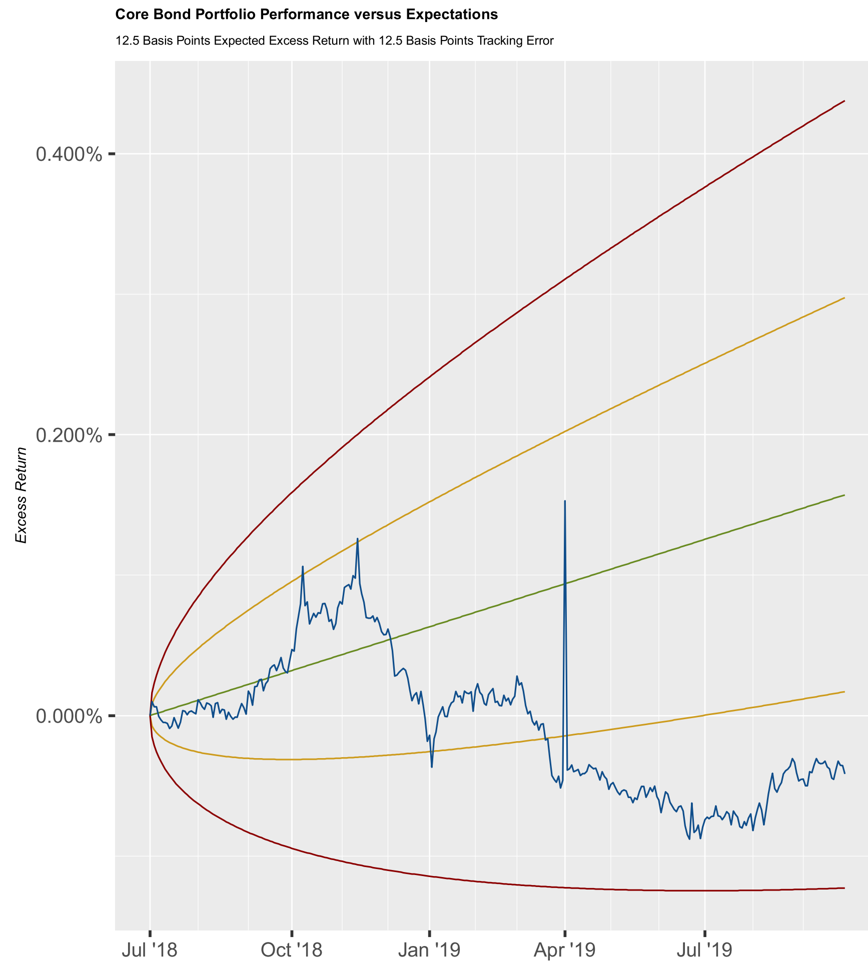
Core Fixed Income for the period ended 9/30/2019 - Preliminary

Annualized Time-Weighted Returns

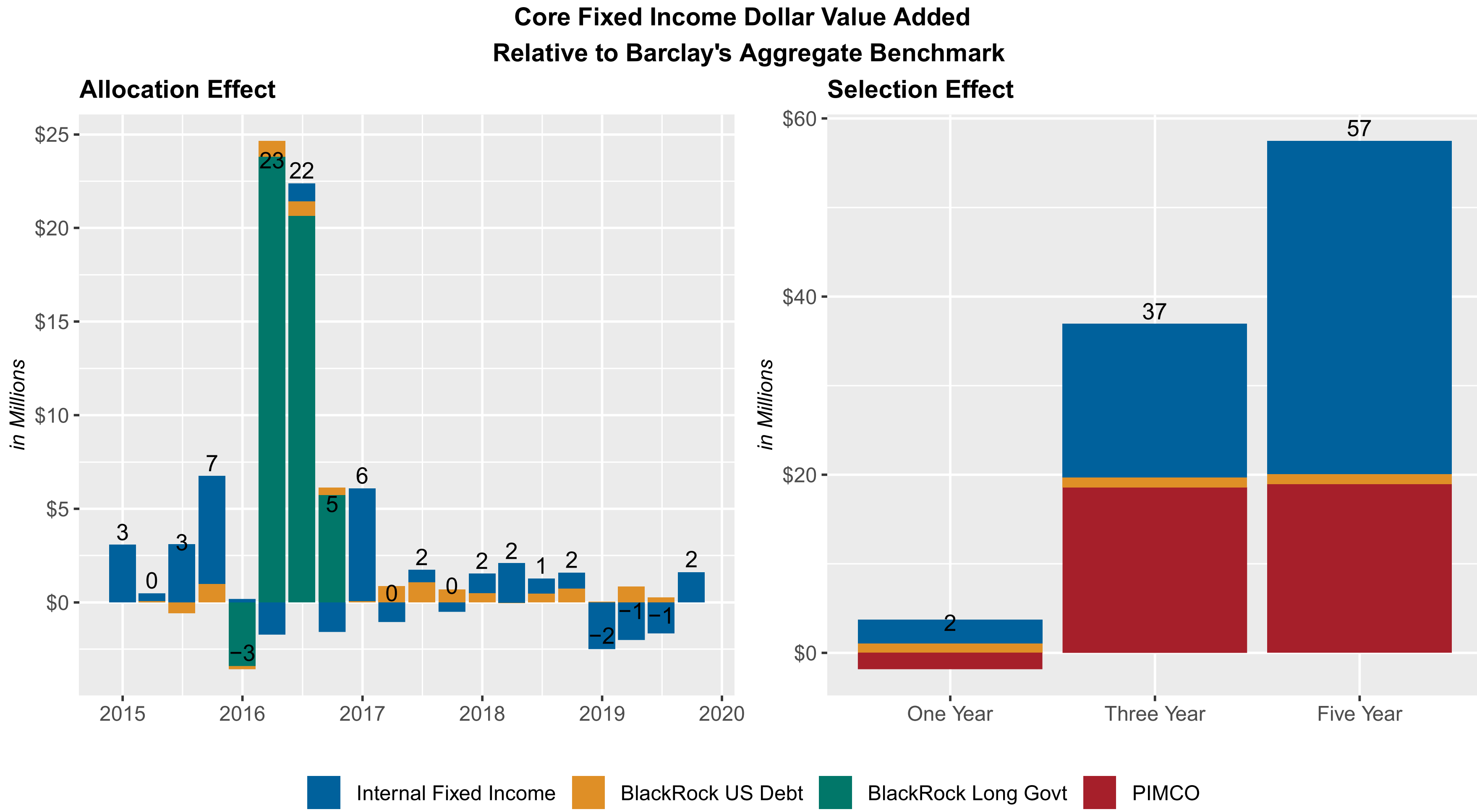
	FYTD	1 Year	3 Year	5 Year
Core Bond Composite	10.27	10.21	3.00	3.66
Barclay's Aggregate	10.32	10.30	2.92	3.38
Core Composite Excess	-0.04	-0.09	0.08	0.28
Internal Fixed Income	10.12	10.05	3.01	3.51
Barclay's Aggregate	10.32	10.30	2.92	3.38
Internal Fixed Income Excess	-0.20	-0.24	0.08	0.14
BlackRock US Debt Fund	10.41	10.35	3.01	3.47
Barclay's Aggregate	10.32	10.30	2.92	3.38
BlackRock Excess	0.10	0.06	0.08	0.09

Core Fixed Income Decomposition for the period ended 9/30/2019 - Preliminary





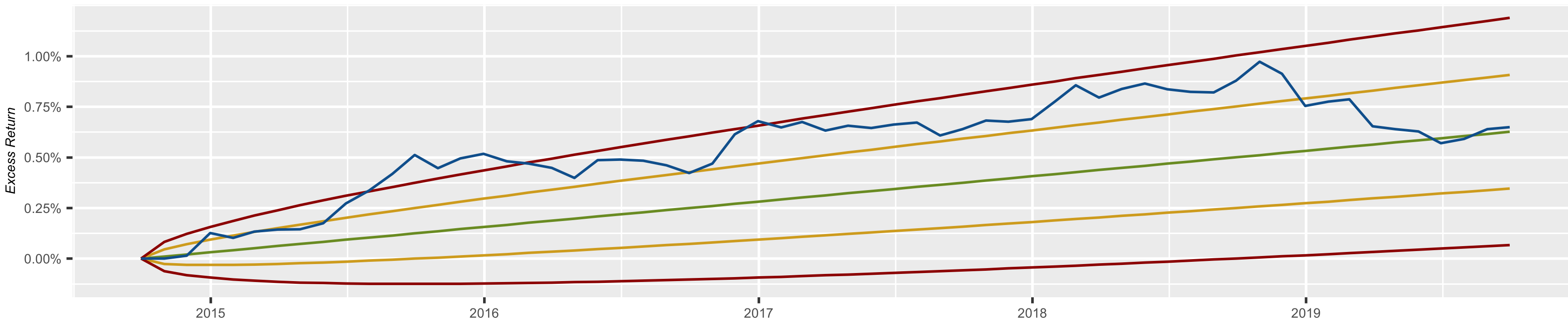
Core Fixed Income Dollar Value Added for the period ended 9/30/2019 - Preliminary



Core Fixed Income Performance for the period ended 9/30/2019 - Preliminary

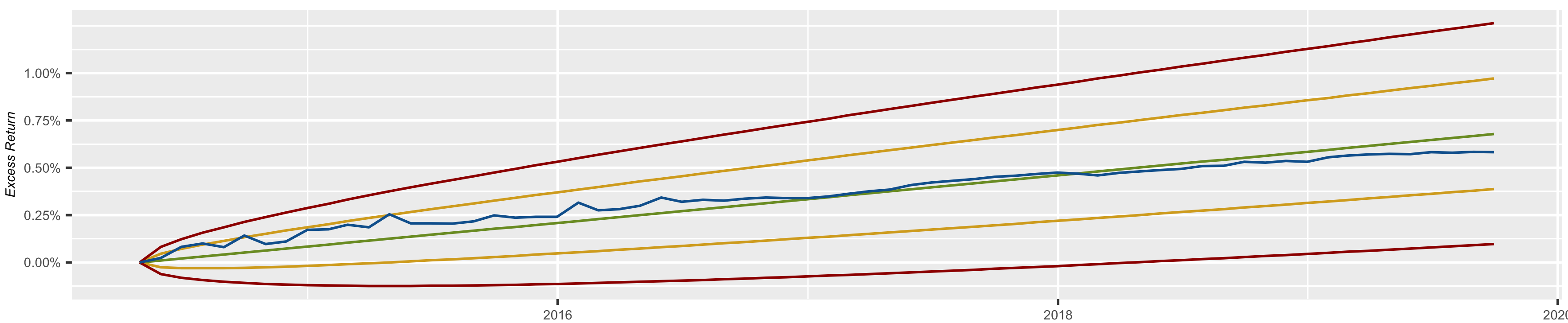
Internal Fixed Income Portfolio Performance versus Expectations

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 8/31/2019

TOTAL PORTFOLIO VALUE-AT-RISK (VAR)

As of August 31st, 2019 Total VaR for ASRS Portfolio was 13.99%, 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