

House Views and Portfolio Positioning

Arizona State Retirement System

September 28, 2018

Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

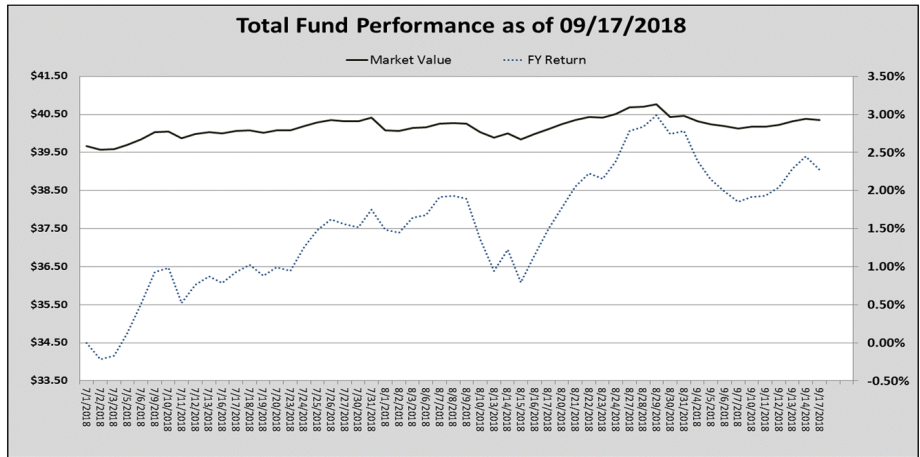
Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

Summary View

- We are close to policy weights throughout the portfolio
 - We moved to slight underweight in equities earlier this year iwth increased volatility
 - We are underweight in core bonds expecting a continued upward trend in rates
 - We are slightly overweight in credit expecting private credit to outperform in current conditions
- In general, markets are priced richly
 - Equity are slightly below their January peak, but are not cheap
 - After a period of some weakness, dollar is showing some strength due at least in part to higher U.S. rates
 - Political uncertainty is affecting markets
 - Prospect of isolationism/trade wars is troubling to the market
 - Unconventional fiscal policy has little precedent
 - Late cycle dynamics create asymmetric risk

Fiscal year Performance



Total Fund Positioning

Asset Class	Total Fund		SAA		Interim		Actual - Interim		
	Exposure	% of NAV	Target	Proration	Target (%)	Target (\$)	Δ (%)	Δ (\$)	
Cash	1.1%	1.1%	0.0%	0.0%	0.00%	\$ mm	1.1%	\$445 mm	
Interest Rate Sensitive	9.6%	9.6%	10.0%	1.9%	11.88%	\$4,793 mm	-2.3%	-\$931 mm	
Credit	16.6%	16.6%	20.0%	-3.4%	16.61%	\$6,705 mm	0.0%	\$ mm	
	Large Cap	19.9%	19.9%	16.5%	3.8%	20.38%	\$8,224 mm	-0.4%	-\$176 mm
	Mid Cap	3.2%	3.2%	2.8%	0.7%	3.45%	\$1,391 mm	-0.2%	-\$93 mm
	Small Cap	3.1%	3.1%	2.9%	0.7%	3.53%	\$1,424 mm	-0.4%	-\$173 mm
US Equity	26.3%	26.3%	22.2%	5.2%	27.35%	\$11,038 mm	-1.1%	-\$442 mm	
	Developed Large Cap	14.5%	14.5%	11.8%	2.7%	14.52%	\$5,859 mm	0.0%	\$5 mm
	Developed Small Cap	2.1%	2.1%	2.1%	0.5%	2.55%	\$1,031 mm	-0.5%	-\$194 mm
	Emerging Markets	4.8%	4.8%	4.3%	1.0%	5.28%	\$2,132 mm	-0.5%	-\$190 mm
Non-US Equity	21.4%	21.4%	18.1%	4.2%	22.36%	\$9,022 mm	-0.9%	-\$379 mm	
Total Public Equity	47.7%	47.7%	40.3%	9.4%	49.71%	\$20,060 mm	-2.0%	-\$820 mm	
	Private Equity - US Exposure	7.7%	7.7%	5.3%	0.0%	5.32%	\$2,149 mm	2.4%	\$975 mm
	Private Equity - Non US Exposure	1.9%	1.9%	4.4%	0.0%	4.35%	\$1,756 mm	-2.4%	-\$975 mm
Total Equity	57.4%	57.4%	50.0%	9.4%	59.38%	\$23,964 mm	-2.0%	-\$820 mm	
Total Real Estate	12.1%	12.1%	20.0%	-7.9%	12.13%	\$4,893 mm	0.0%	\$ mm	
Other	3.2%	3.2%	0.0%	0.0%	0.00%	\$ mm	3.2%	\$1,306 mm	
Total Fund	100.0%	100.0%	100.0%	0.0%	100.00%	\$40,356 mm	0.0%	\$ mm	

Outline

- 1 Summary View and Positioning
- 2 **Macro Environment**
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

Commentary

- Moderate growth Globally
 - Accelerating growth in US and Europe
 - Decelerating growth in UK and Japan
 - US, UK and Japan at or near full employment
 - Europe employment improving, but room to run with nearly 8% unemployment
 - China growth a concern as lending levels are managed and normalized
- Inflation generally low but accelerating in US

Macro Indicators

Slow to moderate growth, strong employment, inflation general low.¹

6/11/2018

Economy		Moving Average		
			2 Yr.	1 Yr.
EHUPUS Index	US Unemp	4.1	4.8	4.7
EHUPEUN Index	EUR Unemp	7.4	8.6	8.4
EHUPGB Index	UK Unemp	4.2	4.9	4.7
EHUPJP Index	Japan Unemp	2.5	3.1	3.0
GDP CYOY Index	US GDP	2.8	1.8	1.9
EHGDEUR Index	EUR GDP	2.0	1.8	1.8
EHGDGB Index	UK GDP	1.2	1.8	2.0
EHGDJP Index	Japan GDP	-0.6	1.0	1.1
EHGDCN Index	China GDP	6.8	6.8	6.8
CPI YOY Index	US CPI	2.5	1.3	2.0
CPI XYOY Index	US CPI X fd nrg	2.1	2.1	2.0
CPEXEUY Index	EU CPI X fd nrg	0.9	0.9	1.0
JCPNEFEY Index	Jpn CPI X fd nrg	0.1	0.3	-0.1
CNCPIYOY Index	China CPI	1.8	1.7	1.6

Global Interest Rates

Rates moving up in US, but soft elsewhere.

9/14/2018

Economy		Moving Average		
			2 Yr.	1 Yr.
EHUPUS Index	US Unemp	3.9	4.4	4.1
EHUPEUN Index	EUR Unemp	7.2	7.9	7.5
EHUPGB Index	UK Unemp	4.1	4.5	4.2
EHUPJP Index	Japan Unemp	2.4	2.8	2.6
GDP CYOY Index	US GDP	2.9	2.2	2.6
EHGDEUR Index	EUR GDP	2.1	2.1	2.3
EHGDGB Index	UK GDP	1.3	1.7	1.4
EHGDJP Index	Japan GDP	3.0	1.7	1.6
EHGDCN Index	China GDP	6.7	6.8	6.8
CPI YOY Index	US CPI	2.7	2.2	2.4
CPI XYOY Index	US CPI X fd nrg	2.2	2.0	2.0
CPEXEUY Index	EU CPI X fd nrg	1.2	1.1	1.2
JCPNEFEY Index	Jpn CPI X fd nrg	0.0	0.0	0.1
CNCPIYOY Index	China CPI	2.3	1.7	1.9

Currency

September 14, 2018

		Price	200 day moving average	100 day moving average	50 day moving average	30 day relative strength	Hurst Exponent	6 month price change	6 month volatility annualized	Momentum Index
Currency										
EURUSD Currency	Euro/USD	1.16	1.19	1.17	1.16	49	63	-5.58	7.47	-0.75
GBPUSD Currency	GBP/USD	1.31	1.35	1.32	1.30	51	105	-6.74	7.65	-0.88
JPYUSD Currency	Yen/USD	0.0089	0.0091	0.0090	0.0090	44	21	-5.28	6.68	-0.79
CNY BGN Currency	CNY/USD	0.1456	0.1535	0.1510	0.1468	60	22	-7.85	4.94	-1.59

Consensus Economic Forecasts

Economic Forecasts

Contributor

Composite

☐ See Previous forecasts

Period

Yearly

☐ See Last Actuals

	Real GDP (yoy %)			CPI (yoy %)			Unemployment (%)			Curr Acct (% of GDP)			Budget (% of GDP)		
	18	19	20	18	19	20	18	19	20	18	19	20	18	19	20
LatAm	2.48	2.92	3.04	337.9	246.97	6.79	10.06	9.38		-1.83	-2.26	-2.59	-5.93	-5.16	-4.92
E. Europe & Africa	3.09	2.88	2.86	5.13	5.2	4.9	7.73	7.66	7.79	-0.1	-0.34	-0.25	-1.68	-1.8	-1.73
Middle East	2.58	2.98	3.41	3.9	3.44	3.25	10.04			1.28	1.22	1.9	-5.53	-4.92	
Asia	5.92	5.87	5.82	2.23	2.58	2.68	3.91	3.9	4.01	1.7	1.47	1.23	-2.9	-2.92	-2.55
China	6.5	6.3	6.2	2.2	2.2	2.3	4	4	4	1.15	1.05	1.1	-3.5	-3.5	-2.9
G-10	2.35	2.05	1.7	1.97	1.88	1.95	5.2	4.98	5.02	0.14	0.09	-0.06	-2.55	-2.88	-2.85
USA	2.8	2.45	1.9	2.5	2.26	2.2	3.86	3.64	3.73	-2.7	-2.81	-2.84	-4	-4.89	-4.88
Japan	1.2	1	0.4	1	1	1.45	2.5	2.5	2.56	3.75	3.7	3.75	-4.2	-4	-3.4
Euro	2.3	1.9	1.7	1.5	1.6	1.75	8.3	7.9	7.8	3.3	3.25	3.1	-1	-1	-0.95
United Kingdom	1.4	1.5	1.8	2.5	2.1	2	4.3	4.4	4.4	-3.7	-3.4	-2.45	-2	-1.7	-1.4
Canada	2.1	1.9	1.8	2.3	2.1	2	5.8	5.7	6.05	-2.86	-2.6	-2.2	-0.8	-0.9	-1.25
Australia	2.7	2.8	2.8	2.2	2.3	2.5	5.5	5.3	5.1	-2.3	-2.3	-2.3	-1	-0.75	-0.1
Sweden	2.55	2.1	2	1.85	1.9	2	6.3	6.15		4	3.9		0.7	0.65	0.6
New Zealand	2.9	2.95	2.85	1.75	2	1.95	4.4	4.3	4.4	-2.8	-2.88	-2.8	0.95	0.9	1.6
Switzerland	2.1	1.8	1.7	0.8	1	1	2.93	2.8	2.7	9.9	9.85	9.2	0.4	0.3	0.3
Denmark	2	1.9	1.8	1	1.5	1.6	4.05	3.9		7.7	7.3		-0.3	-0.3	
Norway	2.3	2.2	1.8	2	1.8	2	3.75	3.5	3.3	6	5.8	6.4	4.65	4.9	5
Germany	2.3	2	1.5	1.7	1.8	1.8	5.2	4.95	4.95	7.8	7.4	7.1	0.9	0.6	0.4
France	2	1.8	1.6	1.6	1.5	1.7	8.8	8.4	8.2	-1	-0.9	-0.7	-2.6	-2.8	-2.4
Italy	1.4	1.2	1	1.2	1.3	1.6	10.7	10.3	10.1	2.7	2.45	2.3	-1.8	-1.8	-1.6
Europe	2.12	1.87	1.63	1.67	1.68	1.74	7.17	6.84	6.75	2.82	2.74	2.85	-0.81	-0.8	-0.87

Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities**
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 **Equities**
 - **Commentary**
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

Positioning

- We are 1.1% underweight US public equities in aggregate
 - 0.4% underweight LC, 0.2% underweight in MC & 0.4% underweight in SC
- We are 0.9% underweight in international equities in aggregate
 - Neutral in EAFE LC, 0.5% underweight EAFE SC, and 0.5% underweight emerging markets
- 80% of private equity exposure in US which more than offsets the underweight
 - Net positioning including PE is overweight US 1.2% and underweight international 2.9%

Commentary

- On a valuation basis, US looks expensive vs ROW
- However...
 - In the US:
 - Economic fundamentals are strong with robust growth & buoyant consumer confidence
 - Now coupled with modestly rising inflation & interest rates
 - In Europe:
 - Moderating GDP growth and slowing employment gains
 - ECB is cautiously pulling back stimulus
 - Dollar has maintained its strength
 - Fund flows have favored US vs ROW
 - Recent tariff announcements in the US and rising political fragmentation in Europe increase volatility and uncertainty
 - EM has underperformed since mid-April driven by Issues in Turkey and currency weakness
 - Comparatively strong economic fundamentals justify, to some extent, the differential valuation between US and international equities

Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 **Equities**
 - Commentary
 - **Trends**
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

Equity Price Trends

Generally favorable price trends. International stocks impacted by currency.

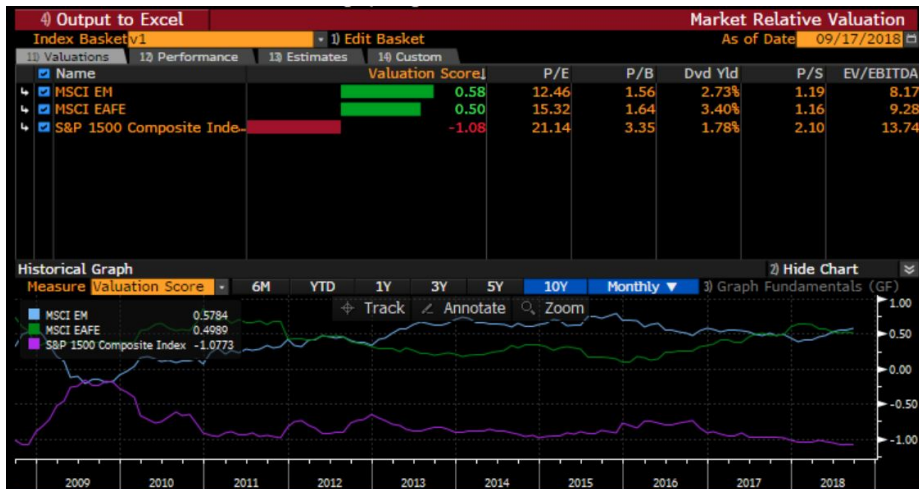
September 14, 2018

		Price	200 day moving average	100 day moving average	50 day moving average	30 day relative strength	Hurst Exponent	6 month price change	6 month volatility annualized	Momentum Index
Stocks										
SPX Index	S&P 500	2905	2742	2780	2841	61	127	6.83	14.61	0.47
MID Index	S&P Mid	2047	1942	1979	2010	57	140	6.72	13.61	0.49
SML Index	S&P Small	1079	991	1036	1066	56	87	12.34	14.65	0.84
MXEA Index	EAFE	1930	2021	1985	1963	44	118	-5.10	10.81	-0.47
MSDLEAFE Index	EAFE Local	1120	1146	1146	1141	43	113	0.04	9.99	0.00
MXEASC Index	EAFE Small	255	267	263	258	43	100	-6.40	10.81	-0.59
NCLDEAFE Index	EAFE Small Local	388	393	396	393	44	106	0.40	9.75	0.04
MXEF Index	EM	1018	1137	1089	1057	40	77	-15.88	14.28	-1.11
NDLEEGF Index	EM Local	561	591	581	573	43	89	-8.44	11.97	-0.71
VIX Index	S&P 500 Volatility	12	15	14	13	48	128	-34.01	164.02	-0.21
RVX Index	Russell 2000 Volatility	14	17	15	15	48	102	-27.07	132.56	-0.20
VXEFA Index	EAFE Volatility	12	13	12	12	50	89	-12.33	190.87	-0.06
VXEEM Index	EM Volatility	20	20	19	19	52	76	-9.71	111.44	-0.09

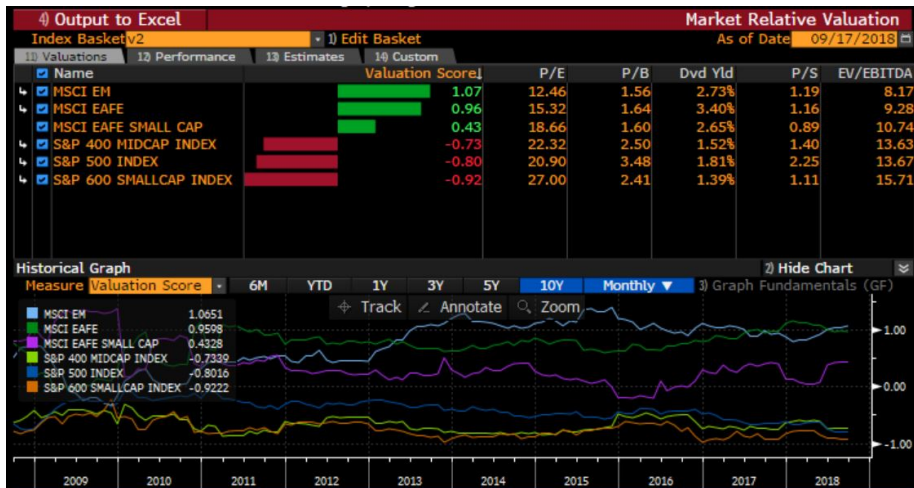
Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 **Equities**
 - Commentary
 - Trends
 - **Valuation**
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

Relative Valuation of Global Indices



Relative Valuation of Global Indices (Continued)



Relative Valuation of Global Indices (Continued)



US Dollar



Currency Forecasts



Consumer Confidence



Fund Flows

Settings							ETF Flows		
View	Highest/Lowest	Show	Netflow	Market	All	Period	3M	In Millions of USD	
Map View	Details	Historical							
Country	Netflow		Netflow	Flow%	Assets	#Funds	Inflow	In/Out	Outflow
Highest									
10) United States			+62,032	+2.0	3,069,074	1,842	320,886		-258,854
11) China			+19,183	+15.4	124,237	342	33,968		-14,785
12) Japan			+10,593	+2.8	372,593	285	54,340		-43,747
13) Canada			+3,496	+4.8	72,765	243	9,118		-5,621
14) Greater China*			+1,524	+6.0	25,491	46	2,555		-1,031
15) Switzerland			+575	+3.3	17,334	48	1,221		-646
16) Mexico			+354	+6.3	5,576	26	1,498		-1,144
17) Sweden			+254	+8.3	3,061	21	406		-152
18) Turkey			+241	+31.9	756	11	393		-151
19) North America*			+224	+2.2	10,089	50	477		-253
Lowest									
20) Spain			-169	-5.3	3,200	12	382		-551
21) India			-170	-0.7	25,178	109	1,891		-2,061
22) Latam Region*			-250	-16.4	1,525	8	81		-332
23) Taiwan			-346	-3.8	9,211	42	1,304		-1,650
24) Germany			-433	-1.1	39,022	141	3,004		-3,437
25) Hong Kong			-876	-3.8	23,271	46	1,658		-2,533
26) Asia Pacific*			-908	-7.5	12,056	26	161		-1,070
27) European Region*			-1,066	-0.9	112,651	324	8,093		-9,159
28) Brazil			-1,276	-15.6	8,172	30	647		-1,923
29) Eurozone*			-2,642	-1.8	144,107	268	11,064		-13,707

Outline

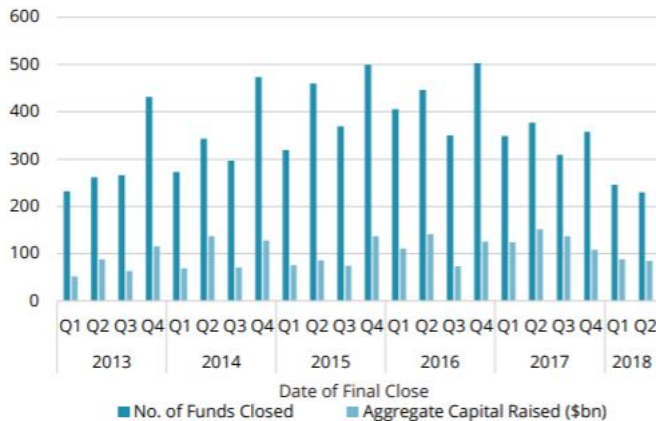
- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities**
 - Commentary
 - Trends
 - Valuation
 - **Private Equity**
- 4 Credit
- 5 Interest Rate Sensitive
- 6 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

Private Equity Environment

- Pace of fundraising has moderated a bit
- Deal volume has been relatively steady while aggregate deal value has trended up
- Exit volume and values recently rebounded after showing a moderate downward trend
- Buyout dry powder has flattened out while overall it has steadily risen as the asset class has grown
- Deal multiples are flat
- Given the long-dated nature of funds we do not attempt to time cycles but are paying close attention to the partners we select and their capabilities

Private Equity Fund Raising

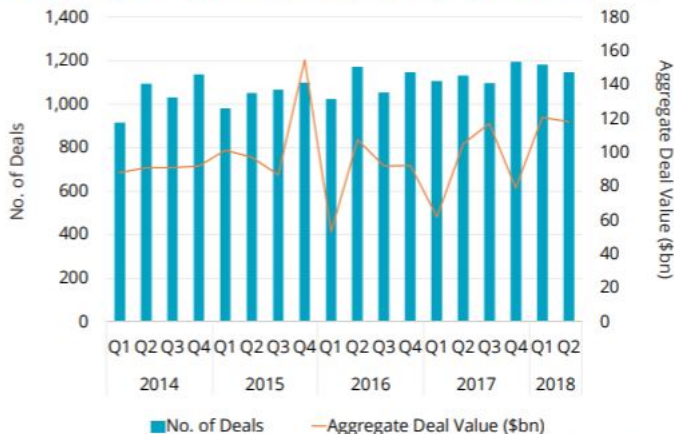
Fig. 1: Global Quarterly Private Equity Fundraising, Q1 2013 - Q2 2018



Source: Preqin

Private Equity M&A Deal Volume

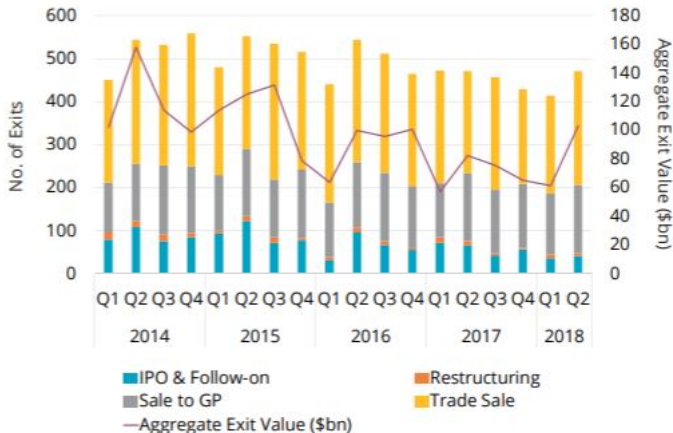
Fig. 17: Private Equity-Backed Buyout Deals, Q1 2014 - Q2 2018



Source: Preqin

Private Equity Exits

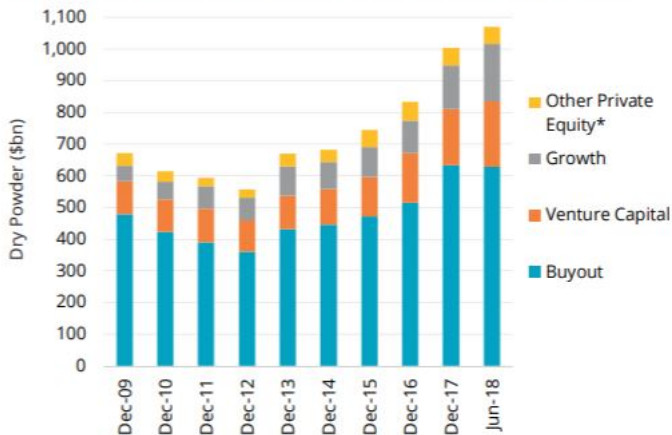
Fig. 19: Private Equity-Backed Buyout Exits by Type and Aggregate Value, Q1 2014 - Q2 2018



Source: Preqin

Private Equity Dry Powder

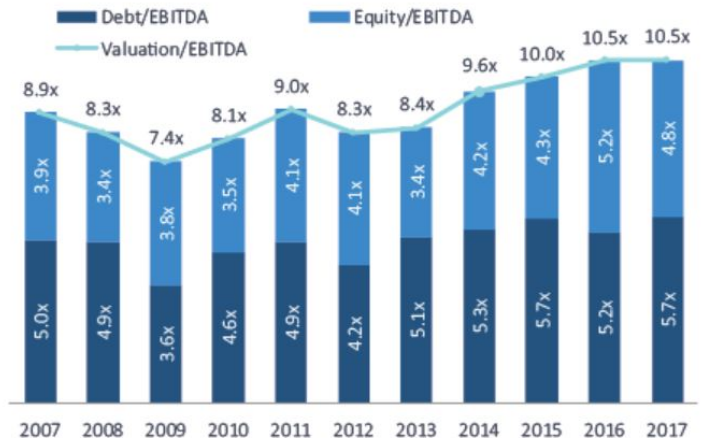
Fig. 28: Private Equity: Dry Powder by Fund Type, 2009 - 2018



Source: Preqin

Private Equity Buyout Multiples

US M&A (including PE buyouts) multiples



Source: PitchBook

Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit**
- 5 Interest Rate Sensitive
- 6 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

Commentary

Credit

- We have a 16.8% allocation to the Credit asset class vs. an SAA target of 20.0%.
- Within the Credit asset class, we are allocated as follows:

	% of Total Fund
Private Debt	12.2%
Distressed Debt	3.5%
Other Credit	1.0%
High Yield	0.1%
Total Credit	16.8%

- The benchmark for the Credit asset class is the S&P/LSTA Leveraged Loan Index plus 250 bps.

Commentary

Credit

- For Credit, our house view is the following:
 - There are compelling investment opportunities to exceed the performance of the Credit asset class benchmark over time in Private Debt, Distressed Debt and Other Credit. These opportunities are almost exclusively in private rather than public markets or are in areas of the market, such as distressed debt, which are best approached in locked-up investment vehicles with limited liquidity.
 - We do not believe that there are attractive investment opportunities in the public credit markets that will meet the return of the Credit asset class benchmark over an extended period.

Private Debt

Private Debt

- We believe Private Debt asset offers the most attractive opportunity in the fixed income markets with double-digit yields available for investors willing to accept illiquidity, and when appropriate, employ leverage. The market opportunity is principally driven by regulatory constraints that make it unattractive for banks to hold illiquid loans or other debt of below investment-grade credit quality.
- In the past several years, regulatory constraints limiting the ability of banks to make below investment-grade, illiquid loans (typically to middle market companies) have become more severe due to a number of policies: the adoption of Basel III, Dodd-Frank financial regulation and “Leveraged Lending Guidelines” of US bank regulators. While some regulatory burdens may be eased, we believe that the primary regulatory constraints on banks, which are driven by international banking requirements, will remain intact.
- Recently, additional capital flowing into the Private Debt markets has increased competition for the funding of private lending transactions; this has generally resulted in lower spreads. To some extent, the lower spreads have been offset by higher LIBOR levels which increase the yields on floating rate loans. Despite some compression in overall yields, the Private Debt market offers significantly higher expected returns than the public credit markets.
- We continue to identify attractive new opportunities in Private Debt that are complementary to our existing strategies. In addition, we are reviewing opportunities to expand our commitments to existing managers when market opportunities are compelling.

Distressed Debt

Distressed Debt

- We believe that select opportunities exist to achieve attractive returns in Distressed Debt.
- With corporate defaults low in the U.S., the primary opportunities in Distressed Debt are in Europe, where banks remain over-leveraged and continue to dispose of distressed assets.
- We have three fund-of-one partnerships in Europe which are actively investing in distressed opportunities. One partnership is targeting corporate loans while the other two are targeting pools of small non-performing loans (“NPLs”).
- The most recent European distressed debt partnership, Cerberus Sonoran NPL Fund, a fund-of-one partnership with Cerberus to primarily invest in large pools of European NPLs, was created in late June with a \$500 million commitment from ASRS.

Other Credit

Other Credit

- We believe that select opportunities exist to achieve attractive returns in Other Credit, a sub-asset class which we characterize as credit opportunities that are not encompassed in Private Debt, Distressed Debt or High Yield, and offer an expected return which will likely meet or exceed the Credit asset class benchmark.
- Currently, our Other Credit strategies which are actively investing include one partnership that invests primarily in publicly-traded, high-yielding business development companies (“BDCs”) and two partnerships that invest in private market opportunities – one in life settlements and one in aircraft leasing.

High Yield

High Yield

- We do not view the High Yield market as attractive.
- With yields and spreads relatively low (see charts on the pages which follow) albeit in a low default environment, we believe that High Yield will likely underperform the Credit asset class benchmark going forward.
- In August, we began to liquidate our remaining investments in High Yield and are redeploying the capital into more attractive opportunities.

High Yield Index Option Adjusted Spread

Bloomberg Barclays US Corporate High Yield Index Option Adjusted Spread (OAS) 2008 – 2018



High View Yield-to-Worst

Bloomberg Barclays US Corporate High Yield Index Yield-to-Worst 2008 – 2018



Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive**
- 6 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

Commentary

Interest Rate Sensitive

- We are underweight Interest Rate Sensitive Fixed Income (9.7% vs. a 11.8% target). Interest Rate Sensitive Fixed Income is likely to generate low returns as Treasury yields are at relatively low levels both on the short-end and long-end of the yield curve. Competing long-term interest rates in major developed countries such as Germany and Japan are very low.
- In addition, over the intermediate term, we see a heightened risk that rates may rise as global growth expectations are generally improving and central banks such as the Federal Reserve and the ECB are pulling back from unusually aggressive monetary policies that have pushed down interest rates in major developed countries.
- That being said, Interest Rate Sensitive Fixed Income remains a safe haven in times of market turbulence or uncertainty and tends to perform well when risky assets such as equities sell off.

Barclay's US Long Treasury Yield

Bloomberg Barclays U.S. Long Treasury Index Yield
2008 – 2018



German Bund

10 Year German Bund Yield 2008 - 2018



Japanese

10 Year Japanese Government Bond Yield 2008 - 2018



Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 **Real Estate**
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 **Real Estate**
 - **Commentary**
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

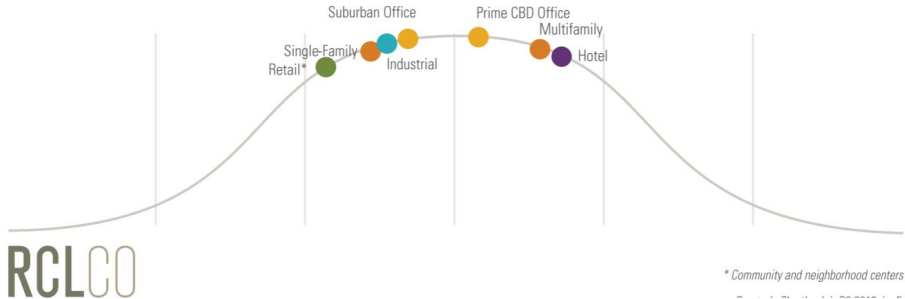
Commentary

- Property markets are generally in the latter stages of the real estate cycle for most property types in most geographies
 - These conditions are anticipated to extend through 2018 and into 2019 due to a continued strong economy and healthy property market fundamentals
 - At the margin, we are targeting certain assets that we believe may be challenged during a downturn to sell, capitalizing on peak pricing conditions
- Fundamentals leads us to emphasize apartments, industrial properties, medical office buildings, and senior housing as well as specific MSA's (e.g. Los Angeles, New York) for demographic and macro policy reasons
 - Certain retail categories require a substantial discount because of weak demand fundamentals and the rapid growth of e-commerce sales
 - For sale housing remains a potential target for opportunistic investing because financing and entitlement constraints have kept the market under-supplied
 - Single-family residential rental market is a target for investing due to new household formations reaching 2001 levels, low availability of mortgage credit, and an under-supplied market
- CMBS spreads have declined and continue to remain at fairly attractive rates as they have not increased commensurate with the 10 year Treasury yield
- Dry powder remains at cyclical highs globally and North America representing more than half of total but fundraising has declined from the 2015 high

Outline

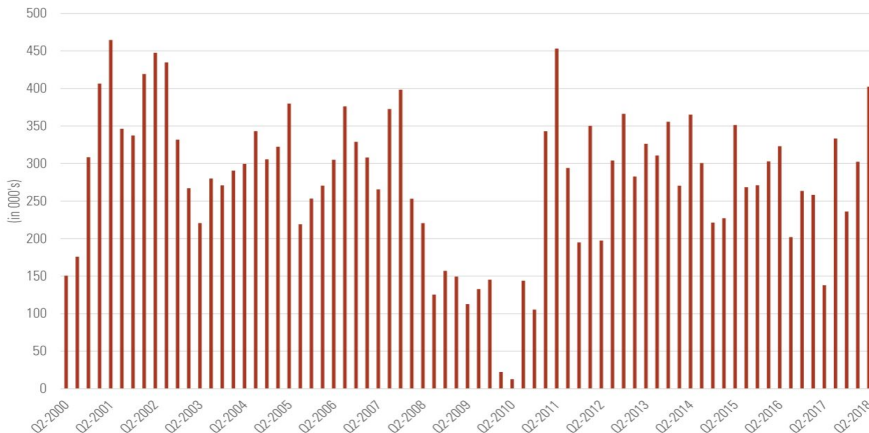
- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 **Real Estate**
 - Commentary
 - **Trends**
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

Real Estate Cycle Overview



New Household Formation

**U.S. Household Formation
2000-Q2 2018**



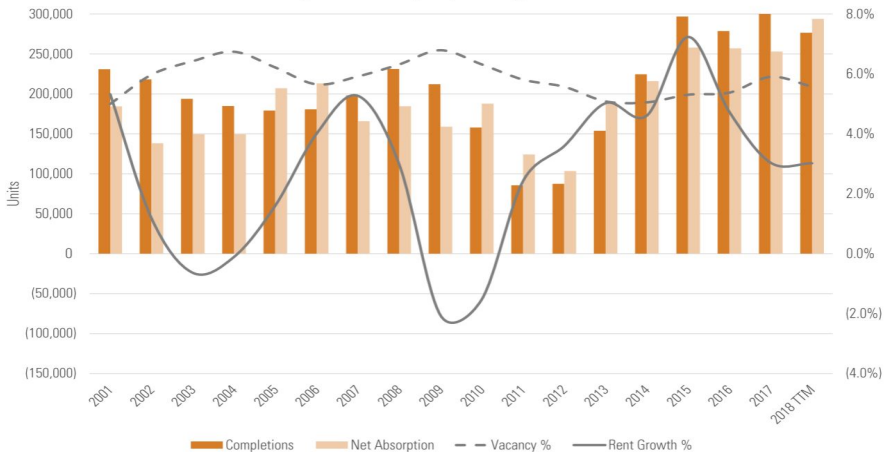
Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 **Real Estate**
 - Commentary
 - Trends
 - **Supply and Demand**
 - Capital Markets Dynamics
- 7 Historic Data

Occupancy Trends and New Supply

Multifamily (As of 6/30/18)

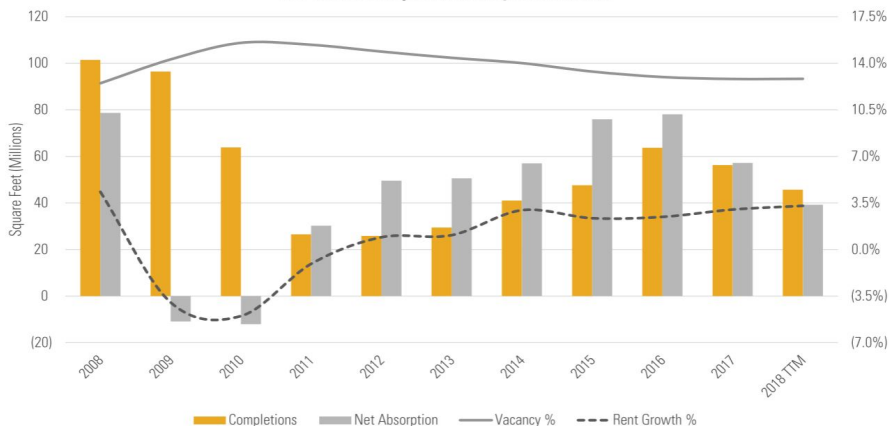
U.S. Apartment Absorption, Vacancy, Rent Growth



Occupancy Trends and New Supply

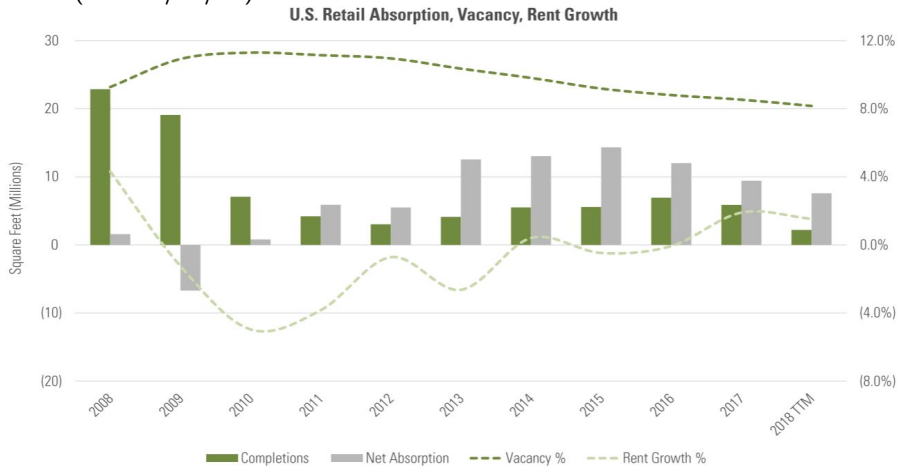
Office (As of 6/30/18)

U.S. Office Absorption, Vacancy, Rent Growth



Occupancy Trends and New Supply

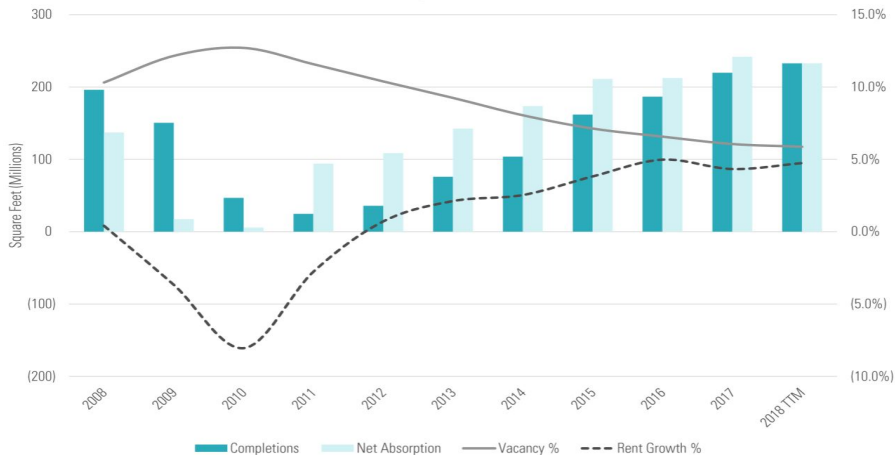
Retail (As of 6/30/18)



Occupancy Trends and New Supply

Industrial (As of 6/30/18)

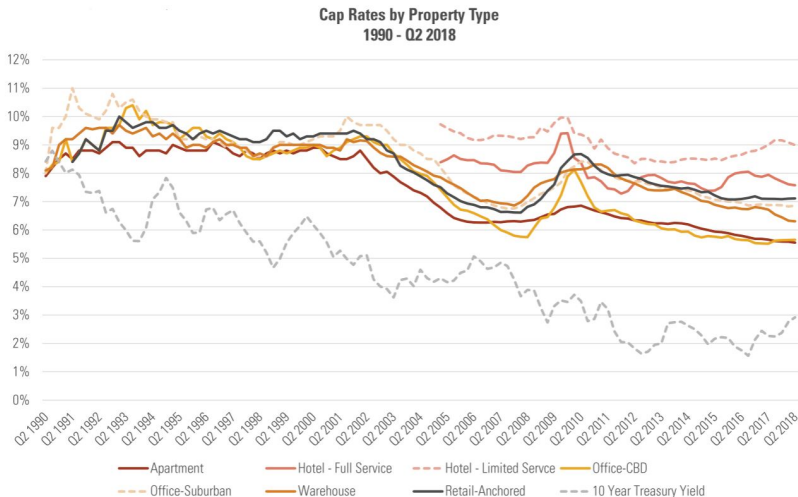
U.S. Industrial Absorption, Vacancy, Rent Growth



Outline

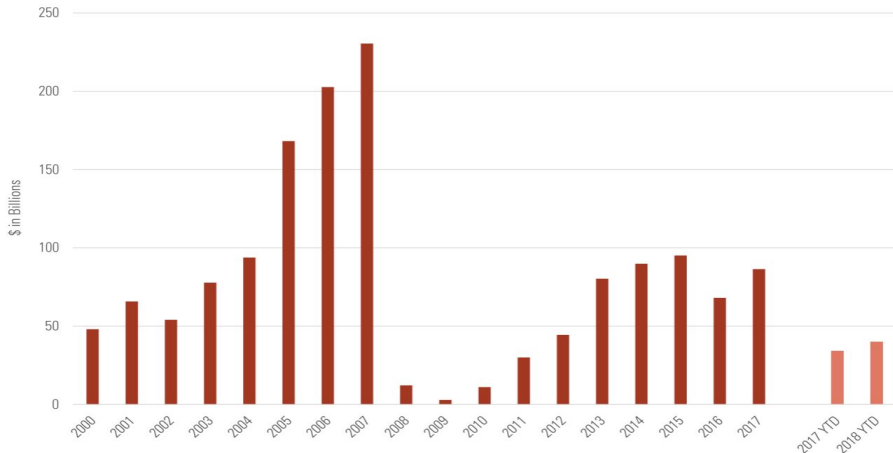
- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 **Real Estate**
 - Commentary
 - Trends
 - Supply and Demand
 - **Capital Markets Dynamics**
- 7 Historic Data

Cap Rate Trends

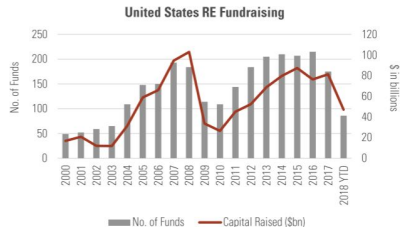
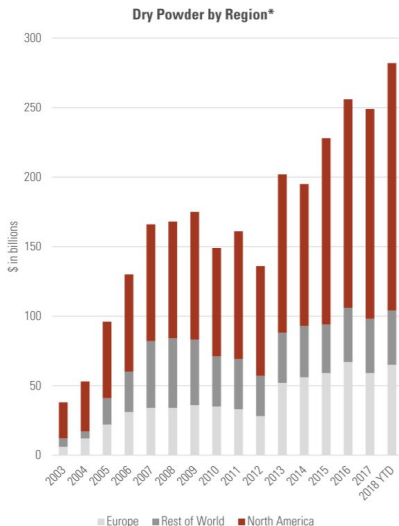


Credit Availability

US Annual CMBS Issuances



Real Estate Dry Powder

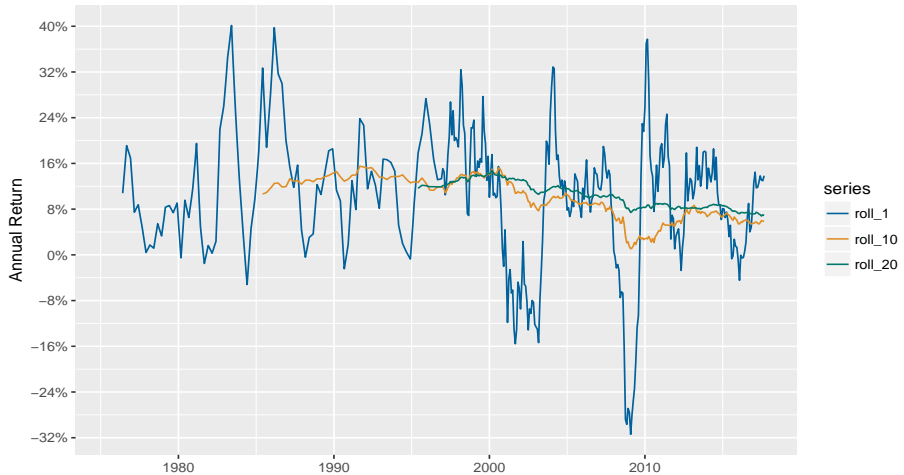


Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Credit
- 5 Interest Rate Sensitive
- 6 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets Dynamics
- 7 Historic Data

ASRS Returns

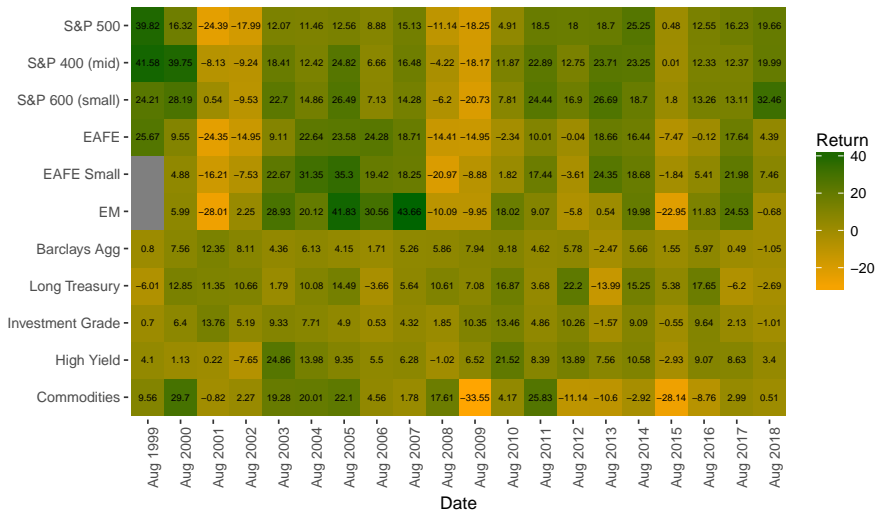
ASRS Total Fund One Ten and Twenty Year Rolling Returns



Source: NEPC data, ASRS graphics

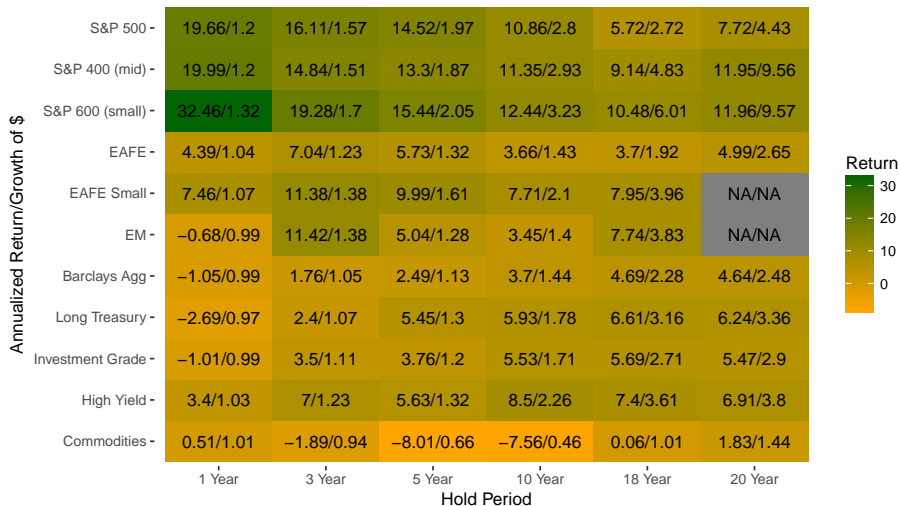
Asset Class One Year Returns

One Year Returns
for indicated end dates



Asset Class Hold Period Returns

Annualized Returns and Growth of a Dollar
for hold periods ending Aug 2018



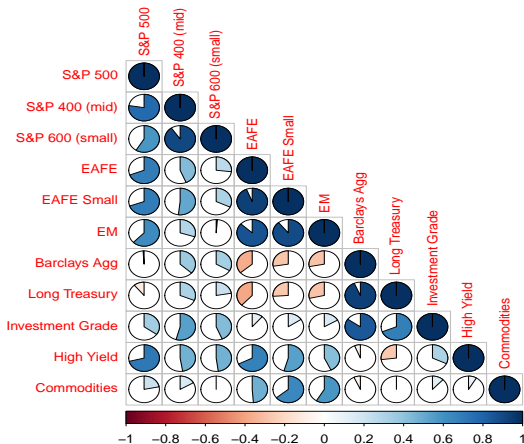
Asset Class Volatility

Volatility
for hold periods ending Aug 2018



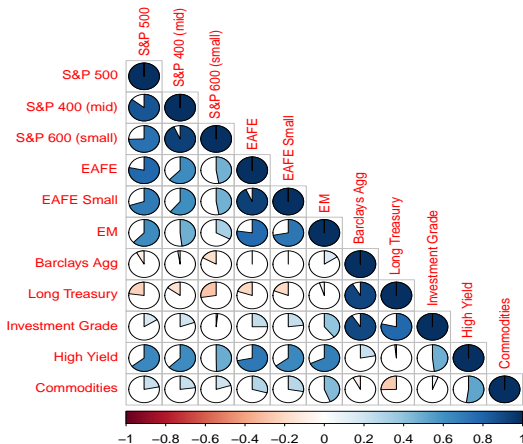
1 Year Correlation

1 Year Correlation Matrix



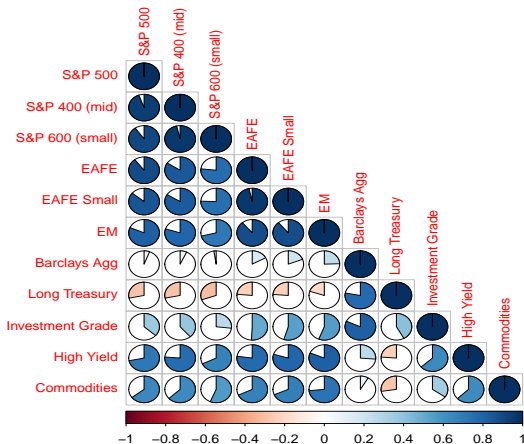
5 Year Correlation

5 Year Correlation Matrix



10 Year Correlation

10 Year Correlation Matrix



20 Year Correlation

20 Year Correlation Matrix

