

Equities, Real Estate, Farmland & Infrastructure, and Commodities

Arizona State Retirement System

June 22, 2018

Outline

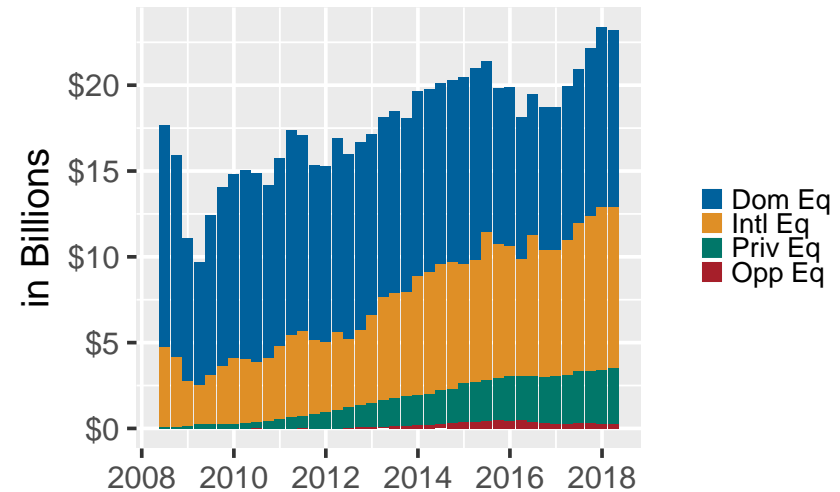
- 1 Equities
 - Public Equity
 - Program Updates & Allocation
 - Performance
 - Private Equity
 - Performance
- 2 Real Estate
- 3 Farmland, Infrastructure and Timber
- 4 Commodities

Total Equities

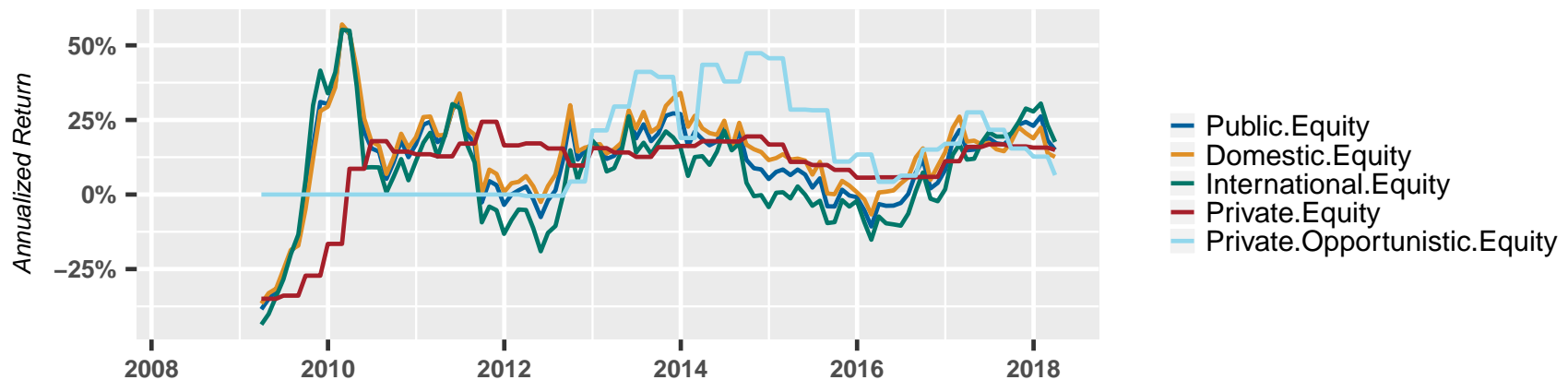
Annualized Returns

Composite	One Year	Three Year	Five Year	Ten Year
Domestic Equity	12.61%	10.1%	12.75%	10.06%
Benchmark	13.55%	10.62%	13.24%	9.99%
Excess	-0.95%	-0.52%	-0.49%	0.07%
International Equity	17.62%	6.77%	6.27%	3.25%
Benchmark	17.59%	6.85%	6.55%	3.42%
Excess	0.03%	-0.09%	-0.28%	-0.17%
Private Equity	14.94%	12.13%	13.01%	6.98%
Benchmark	14.65%	9.96%	14.12%	8.71%
Excess	0.29%	2.17%	-1.11%	-1.73%
Private Opportunistic Equity	6.49%	12.3%	21.15%	NA%
Benchmark	8%	8%	8%	NA%
Excess	-1.51%	4.3%	13.15%	NA%

Market Values

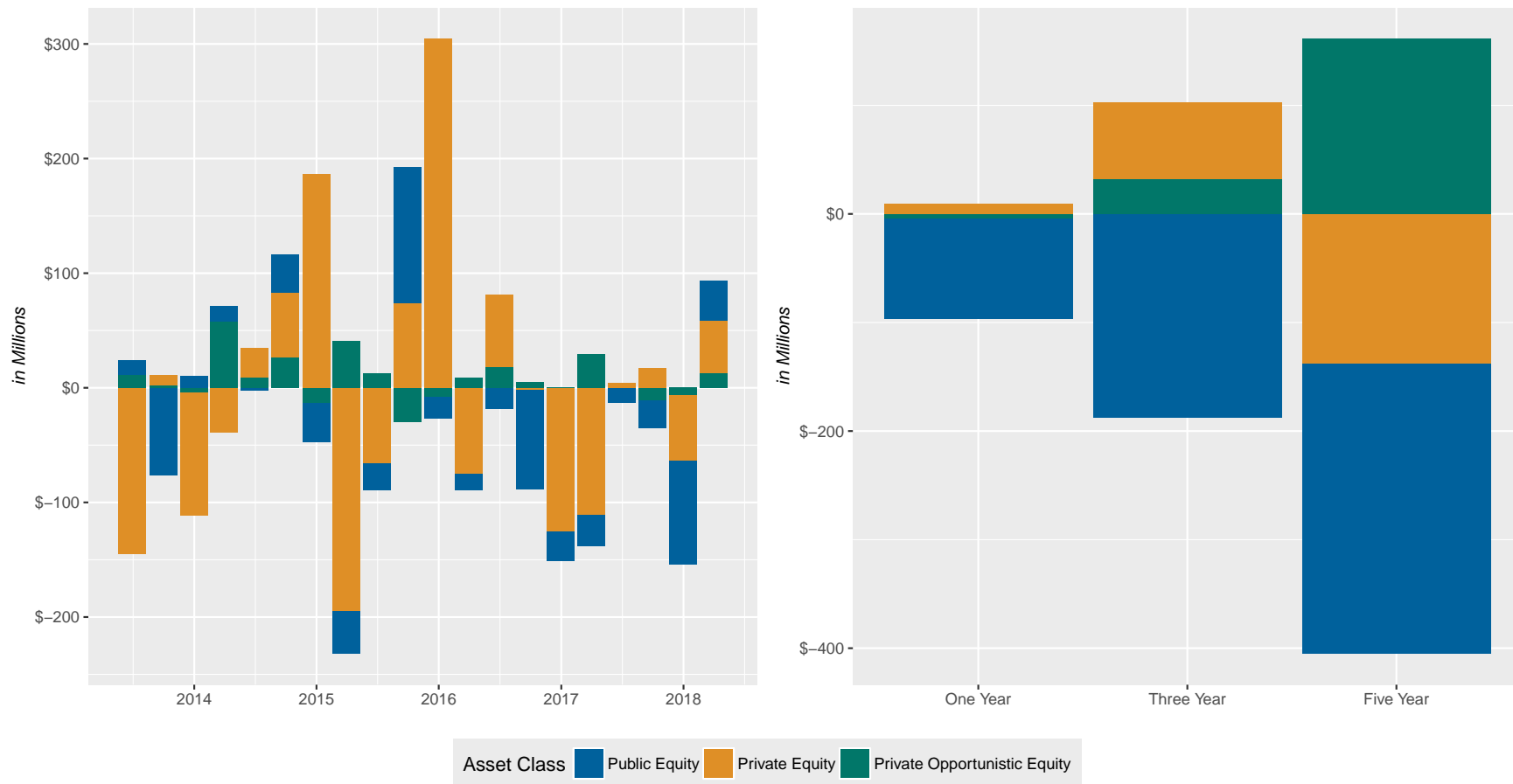


Total Equity Rolling 1 Year Returns



Total Equity Dollar Value Added

Total Equity Dollar Value Added
Relative to Sub-Asset Class Benchmarks



Update: Transitions

Transition Event	Date	Amount	Total Cost	Market Avg	Net \$	# of
			(bps)	Cost (bps)	vs. Avg	Weeks
US LC Factors	July 2017	\$1,670 MM	+5	-23	\$4.7 M	1
US MC Active	Sep 2017	\$240 MM	-35	-42	\$0.2 M	1
US SC Actives	Sep 2017	\$650 MM	-51	-57	\$0.4 M	4
EAFE SC Actives	Oct 2017	\$400 MM	-69	-76	\$0.3 M	4
US LC Active	Nov 2017	\$760 MM	-25	-23	-\$0.2 M	1
EM/EM Factors	Apr 2018	\$1,500 MM	-18	-92	\$11.1	6
EAFE LC/EAFE LC Factors	Apr 2018	\$2,350 MM	-26	-54	\$6.6 M	4

- Transitions are complete: net total savings versus market average cost is \$23.1 M for completed transitions

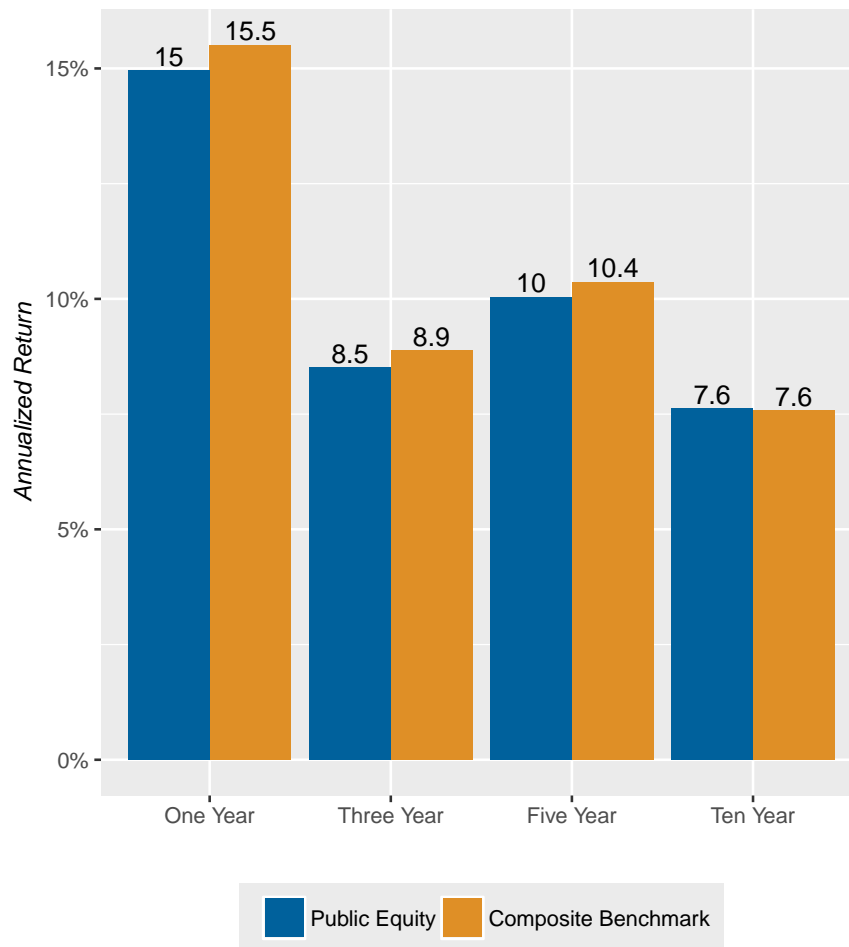
Allocation: Public Equity

Sub-asset class	Benchmark	Actual	SAA	Interim	Over/Under	Enhanced	Factors	Active
			Target	SAA	Interim SAA	Index		
US LC	S&P 500	19.3%	20%	20%	-0.7%	75%	25%	0%
US MC	S&P 400	3.0%	3%	3%	0.0%	100%	0%	0%
US SC	S&P 600	3.0%	3%	3%	0.0%	100%	0%	0%
Int'l Developed LC	MSCI EAFE	15.6%	17%	17%	-1.4%	75%	25%	0%
Int'l Developed SC	MSCI EAFE SC	1.8%	2%	2%	-0.2%	100%	0%	0%
Emerging Markets	MSCI EM	4.8%	5%	5%	-0.2%	75%	25%	0%

Public Equities Returns & DVA

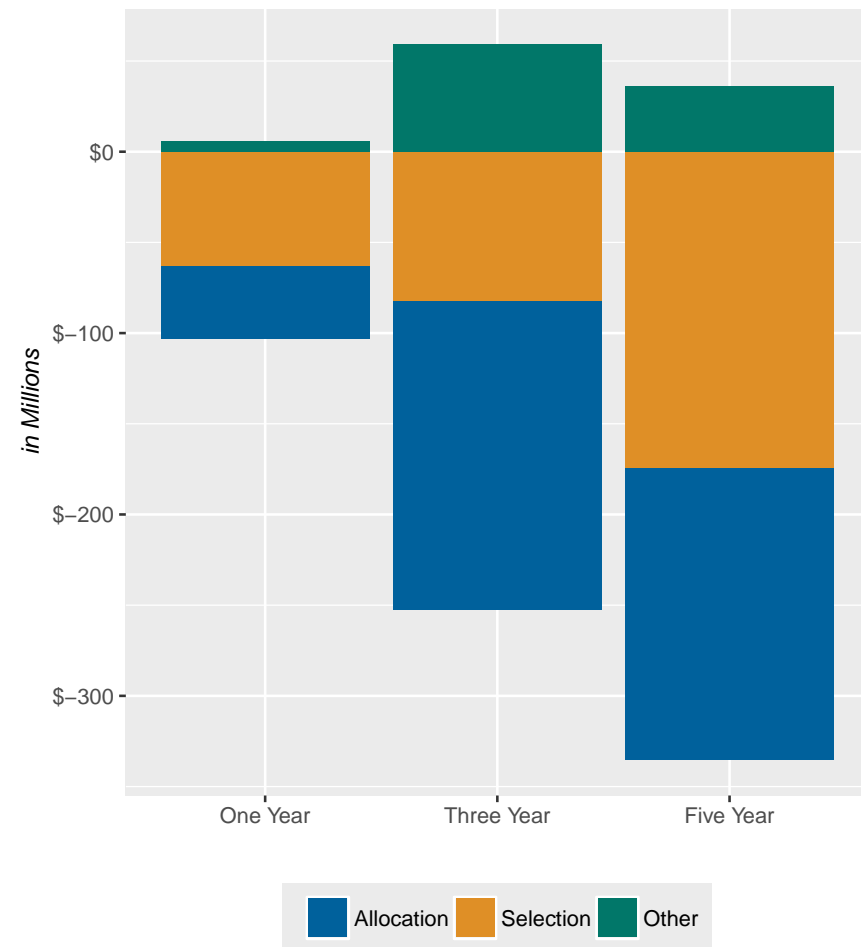
Public Equity and Composite Benchmark

Trailing Period Returns



Public Equity Dollar Value Add

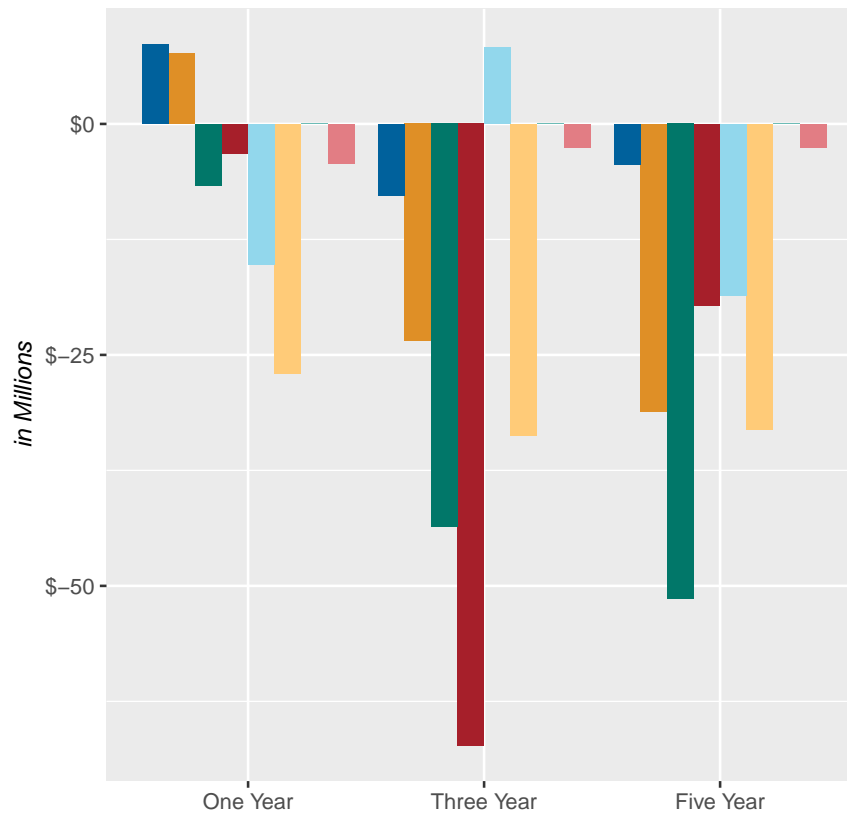
Relative to Composite Benchmark



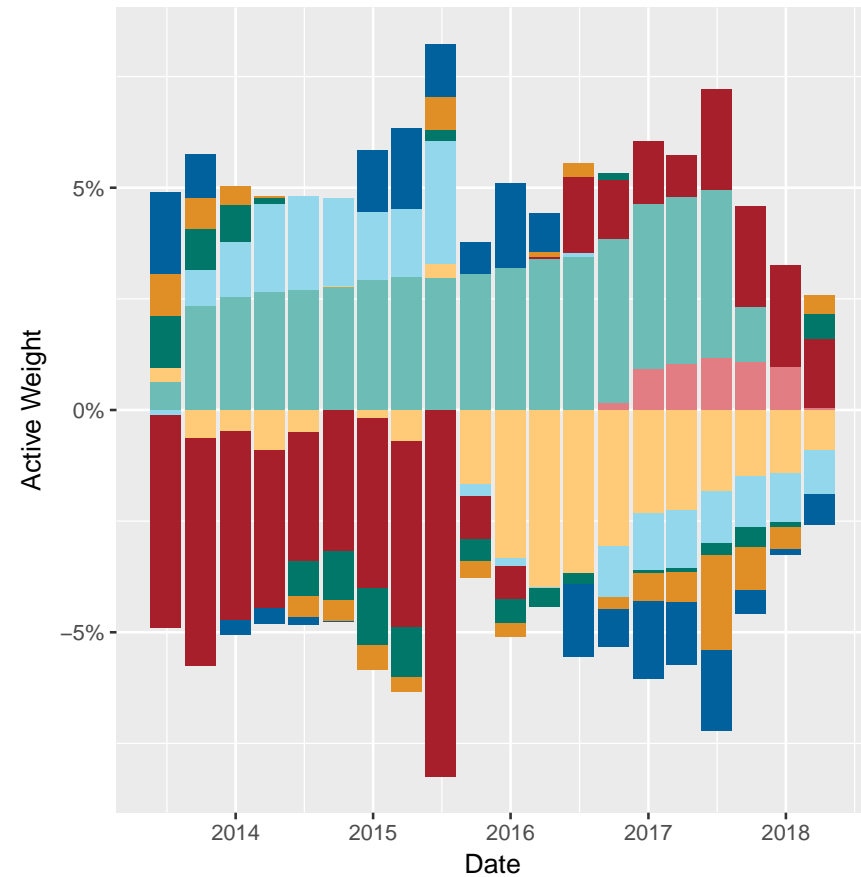
Allocation Effect

Public Equity Allocation Effect by Sub Asset Class

Relative to Composite Benchmark



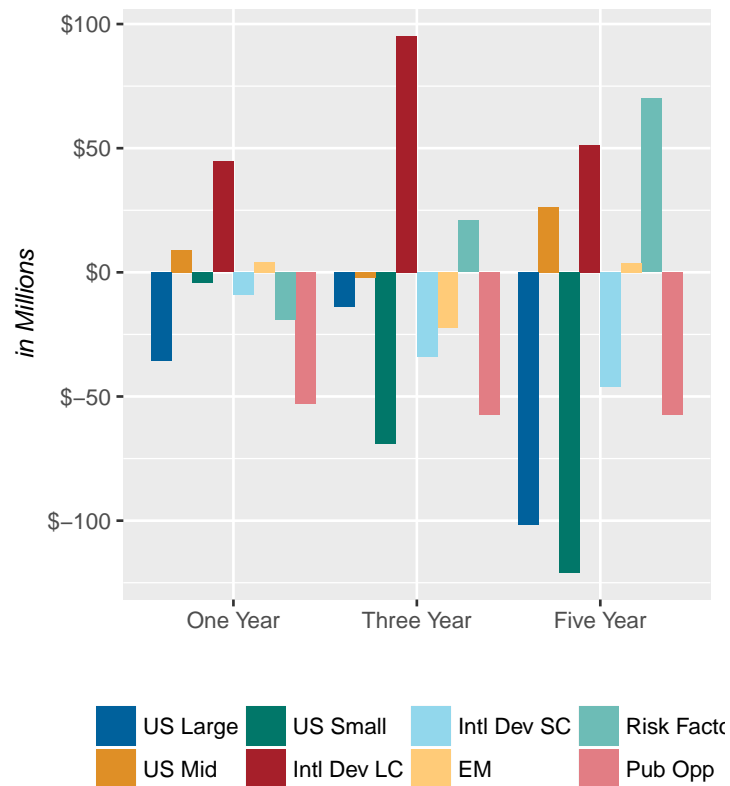
Average Quarterly Active Weight



Selection Effect

Public Equity Selection Effect

Relative to Composite Benchmark

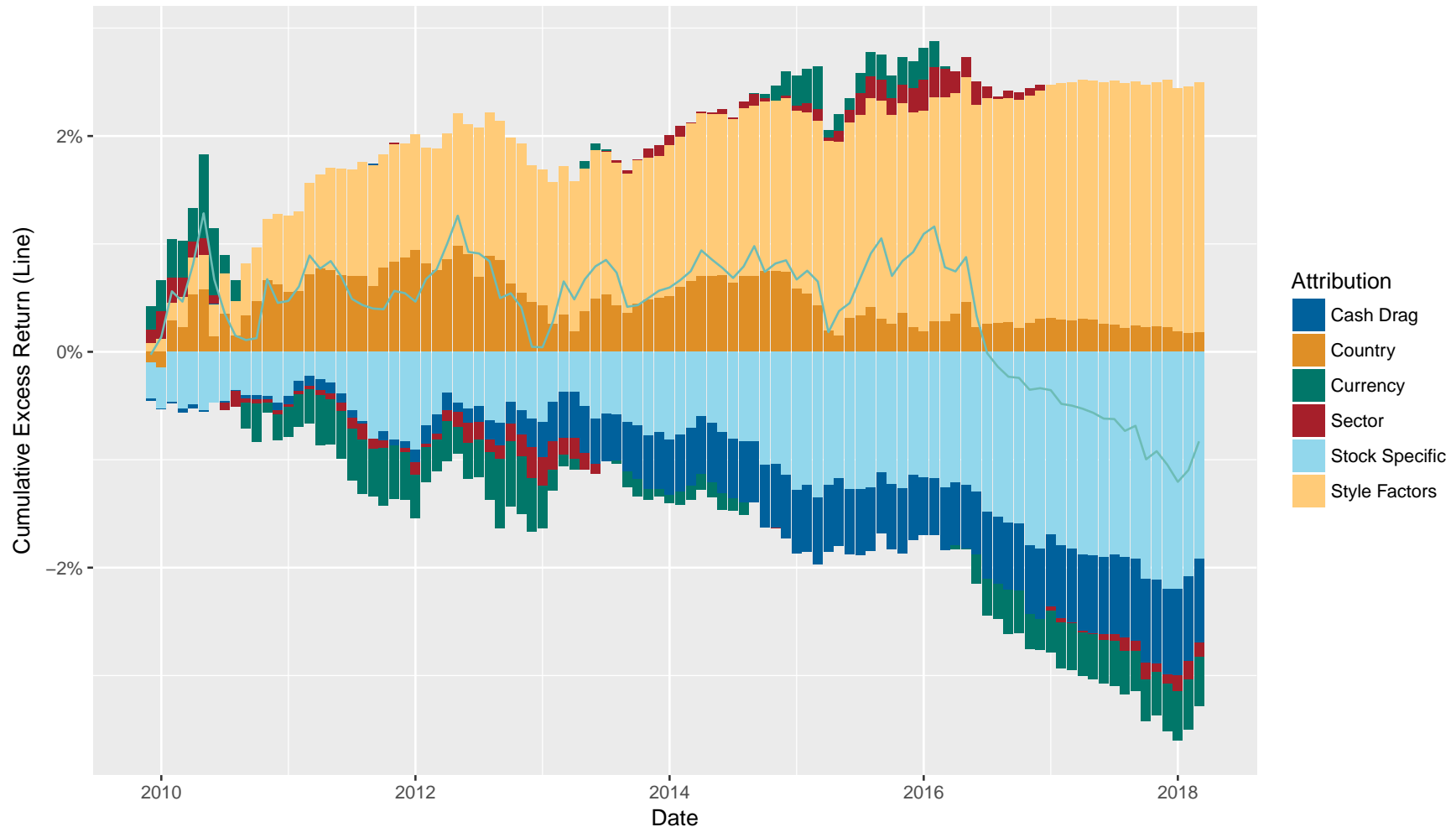


Annualized Returns

	Composite	One Year	Three Year	Five Year	Ten Year
US Large Cap	13.48%	13.48%	10.72%	13.07%	9.56%
Benchmark	13.99%	13.99%	10.78%	13.31%	9.49%
Excess	-0.51%	-0.51%	-0.06%	-0.23%	0.07%
US Mid Cap	12.14%	12.14%	8.9%	12.2%	10.82%
Benchmark	10.97%	10.97%	8.96%	11.97%	10.9%
Excess	1.16%	1.16%	-0.06%	0.23%	-0.08%
US Small Cap	12.27%	12.27%	8.43%	11.59%	10.95%
Benchmark	12.68%	12.68%	10.76%	13.56%	11.35%
Excess	-0.41%	-0.41%	-2.33%	-1.97%	-0.41%
Int'l Dev Large Cap	15.53%	15.53%	6.05%	6.67%	NA%
Benchmark	14.8%	14.8%	5.55%	6.56%	NA%
Excess	0.73%	0.73%	0.5%	0.11%	NA%
Int'l Dev Small Cap	21.5%	21.5%	10.74%	10.18%	NA%
Benchmark	23.49%	23.49%	12.25%	11.15%	NA%
Excess	-2%	-2%	-1.51%	-0.97%	NA%
Emerging Markets	25.34%	25.34%	8.31%	4.97%	NA%
Benchmark	24.93%	24.93%	8.81%	5.05%	NA%
Excess	0.41%	0.41%	-0.5%	-0.08%	NA%
Public Opportunistic	-19.55%	-19.55%	NA%	NA%	NA%
Benchmark	13.55%	13.55%	NA%	NA%	NA%
Excess	-33.11%	-33.11%	NA%	NA%	NA%

Holdings Based Performance Attribution

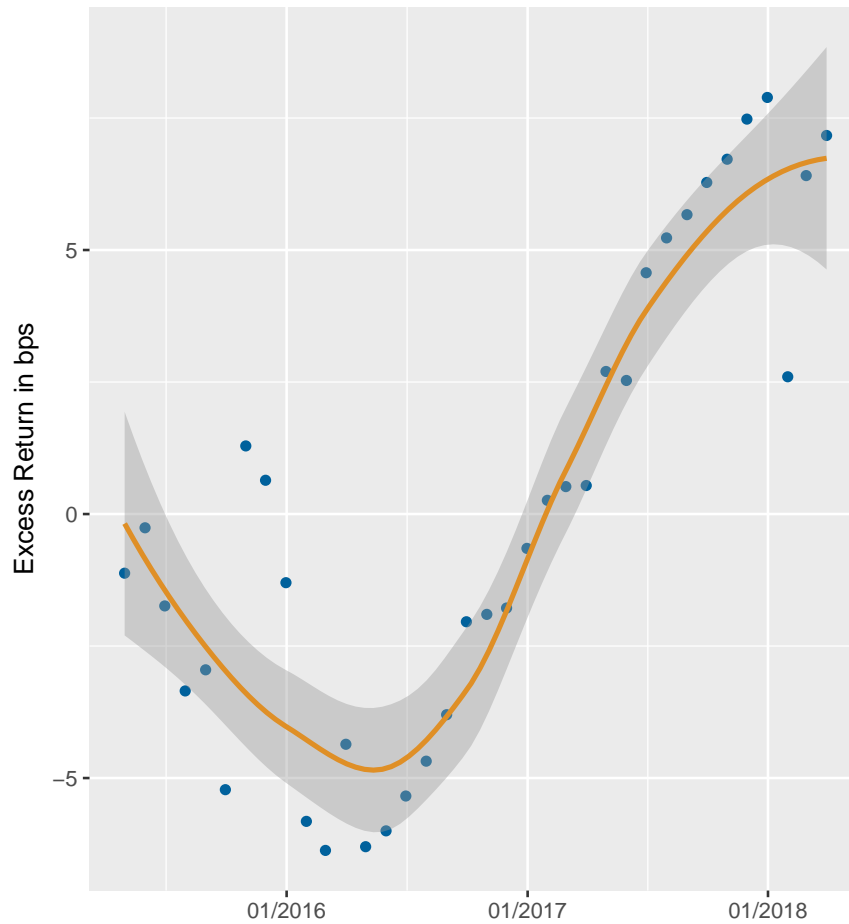
Public Equity Barra Factor Attribution



Internal Portfolios

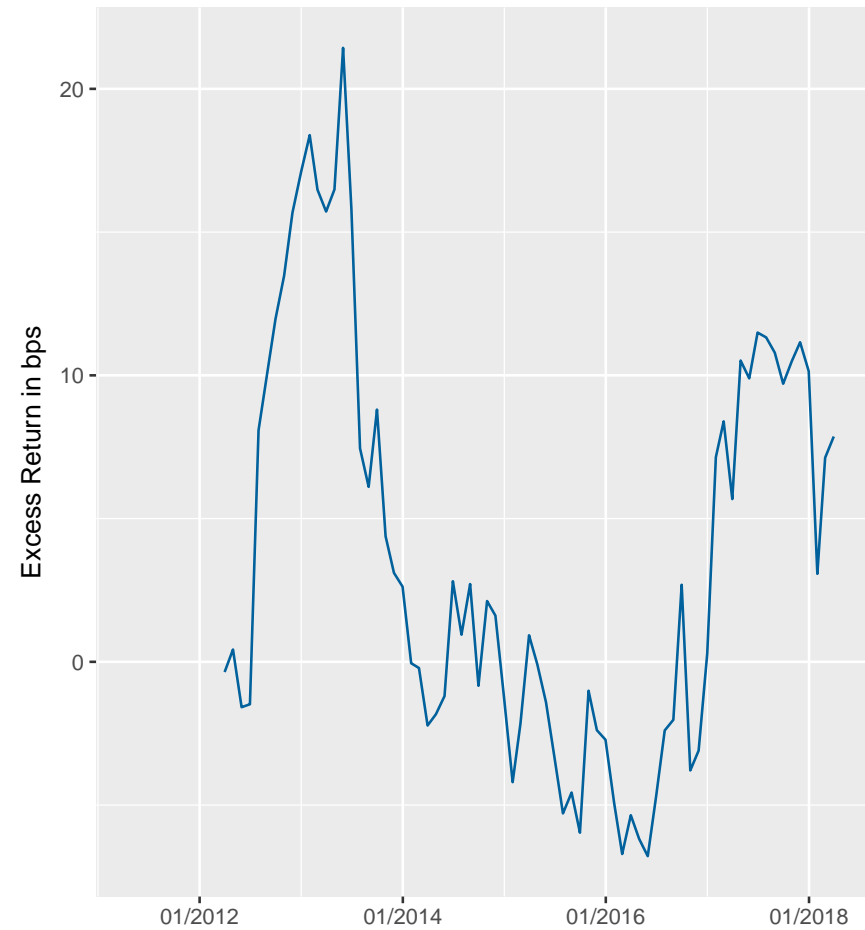
E Portfolios Composite

Monthly Cumulative Excess Performance



E Portfolios

Rolling 1 Year Excess Performance

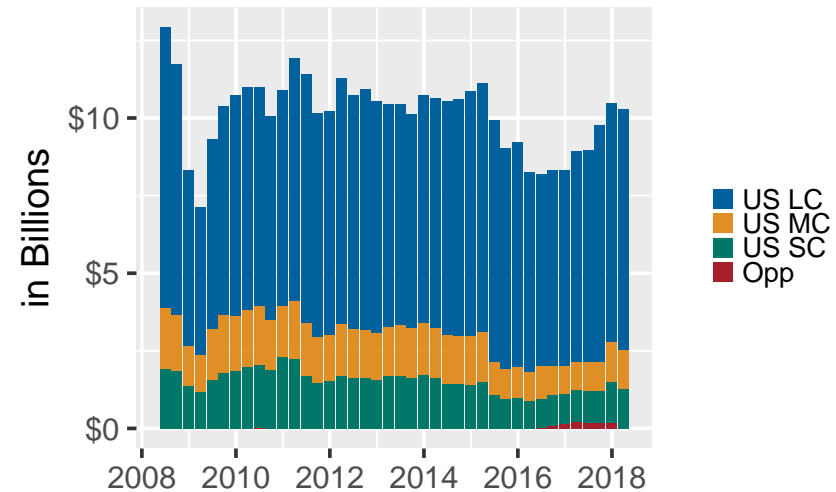


Domestic Equity

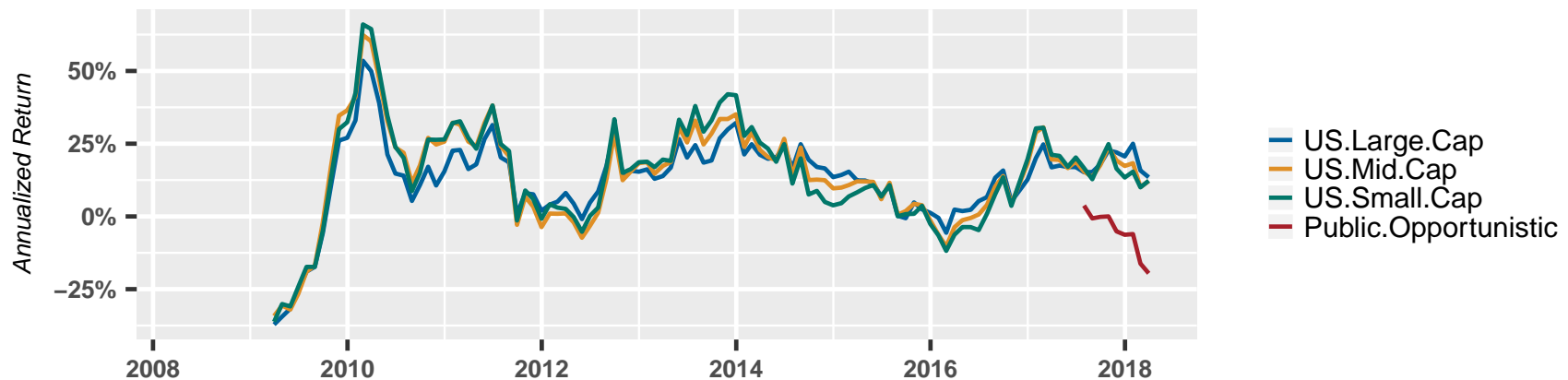
Annualized Returns - TWRs

Composite	One Year	Three Year	Five Year	Ten Year
US Large Cap	13.48%	10.72%	13.07%	9.56%
Blended Benchmark	13.99%	10.78%	13.31%	9.49%
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US Mid Cap	12.14%	8.9%	12.2%	10.82%
Blended Benchmark	10.97%	8.96%	11.97%	10.9%
Excess	1.16%	-0.06%	0.23%	-0.08%
US Small Cap	12.27%	8.43%	11.59%	10.95%
Blended Benchmark	12.68%	10.76%	13.56%	11.35%
Excess	-0.41%	-2.33%	-1.97%	-0.41%
Public Opportunistic	-19.55%	NA%	NA%	NA%
Blended Benchmark	13.55%	NA%	NA%	NA%
Excess	-33.11%	NA%	NA%	NA%

Market Values

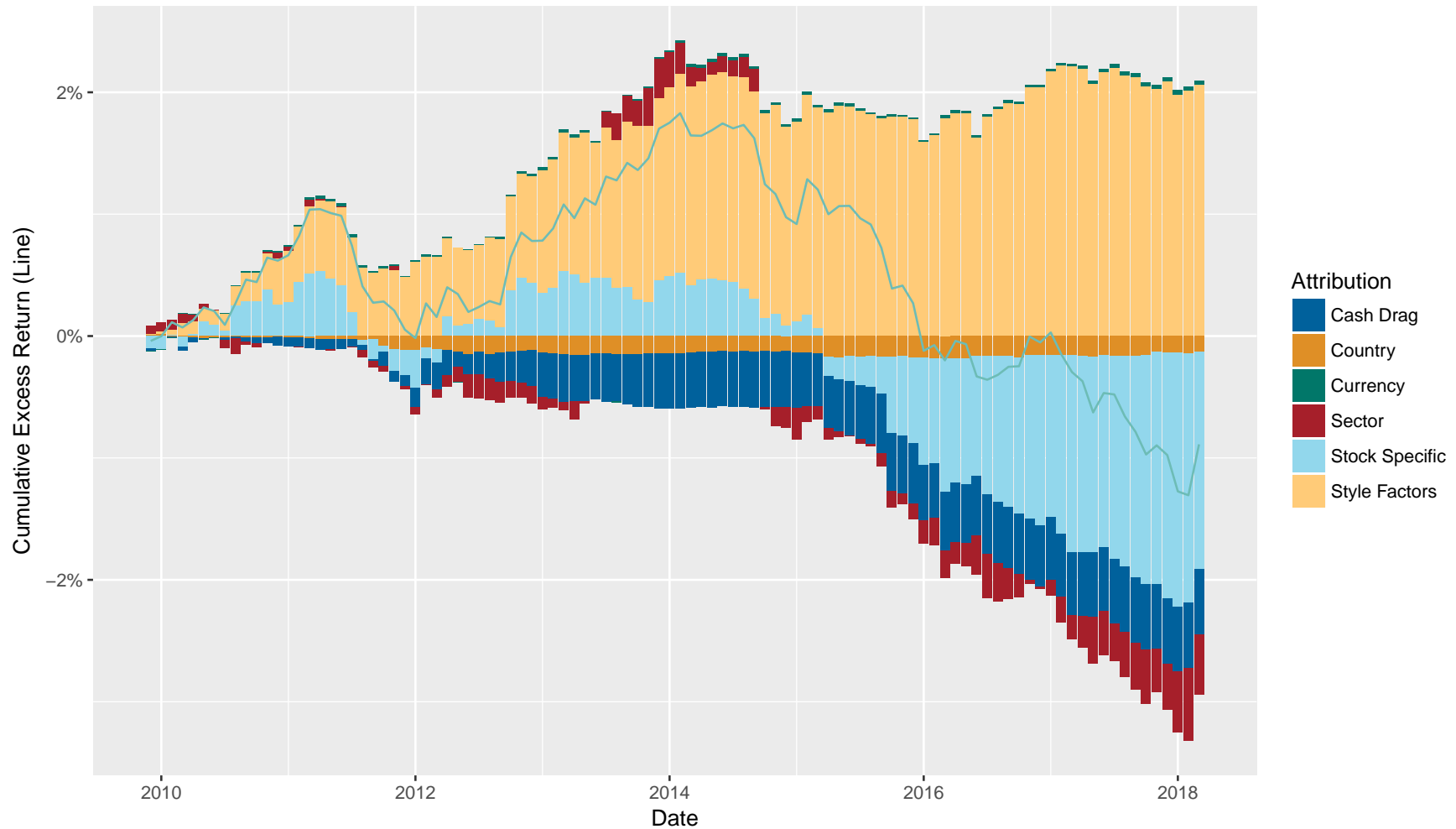


Domestic Equity Rolling 1 Year Returns



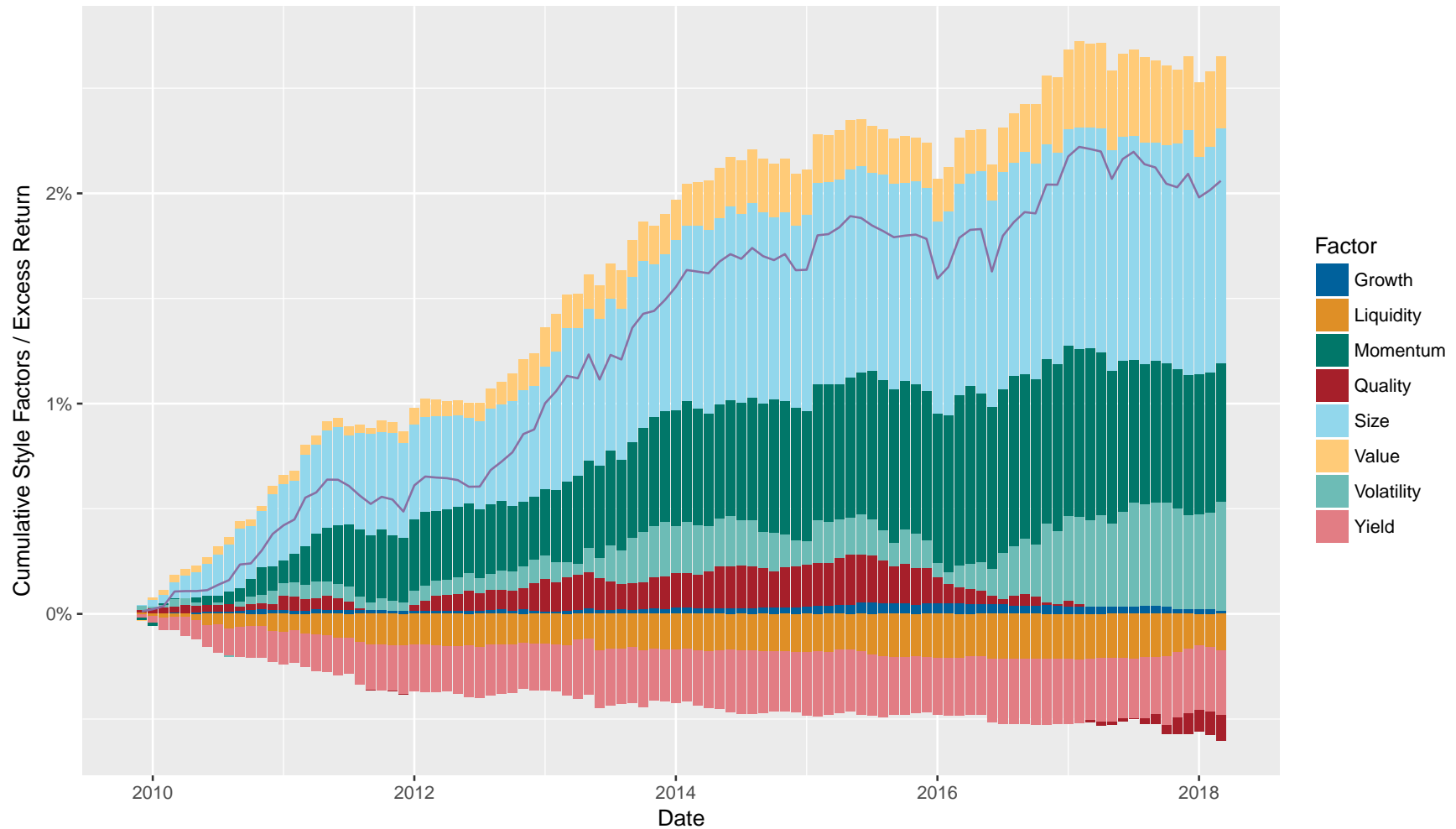
Domestic Equity: Barra Attribution

Domestic Equity Barra Factor Attribution



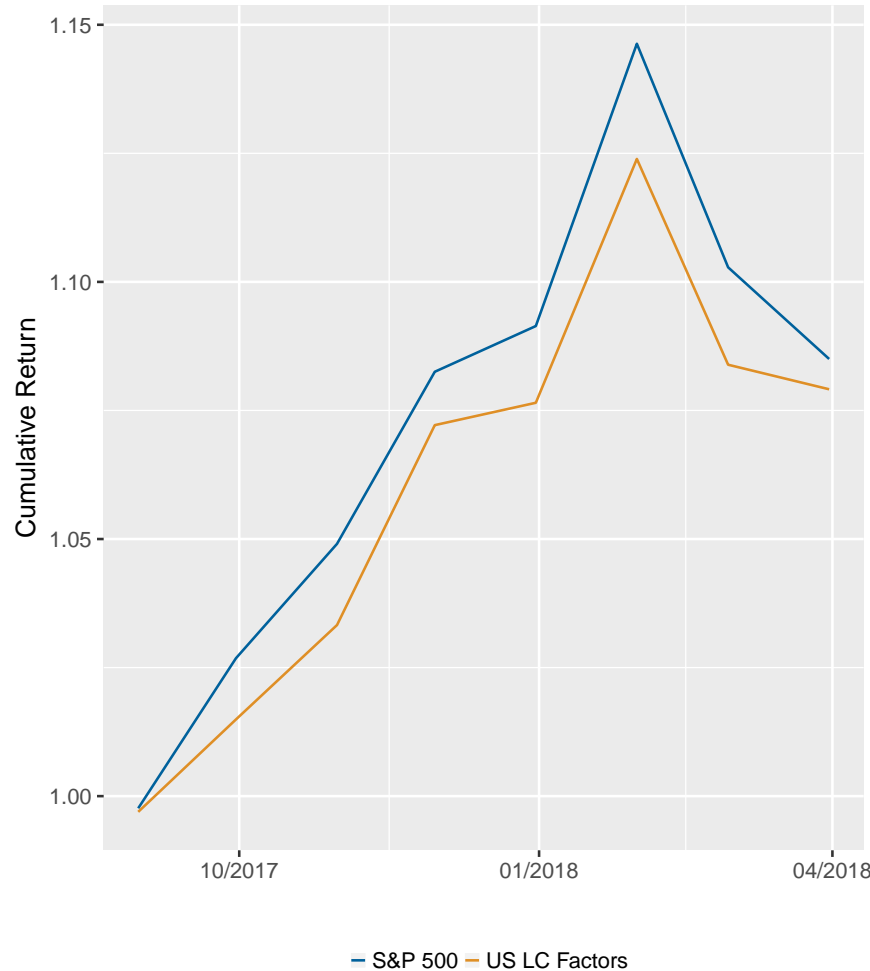
Domestic Equity: Style Factors

Domestic Equity Style Factor Breakout

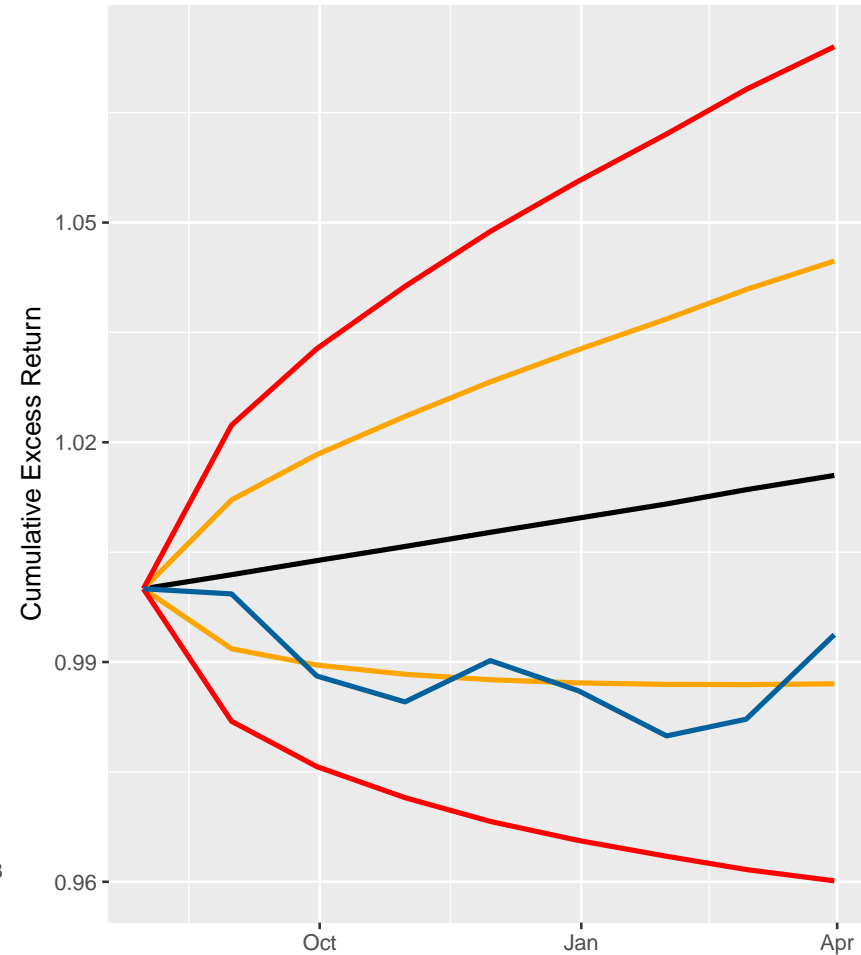


US Large Cap Factor Portfolio Performance Summary

US Large Cap Factor Portfolio Performance



Actual Excess vs Expected Excess ± 1 & 2 Std Dev

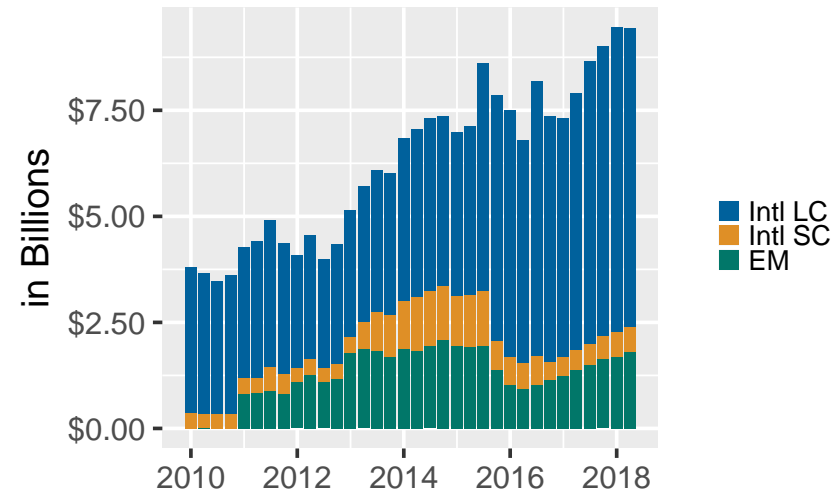


International Equity

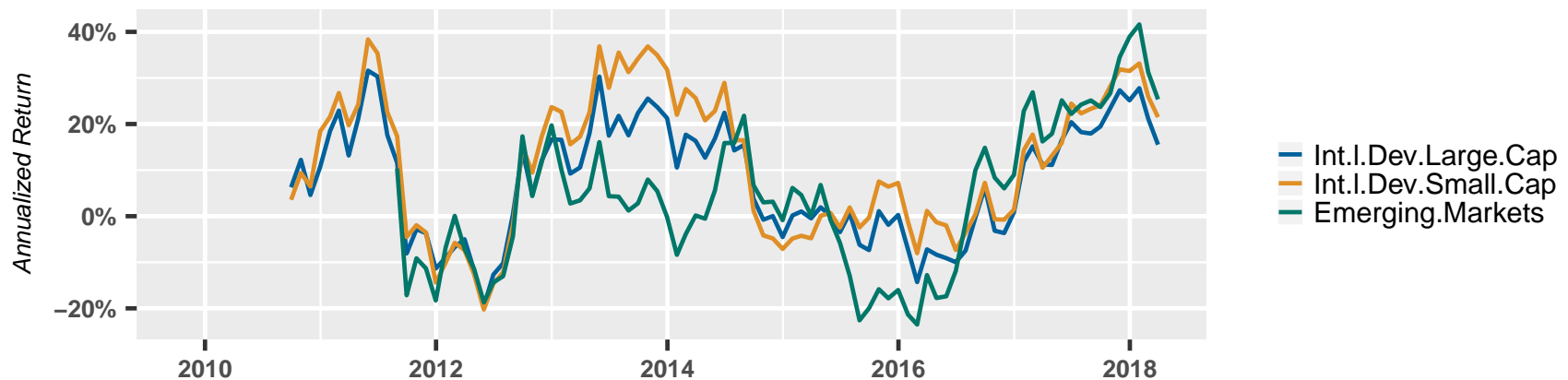
Annualized Returns - TWRs

Composite	One Year	Three Year	Five Year
Int'l Dev Large Cap	15.53%	6.05%	6.67%
Blended Benchmark	14.8%	5.55%	6.56%
Excess	0.73%	0.5%	0.11%
Int'l Dev Small Cap	21.5%	10.74%	10.18%
Blended Benchmark	23.49%	12.25%	11.15%
Excess	-2%	-1.51%	-0.97%
Emerging Markets	25.34%	8.31%	4.97%
Blended Benchmark	24.93%	8.81%	5.05%
Excess	0.41%	-0.5%	-0.08%

Market Values

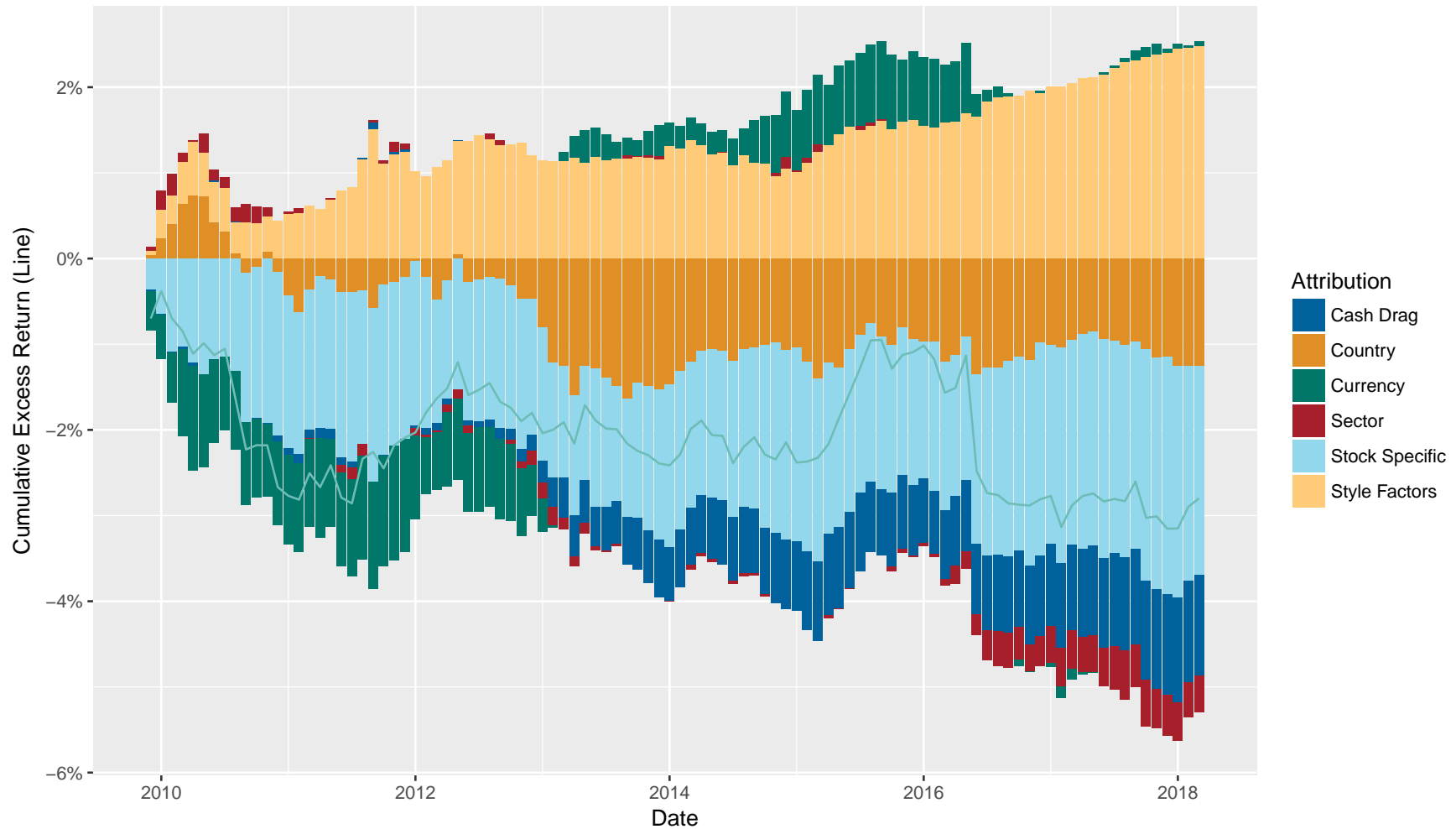


Domestic Equity Rolling 1 Year Returns



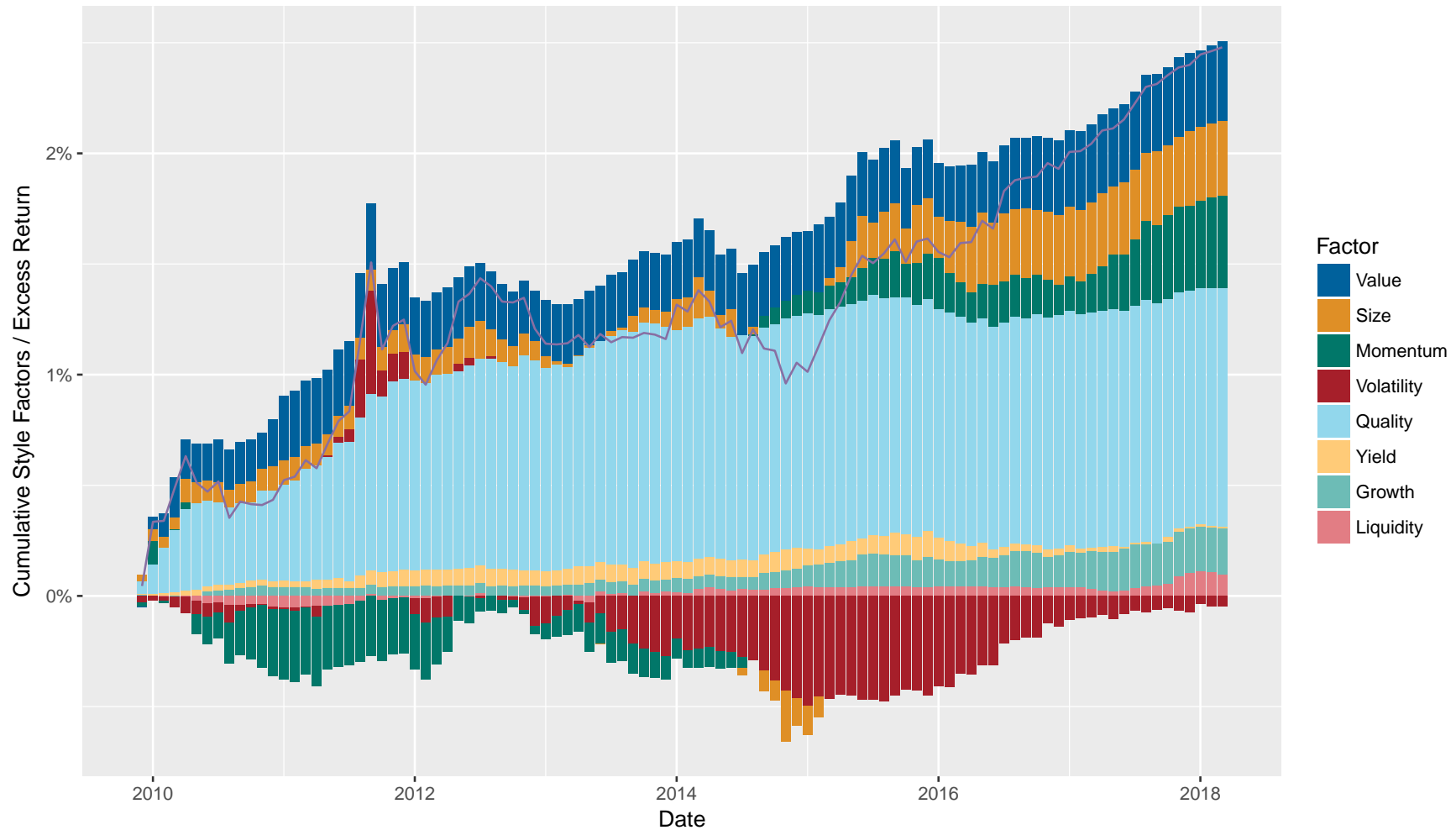
International Equity: Barra Attribution

International Equity Barra Factor Attribution



International Equity: Style Factors

International Equity Style Factor Breakout

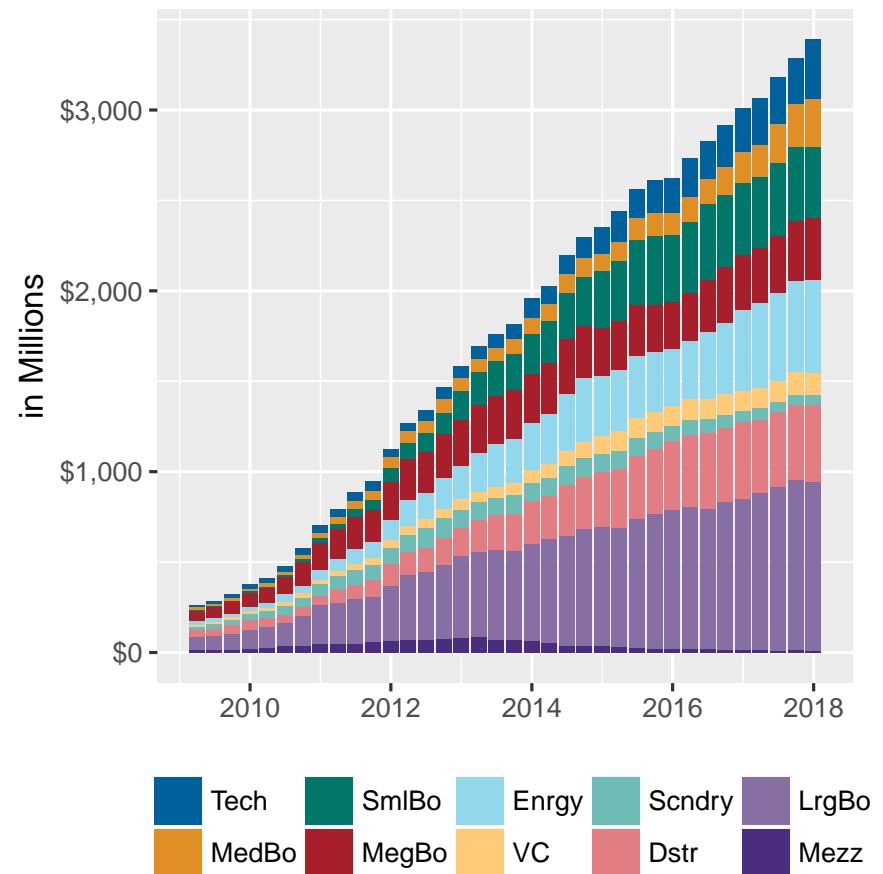


Performance Overview & Allocation

Private Equity IRRs

Category	Qtr	1 Year	3 Year	5 Year	ITD
Private Equity	4.86%	15.1%	12%	12.8%	12.3%
Russell 2000	3.39%	15%	10.2%	13.9%	13.2%
Excess	1.47%	0.1%	1.8%	-1.1%	-1%
Tech	7.91%	23.4%	17.9%	19%	17.5%
MedBo	7.84%	17.4%	20.8%	19.9%	15.4%
SmlBo	1.42%	9.8%	17.8%	16.5%	13.7%
MegBo	5.94%	24%	16.3%	16%	13%
Enrgy	4.19%	9.6%	5.3%	7%	8%
VC	2.85%	12.2%	10.9%	14.1%	10.8%
Scndry	2.39%	17.5%	4.9%	8.8%	9.6%
Dstr	4.35%	5.4%	3.8%	6.3%	8.5%
LrgBo	5.28%	19.7%	13.7%	13.8%	13.8%
Mezz	3.75%	12.2%	8.4%	8.8%	9.6%

NAV by Strategy

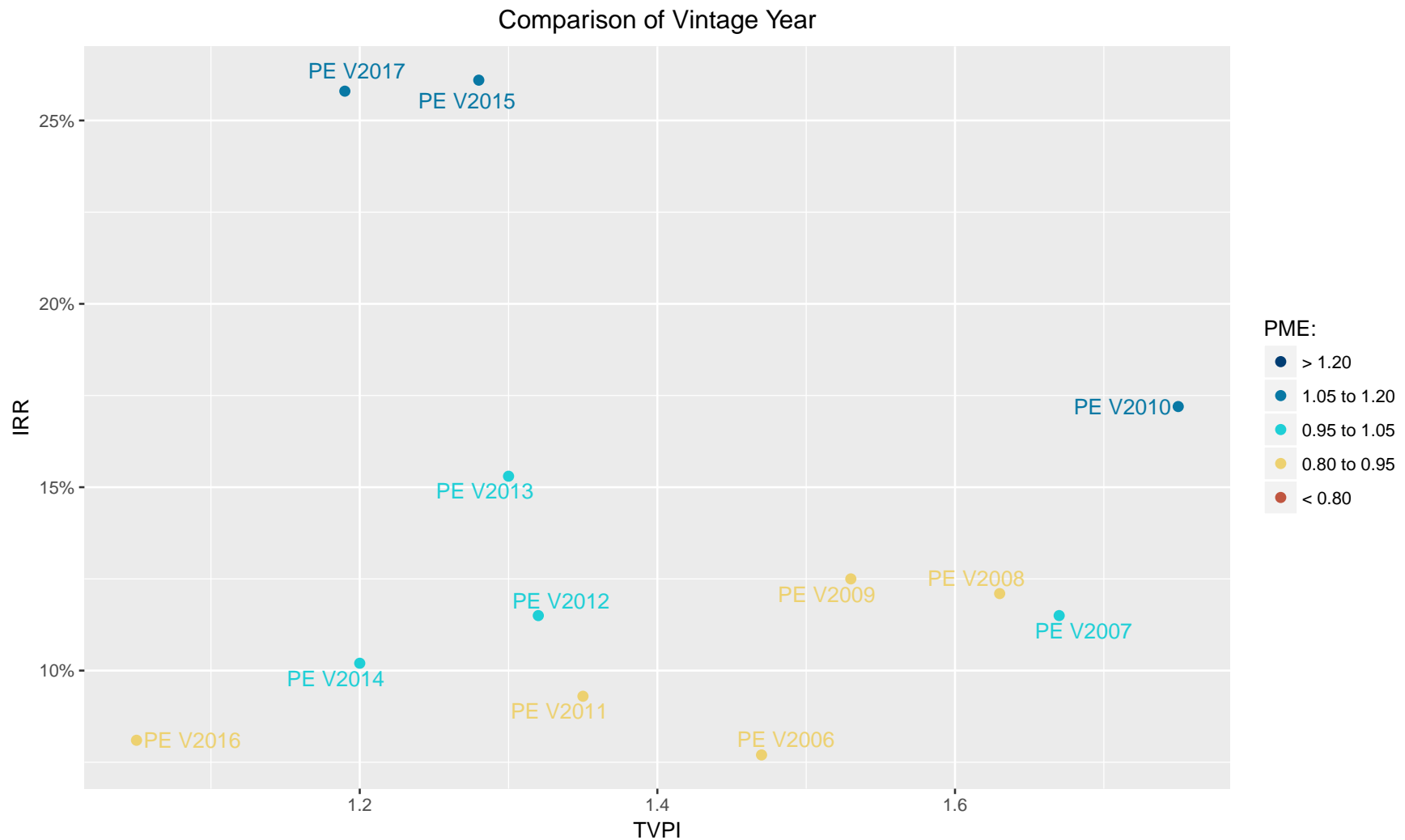


Performance by Total

Comparison of Total, Current, and Legacy Portfolios

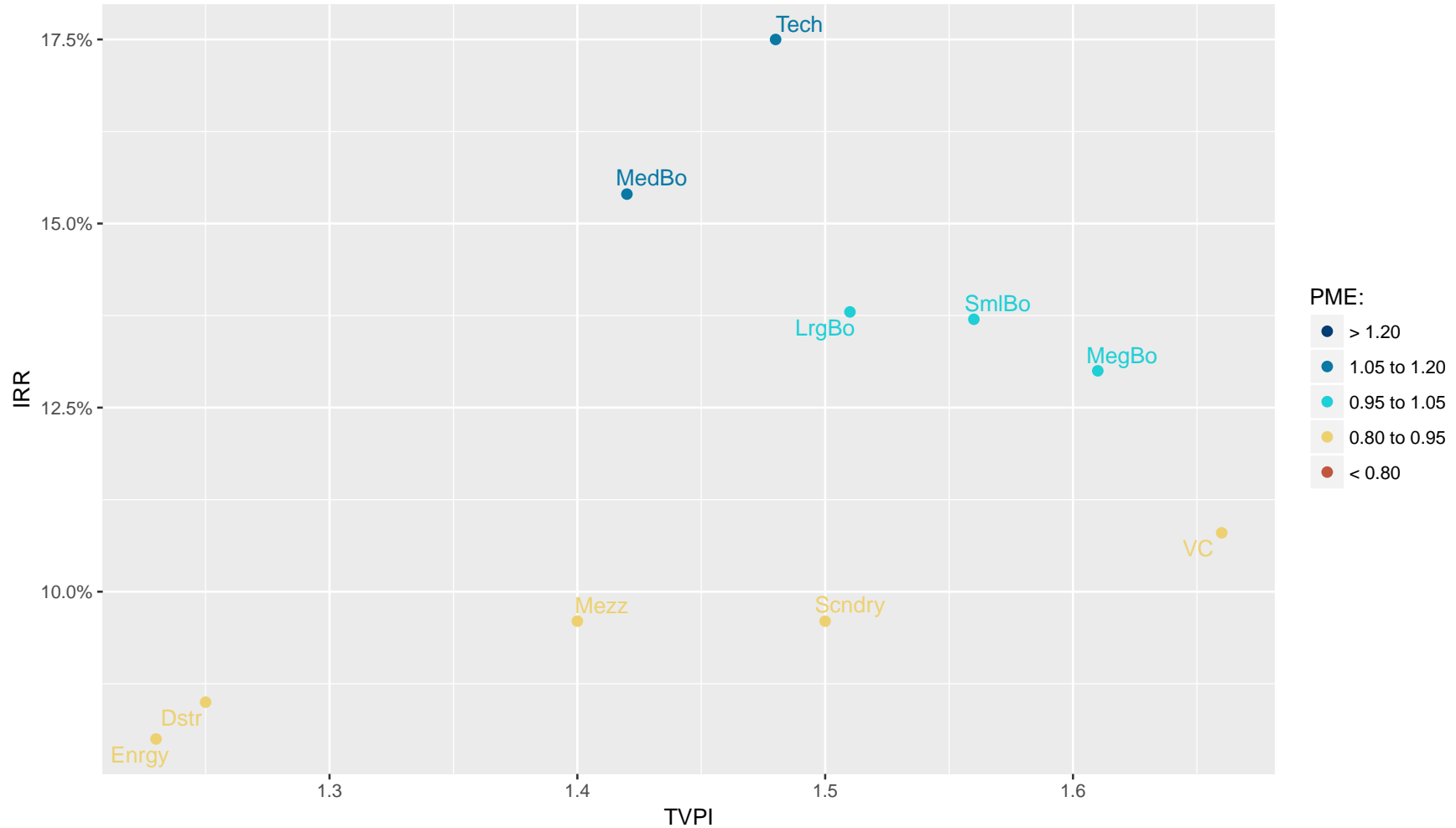


Performance by Vintage



Performance by Category

Comparison of Strategies

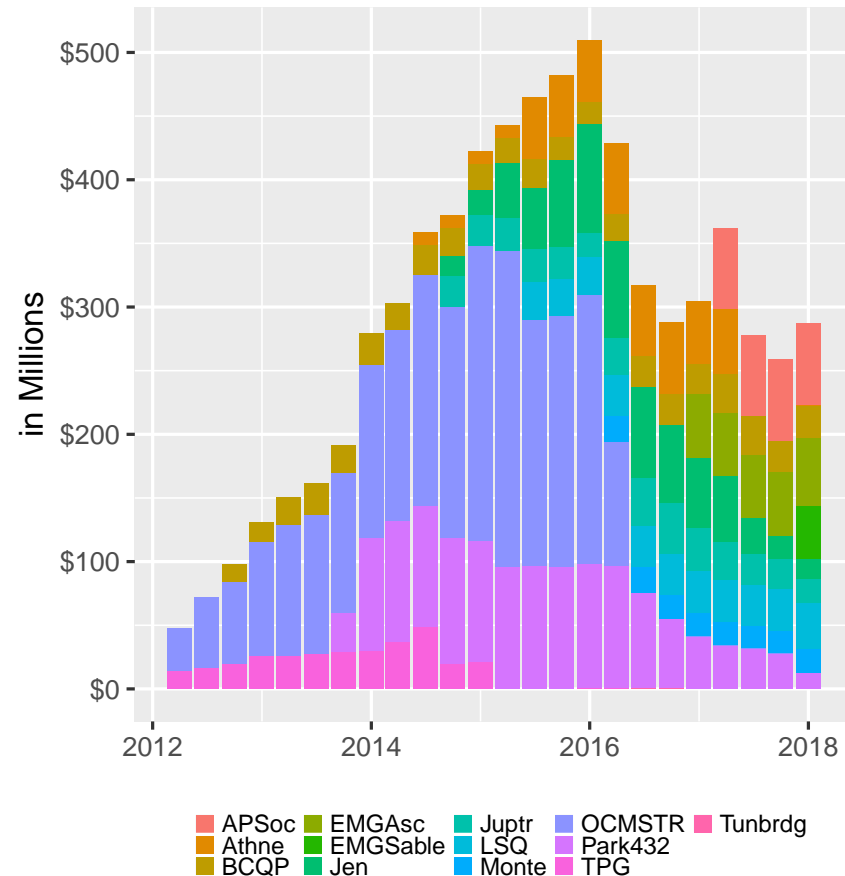


Private Opportunistic Equity

Private Opportunistic Equity IRRs

Category	Qtr	1 Year	3 Year	5 Year	ITD
Private Opportunistic Equity	6.7%	5.5%	11.1%	20.6%	21.4%
Absolute 8%	2%	8%	8%	8%	8%
Excess	4.8%	-2.5%	3.1%	12.6%	13.4%

Private Opportunistic Equity Funds



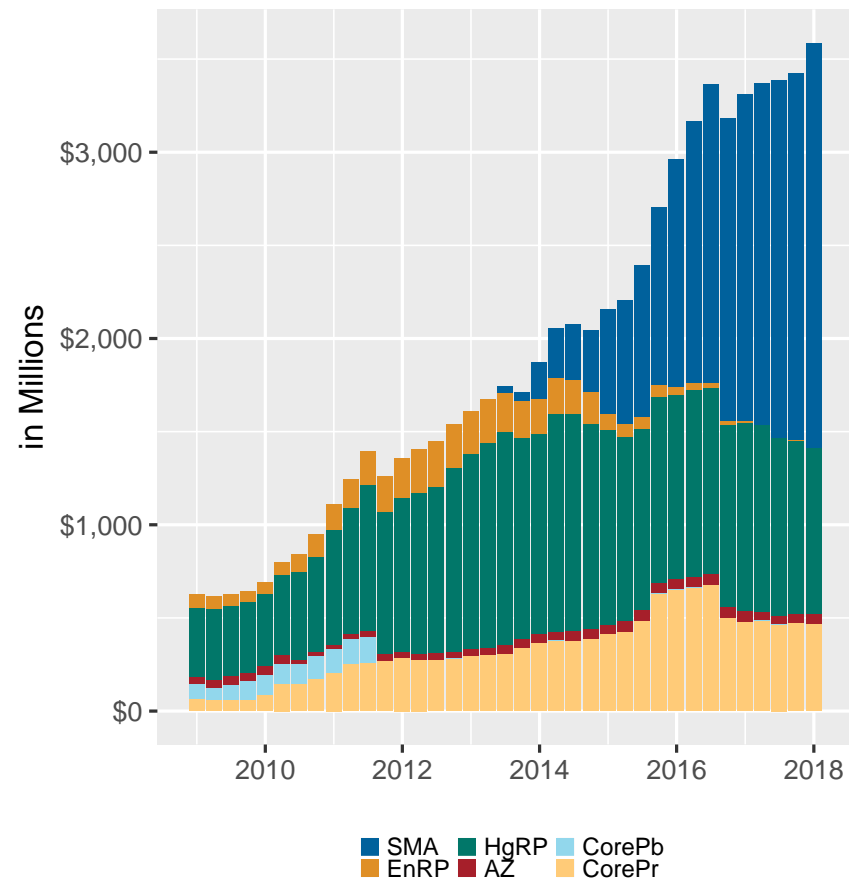
- While we customarily compare opportunistic investments to an absolute return benchmark
 - The inception to date dollar matched IRR for an investment in Russell 2000 would have been 10.64%

Performance Overview & Allocation

Real Estate IRRs

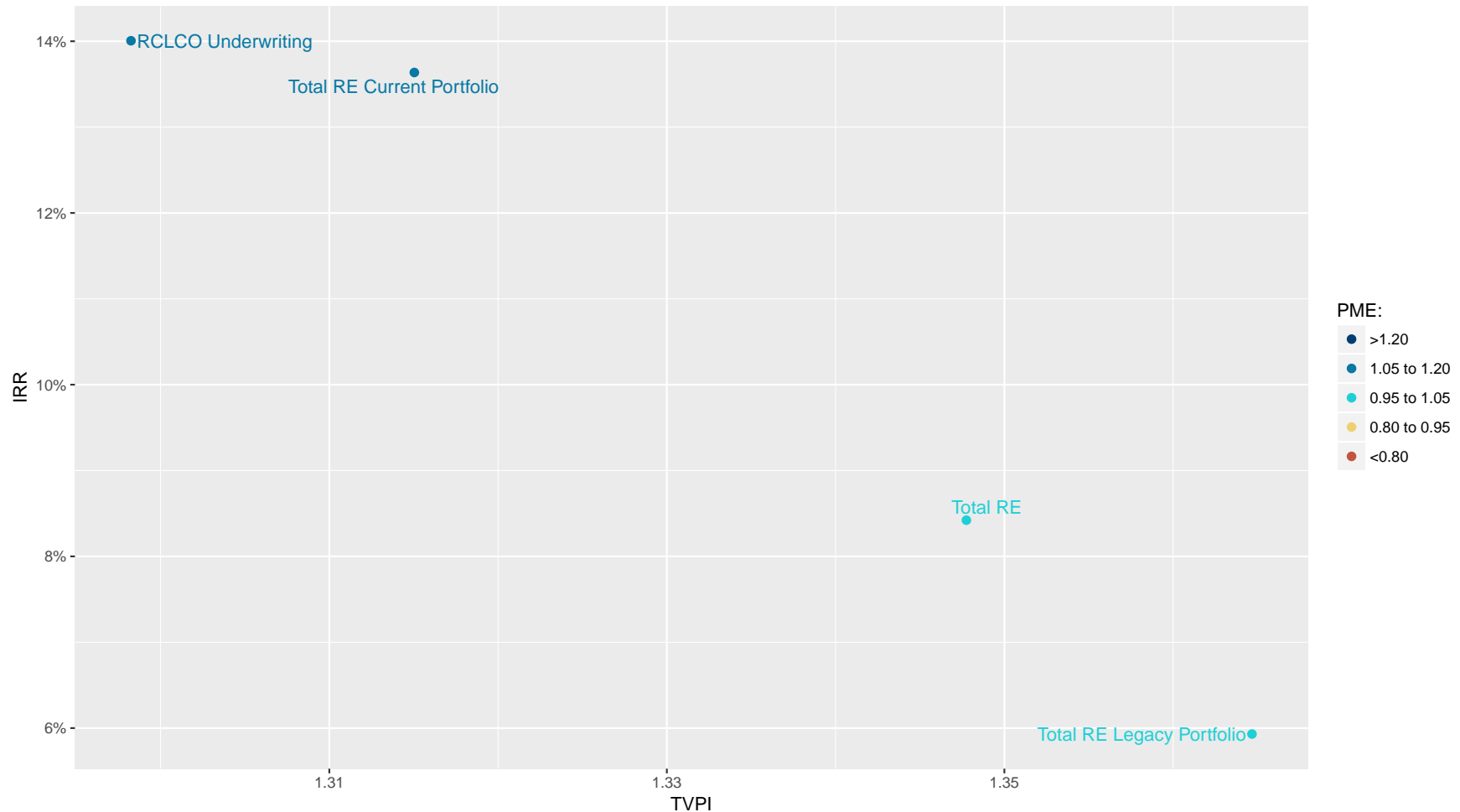
Category	Qtr	1 Year	3 Year	5 Year	ITD
Real Estate	2%	7.8%	11%	12.1%	8.4%
ODCE Net	1.6%	6.7%	9.8%	10.7%	7.2%
Excess	0.4%	1.1%	1.2%	1.5%	1.2%
EnRP	7.1%	-10.7%	15.4%	14.7%	5.7%
HgRP	1%	7.7%	8.8%	11.5%	7.5%
CorePb	0%	0%	NA%	NA%	0.1%
CorePr	2.2%	7.1%	9.1%	9.6%	9.4%
AZ	1%	-18.5%	-1.2%	7.4%	8.7%
Strat	2.5%	9%	13.7%	14.4%	14.4%

NAV by Strategy

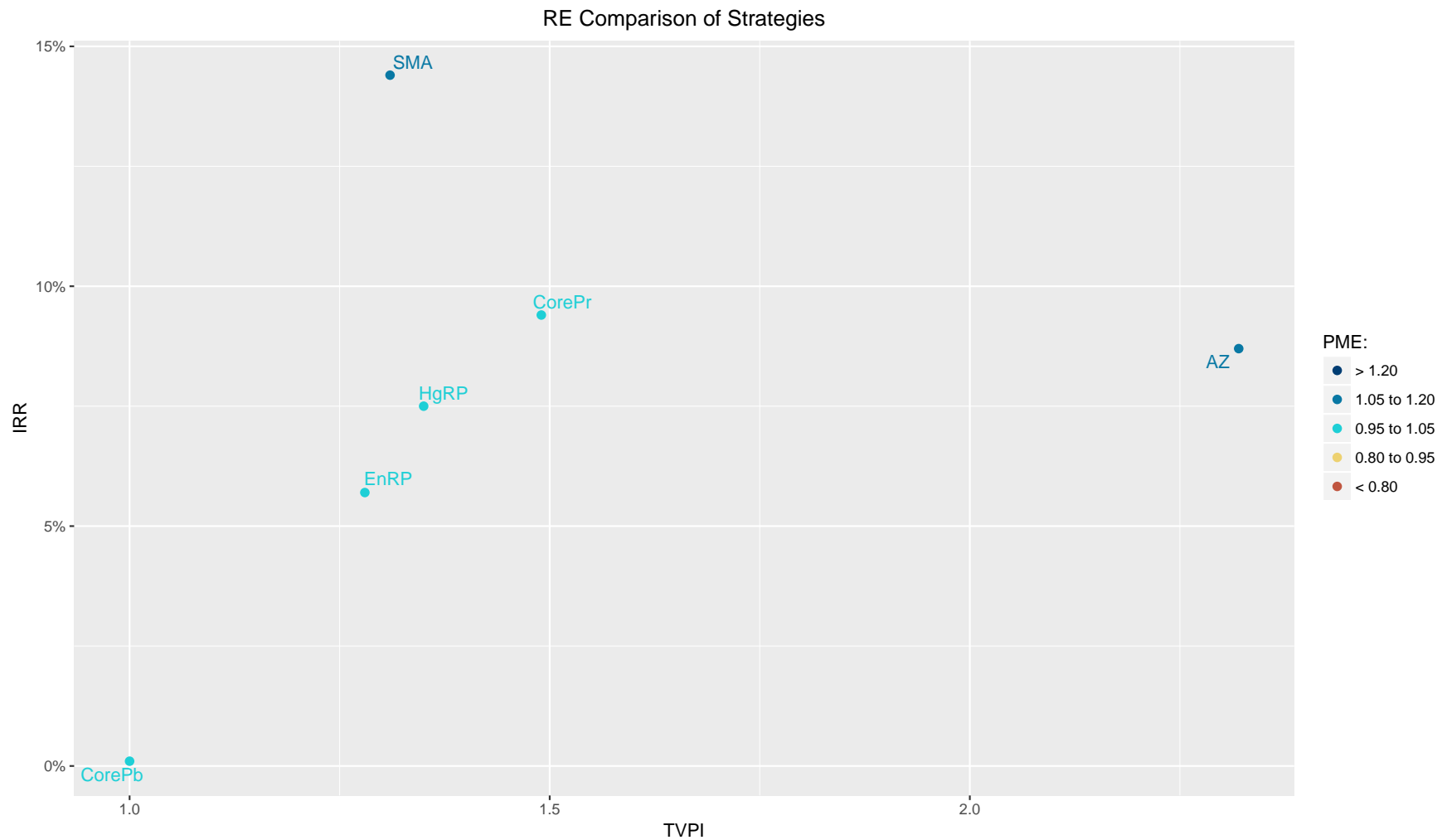


Total Performance

Comparison of Current, Legacy, and Consultant



Performance by Strategy

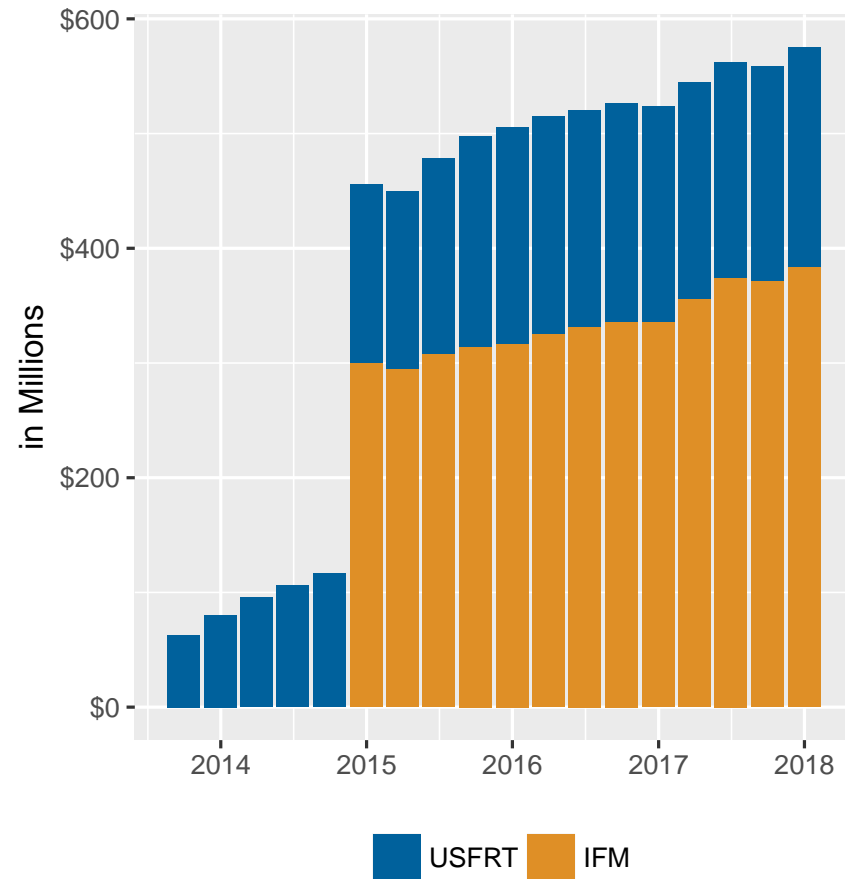


Performance Overview & Allocation

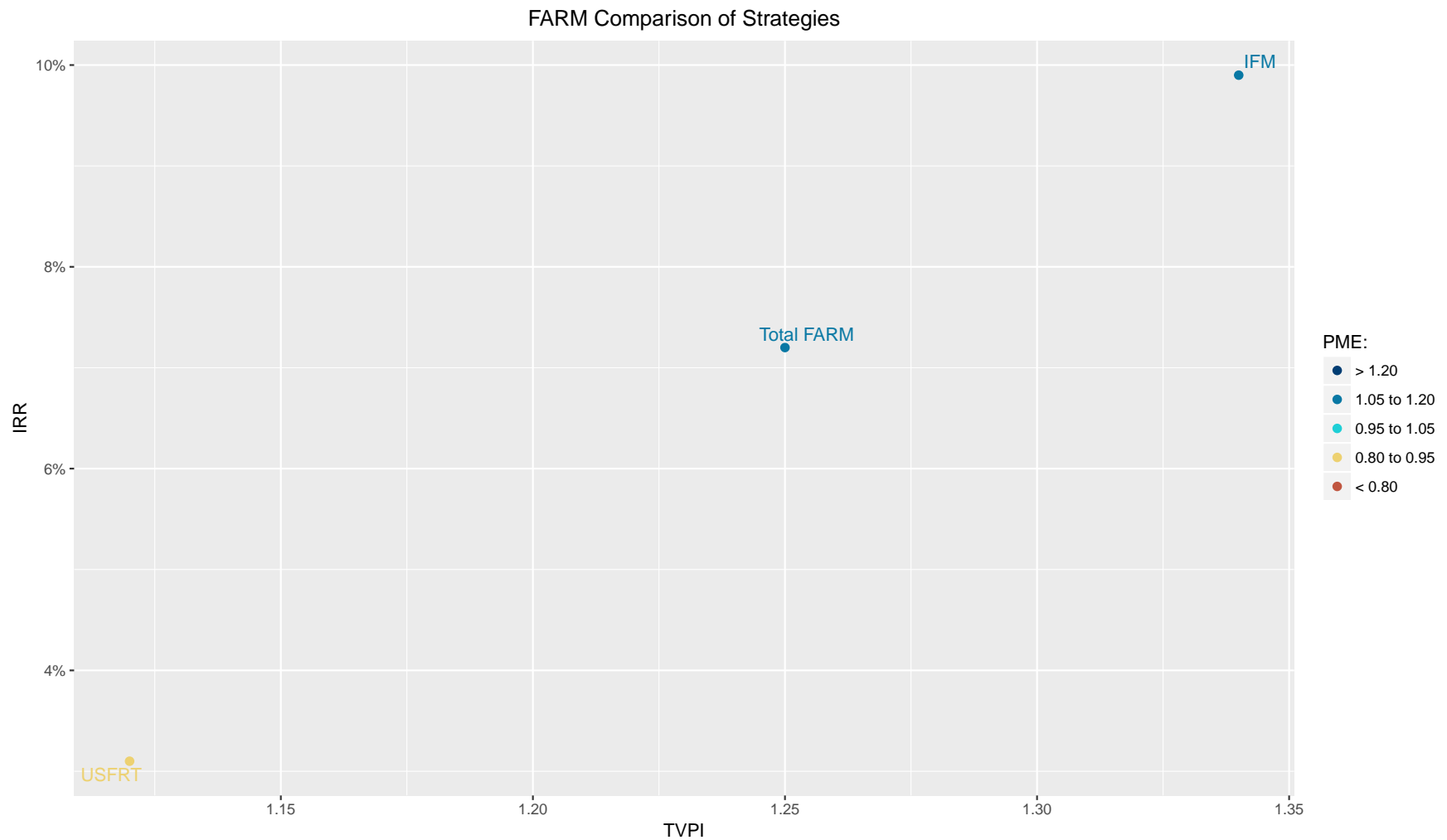
Farmland & Infrastructure IRRs

Category	Qtr	1 Year	3 Year	5 Year	ITD
Farmland	3.3%	13.4%	7.5%	7.2%	7.2%
Core CPI + 350 Bps	1.4%	5.3%	5.6%	5.5%	5.5%
Excess	1.9%	8.1%	2%	1.6%	1.6%
IFM	4%	19.5%	10.1%	9.9%	9.9%
USFRT	2.1%	2.7%	2.9%	3.1%	3.1%

NAV by Strategy



Total Performance



Commodities Performance

Portfolio	Benchmark	3M	Fiscal YTD	1Y	3Y	5Y	ITD
		alpha (bps)	alpha (bps)	alpha (bps)	alpha (bps)	alpha (bps)	alpha (bps)
Gresham	B'berg Commod Tot Ret	+19	+382	+362	+92	+100	+140