

House Views and Portfolio Positioning

Arizona State Retirement System

April 17, 2018

Outline

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

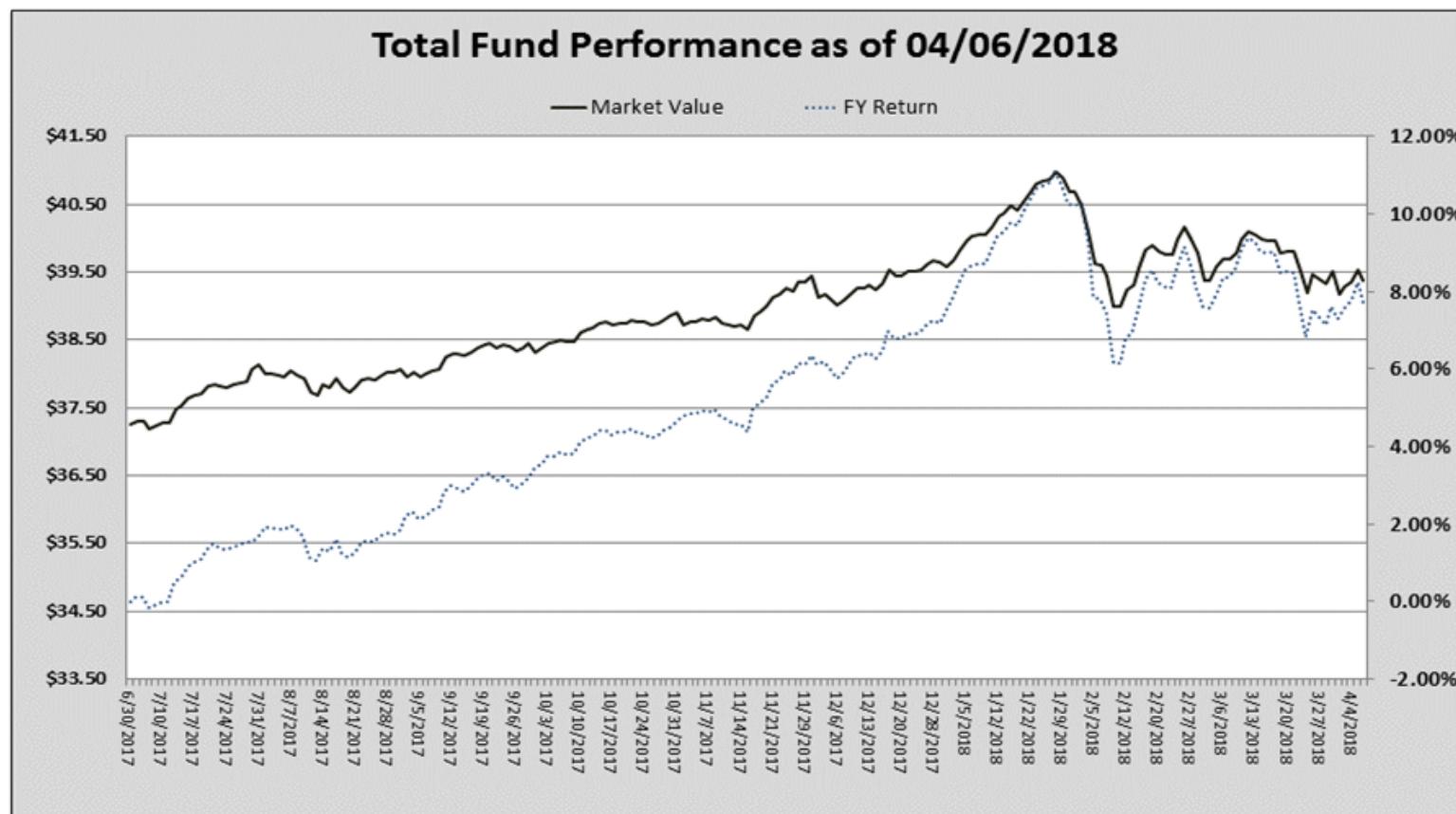
Outline

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

Summary View

- We are very close to policy weights throughout the portfolio
 - We moved to slight underweight in equities earlier this year with increased volatility
 - We are underweight core bonds expecting a continued upward trend in rates
 - We are slightly overweight credit expecting private credit to outperform in current conditions
- In general, markets are priced richly
 - Equity markets have trended down since January, but still are not cheap
 - Dollar has softened to major international currencies reflecting relative confidence in those economies, notwithstanding higher rates in the U.S.
 - Political uncertainty is affecting markets
 - Prospect of isolationism/trade wars is troubling to the market
 - Concern about unconventional fiscal policy of increased spending and deficits at latter stages of economic cycle

Fiscal Year Performance



Total Fund Positioning

Market Value as of 04/06/2018				
	Market Value	Weight	Interim Target	Over/Under
US Equity	9.8	25.0%	26%	-1.0%
non-US Equity	9.3	23.7%	24%	-0.3%
Private Equity	3.7	9.4%	8%	1.4%
Core Bonds	3.9	9.9%	12%	-2.1%
Credit	6.4	16.3%	13%	3.3%
Real Estate	3.6	9.1%	10%	-0.9%
Other	2.6	6.6%	7%	-0.4%
Total Fund	39.4	100.0%	100%	0.0%

Outline

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

Commentary

- Moderate growth globally
 - Growth positive in major economies, except UK which has decelerated a bit
 - 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
 - U.S. inflation now over 2%
 - Wage inflation in US a concern, but core inflation still below targets

Macro Indicators

Slow to moderate growth, strong employment, inflation generally low¹

4/9/2018

Economy		Moving Average		
		2 Yr.	1 Yr.	
EHUPUS Index	US Unemp	4.1	4.8	4.7
EHUPEUN Index	EUR Unemp	7.6	8.6	8.4
EHUPGB Index	UK Unemp	4.3	4.9	4.7
EHUPJP Index	Japan Unemp	2.7	3.1	3.0
GDP CYOY Index	US GDP	2.6	1.8	1.9
EHGDEUR Index	EUR GDP	2.5	1.8	1.8
EHDGDB Index	UK GDP	1.4	1.8	2.0
EHGDJP Index	Japan GDP	1.6	1.0	1.1
EHGDCN Index	China GDP	6.8	6.8	6.8
CPI YOY Index	US CPI	2.2	1.3	2.0
CPI XYOY Index	US CPI X fd nrg	1.8	2.1	2.0
CPEXEUYY Index	EU CPI X fd nrg	1.1	0.9	1.0
JCPNEFEEY Index	Jpn CPI X fd nrg	0.3	0.3	-0.1
CNCPIYOY Index	China CPI	2.9	1.7	1.6

¹ Note on data sources: Unless otherwise noted, all market and economic data in this report are from Bloomberg either in the form of screen shots or automatically retrieved using an API and formatted with ASRS software.

Global Interest Rates

Rates moving up in US, but soft elsewhere.

April 9, 2018

	100 day moving Price	50 day moving average	30 day relative strength	Hurst Exponent
--	----------------------------	-----------------------------	--------------------------------	-------------------

Global Interest Rates

USGG3M Index	US 3 Month	1.71	1.50	1.64	60	25
USGG10YR Index	US 10 Year	2.79	2.65	2.83	52	52
GETB1 Index	German 3 Month	-0.66	-0.74	-0.69	55	40
GDBR10 Index	German 10 Year	0.50	0.53	0.63	43	61
GUKG3M Index	UK 3 Month	0.49	0.39	0.40	54	37
GUKG10 Index	UK 10 Year	1.41	1.38	1.49	48	76
GJTB3MO Index	Japan 3 Month	-0.15	-0.18	-0.17	57	100
JGBS10 Index	Japan 10 Year	0.04	0.05	0.05	47	37

Currency

Dollar weakening to major global currencies

April 9, 2018

Currency	Price	200 day	100 day	50 day	30 day	Hurst Exponent	6 month price change	6 month	Momentum Index
		moving average	moving average	moving average	relative strength			volatility	
								annualized	
EURUSD Curncy	Euro/USD	1.23	1.20	1.22	1.23	52	80	4.27	7.16 0.60
GBPUSD Curncy	GBP/USD	1.41	1.34	1.38	1.40	57	84	6.87	8.13 0.85
JPYUSD Curncy	Yen/USD	0.0094	0.0090	0.0091	0.0093	53	23	5.07	7.29 0.70
CNY BGN Curncy	CNY/USD	0.1586	0.1524	0.1552	0.1582	43	46	4.51	4.09 1.10

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	2.34	2.73	2.83	565.35	181.45		9.97	9.37		-1.79	-2.33		-5.77	-5.09	
E. Europe & Africa	3.06	2.91	2.64	5.33	5.28	4.53	8.02	7.86		-0.21	-0.49		-1.9	-1.94	
Middle East	2.67	2.99		4.35	3.8		10.04			1.05	0.98		-5.9	-4.94	
Asia	5.91	5.79	5.75	2.5	2.66	2.72	3.93	3.93	4.11	1.77	1.57	1.37	-2.92	-3.19	-3.01
China	6.5	6.2	6	2.3	2.3	2.4	4	4	4.1	1.3	1.2	1.4	-3.55	-3.9	-3.5
G-10	2.4	2.06	1.79	1.95	1.87	1.98	5.23	5.02	4.99	0.14	0.07	0.06	-2.6	-2.97	-3.1
USA	2.8	2.4	2.05	2.44	2.2	2.35	3.92	3.71	3.8	-2.6	-2.66	-2.61	-3.94	-5	-4.9
Japan	1.3	1	0.75	1	1.1	1.2	2.6	2.53	2.63	4	3.85	3.9	-4.5	-4.05	
Euro	2.4	2	1.7	1.5	1.6	1.7	8.4	8	7.7	3.2	3	3.25	-1	-0.95	-1.1
United Kingdom	1.5	1.5	1.45	2.5	2.1	2.1	4.4	4.5	4.7	-4.1	-3.7	-2.4	-2.1	-1.7	-1.4
Canada	2.2	1.8	1.9	2.1	2	1.95	5.85	5.9	6.3	-2.55	-2.15	-1.7	-0.8	-0.8	
Australia	2.7	2.8	2.8	2.2	2.3	2.5	5.4	5.2	5	-2.25	-2.3	-2.5	-1.3	-1.3	-1.2
Sweden	2.6	2.2		1.9	2		6.45	6.3		4.15	4.2		0.8	0.65	
New Zealand	2.9	2.7		1.9	2		4.6	4.5		-2.9	-2.8		1	0.85	
Switzerland	2	1.8	1.65	0.7	0.95	0.95	3	2.8	2.9	10.45	10.6	8.9	0.4	0.3	0.2
Denmark	2	1.9		1.45	1.75		4.2	4.1		8.2	7.6		-0.3	-0.3	
Norway	2.2	2.05	2.15	1.9	1.9	1.8	3.75	3.5	3.2	5.6	5.6		4.25	4.8	
Germany	2.5	1.9	1.6	1.7	1.8	1.9	5.4	5.2		7.7	7.3	7.5	0.85	0.5	0.5
France	2.1	1.8	1.6	1.4	1.5	1.45	8.9	8.5	8.2	-1	-1.2	-0.5	-2.8	-2.85	-2.6
Italy	1.5	1.3	1.2	1.2	1.4	1.8	10.7	10.25	10	2.5	2.3	3.4	-1.9	-1.8	-1.6
Europe	2.2	1.88	1.63	1.65	1.71	1.74	7.3	6.97		2.75	2.66	2.71	-0.89	-0.85	-1.07

Outline

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

Outline

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

Positioning

- We are 1.0% underweight US public equities in aggregate
 - 1.0% underweight LC, neutral in MC & SC largely reflecting performance difference since March 1
 - 0.7% in private opportunistic equity, which is predominantly US equity exposure
 - In December the MLP account was substantially liquidated as a funding source
 - In late February equitization was removed from cash to reflect more defensive posture
- We are 0.3% underweight in international equities in aggregate
 - 0.7% overweight EAFE LC, 0.5% underweight EAFE SC, and 0.5% underweight emerging markets
 - Currently undertaking transition to fund international factor portfolios and in conjunction rebalance weight differences

Commentary

- On a valuation basis, US looks expensive vs ROW
- However. . .
 - Economic fundamentals of US and Europe are good
 - Low but modestly rising inflation, stable GDP growth, and high profitability
 - Easy monetary policy in US has ended while it persists in Europe
 - Fiscal stimulus via tax reform likely to bolster confidence in the short term albeit while unemployment is low
 - Dollar strength in anticipation of rising rates has not materialized
 - Fund flows have recently favored ROW versus US
 - EM has performed well and China appears to be handling restructuring efforts well but with caution warranted over its credit growth
 - Recent tariff announcements also increase volatility and uncertainty
- Comparatively strong economic fundamentals justify, to some extent, the differential valuation between US and international equities
 - Consumer confidence in the US remains strong but several risk indicators are trending up after being on a downward trend from early 2016 to the end of 2017

Outline

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

Equity Price Trends

Favorable price trends across the world. Volatility picking up but still low.

April 9, 2018

		Price	200 day	100 day	50 day	30 day	Hurst Exponent	6 month price change	6 month	Momentum Index
			moving average	moving average	moving average	relative strength			volatility annualized	
Stocks										
SPX Index	S&P 500	2650	2594	2695	2710	44	38	3.88	13.76	0.28
MID Index	S&P Mid	1876	1834	1899	1896	46	39	3.19	13.40	0.24
SML Index	S&P Small	934	905	940	943	49	49	2.63	14.86	0.18
MXEA Index	EAFE	2013	2004	2053	2044	46	30	1.08	9.20	0.12
MSDLEAFE Index	EAFE Local	1113	1135	1148	1125	46	61	-2.34	9.31	-0.25
MXEASC Index	EAFE Small	268	259	269	271	48	-15	4.74	9.70	0.49
NCLDEAFE Index	EAFE Small Local	383	377	388	385	48	56	1.97	9.25	0.21
MXEF Index	EM	1162	1133	1181	1196	45	50	4.16	12.28	0.34
NDLEEGF Index	EM Local	590	578	598	604	45	50	2.77	10.70	0.26
VIX Index	S&P 500 Volatility	20	13	15	20	53	44	105.71	166.14	0.64
RVX Index	Russell 2000 Volatility	20	16	18	20	52	42	38.36	130.93	0.29
VXEFA Index	EAFE Volatility	15	12	14	17	50	34	60.41	161.86	0.37
VXEEM Index	EM Volatility	25	18	20	24	53	52	59.94	118.63	0.51

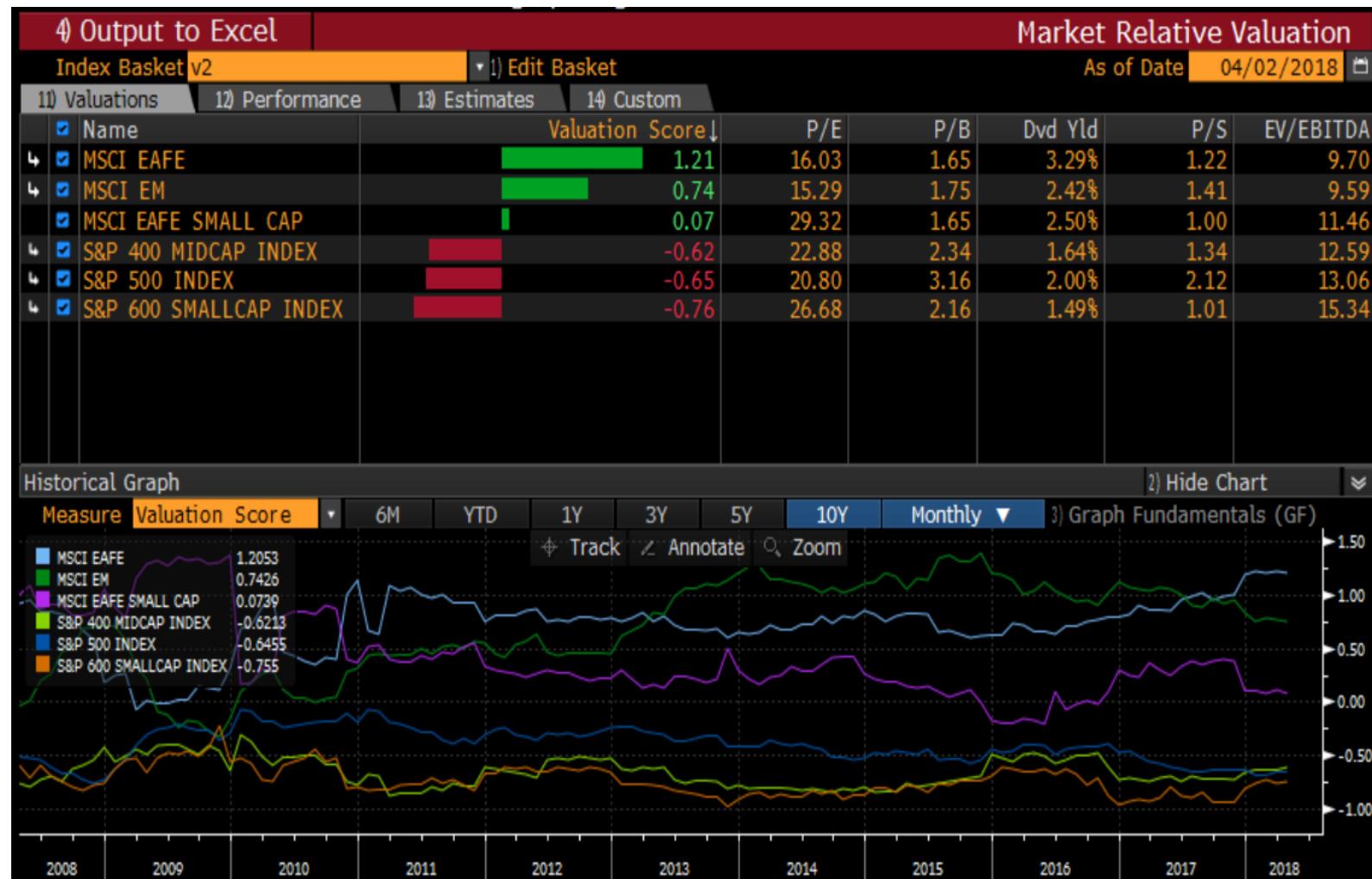
Outline

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

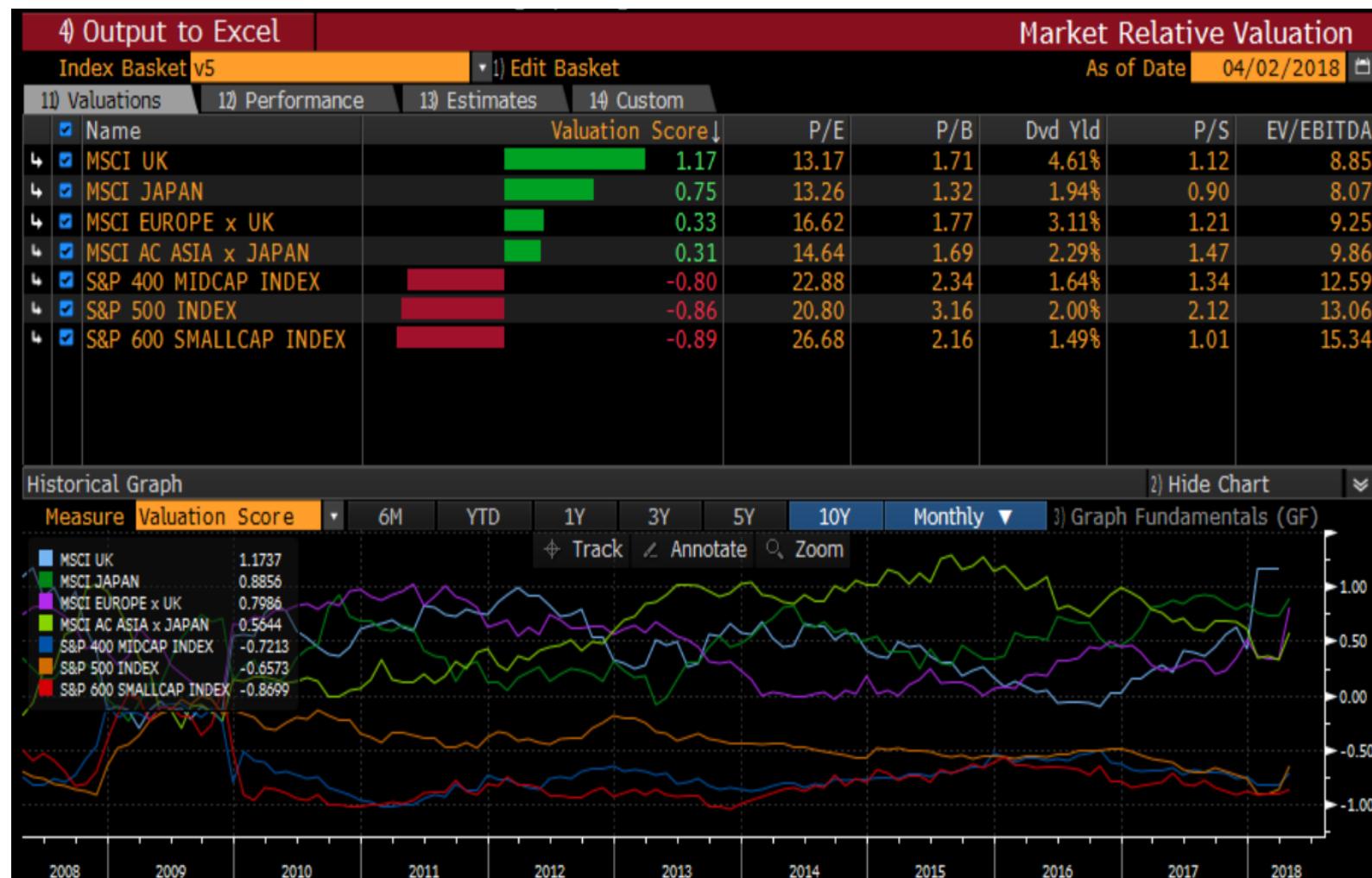
Relative Valuation of Global Indices



Relative Valuation of Global Indices (Continued)



Relative Valuation of Global Indices (Continued)



US Dollar



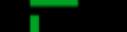
Currency Forecasts



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
Highest								
10) Japan			+25,070	+6.7	371,445	270	68,516	
11) United States			+24,059	+0.9	2,708,646	1,797	372,673	
12) China			+10,881	+9.6	112,826	327	26,849	
13) European Region*			+1,798	+1.5	120,970	329	13,006	
14) Eurozone*			+1,563	+0.9	166,541	268	16,414	
15) Canada			+1,480	+2.1	69,092	243	9,067	
16) South Korea			+1,098	+3.4	32,498	192	14,040	
17) Brazil			+942	+7.1	13,290	31	1,412	
18) Germany			+839	+1.9	43,220	141	5,534	
19) Greater China*			+690	+4.5	15,417	47	2,735	
Lowest								
20) India			-73	-0.3	24,116	104	723	
21) Taiwan			-77	-0.8	9,549	40	1,125	
22) Sweden			-79	-2.6	3,061	21	273	
23) Europe ex UK*			-82	-1.3	6,512	8	273	
24) Turkey			-98	-15.8	622	11	27	
25) Russia			-113	-2.4	4,629	19	639	
26) European Union*			-114	-2.9	3,884	5	454	
27) Asia Pac ex Japan*			-144	-0.7	21,867	46	1,329	
28) United Kingdom			-428	-1.2	35,636	106	2,324	
29) Italy			-605	-10.6	5,688	43	1,001	

*Regionally Focused Funds

Outline

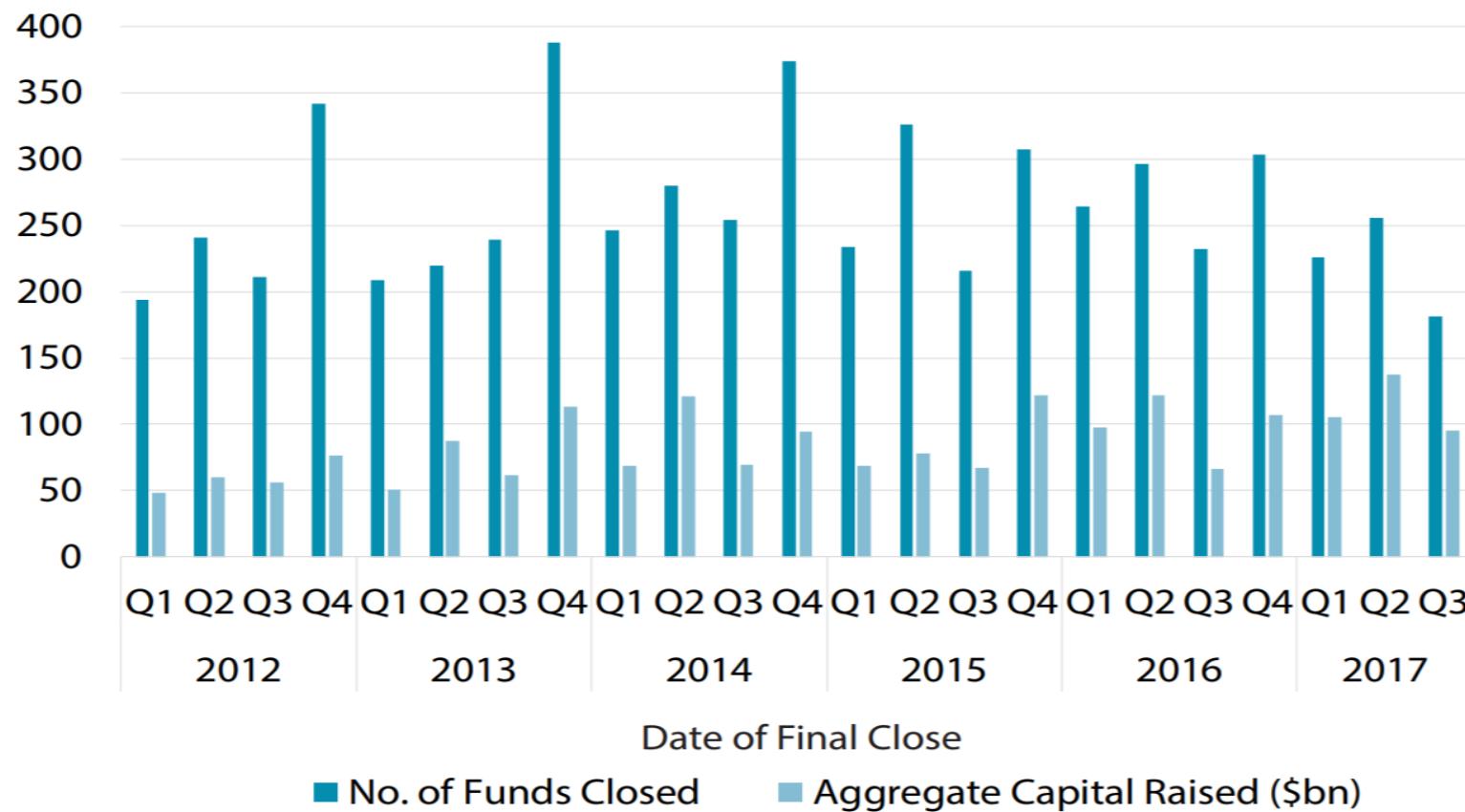
- 1 **Summary View and Positioning**
- 2 **Macro Environment**
- 3 **Equities**
 - Commentary
 - Trends
 - Valuation
 - **Private Equity**
- 4 **Fixed Income**
 - Commentary
 - Interest Rate Sensitive Fixed Income
 - High Yield and Private Debt
- 5 **Real Estate**
 - Commentary
 - Trends
 - Supply and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

Private Equity Environment

- Pace of fundraising is strong
- Deal volume is in line with the past couple years while aggregate deal value is slightly down
- Exit volume and values are showing a moderate downward trend
- Dry powder has steadily risen as the asset class has grown
- Deal multiples are flat while debt levels are up
- 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

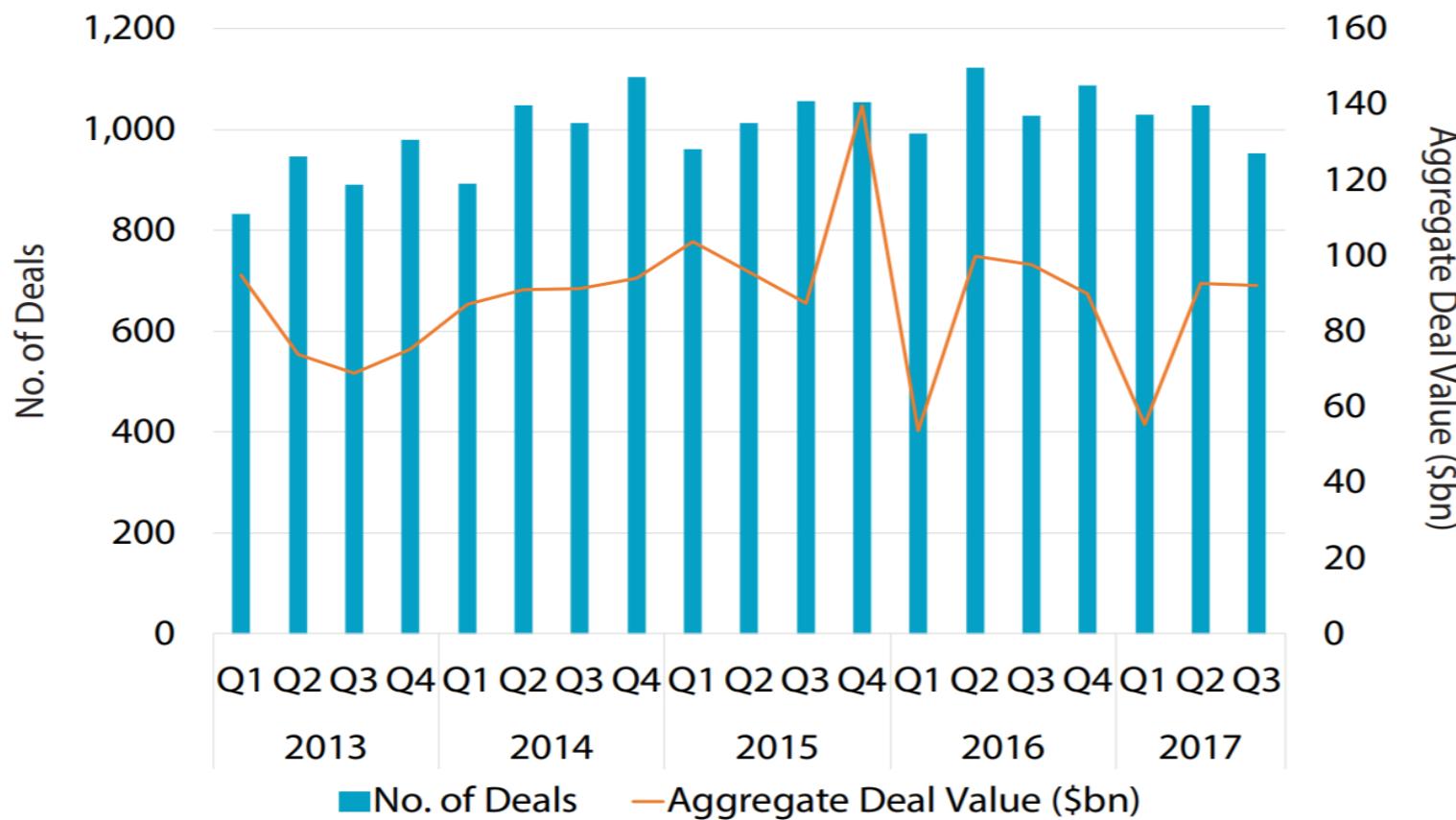
Fig. 1: Private Equity Fundraising, Q1 2012 - Q3 2017



Source: Preqin Private Equity Online

Private Equity M&A Deal Volume

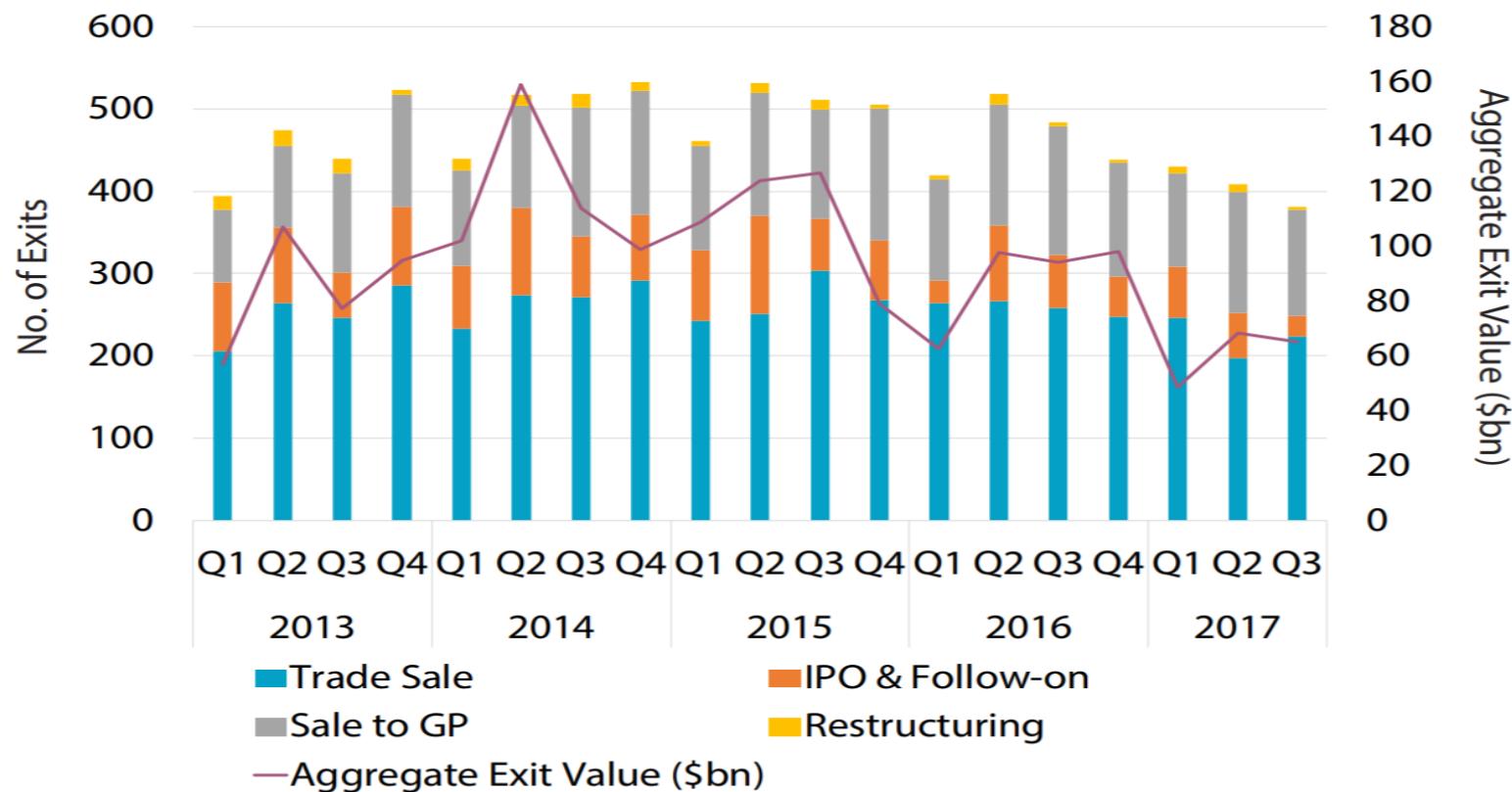
Fig. 17: Private Equity-Backed Buyout Deals, Q1 2013 - Q3 2017



Source: Preqin Private Equity Online

Private Equity Exits

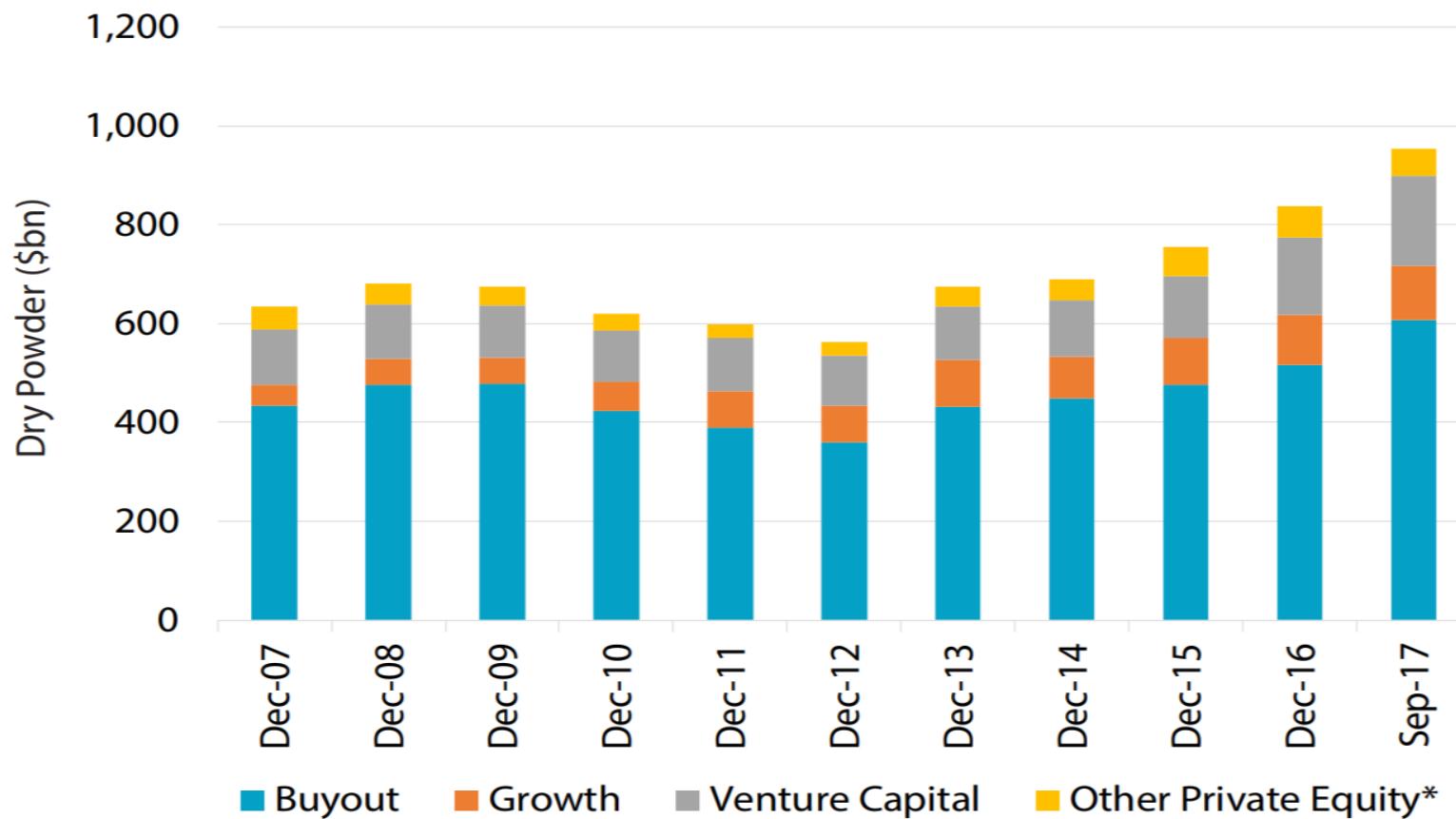
Fig. 19: Private Equity-Backed Buyout Exits by Type and Aggregate Exit Value, Q1 2013 - Q3 2017



Source: Preqin Private Equity Online

Private Equity Dry Powder

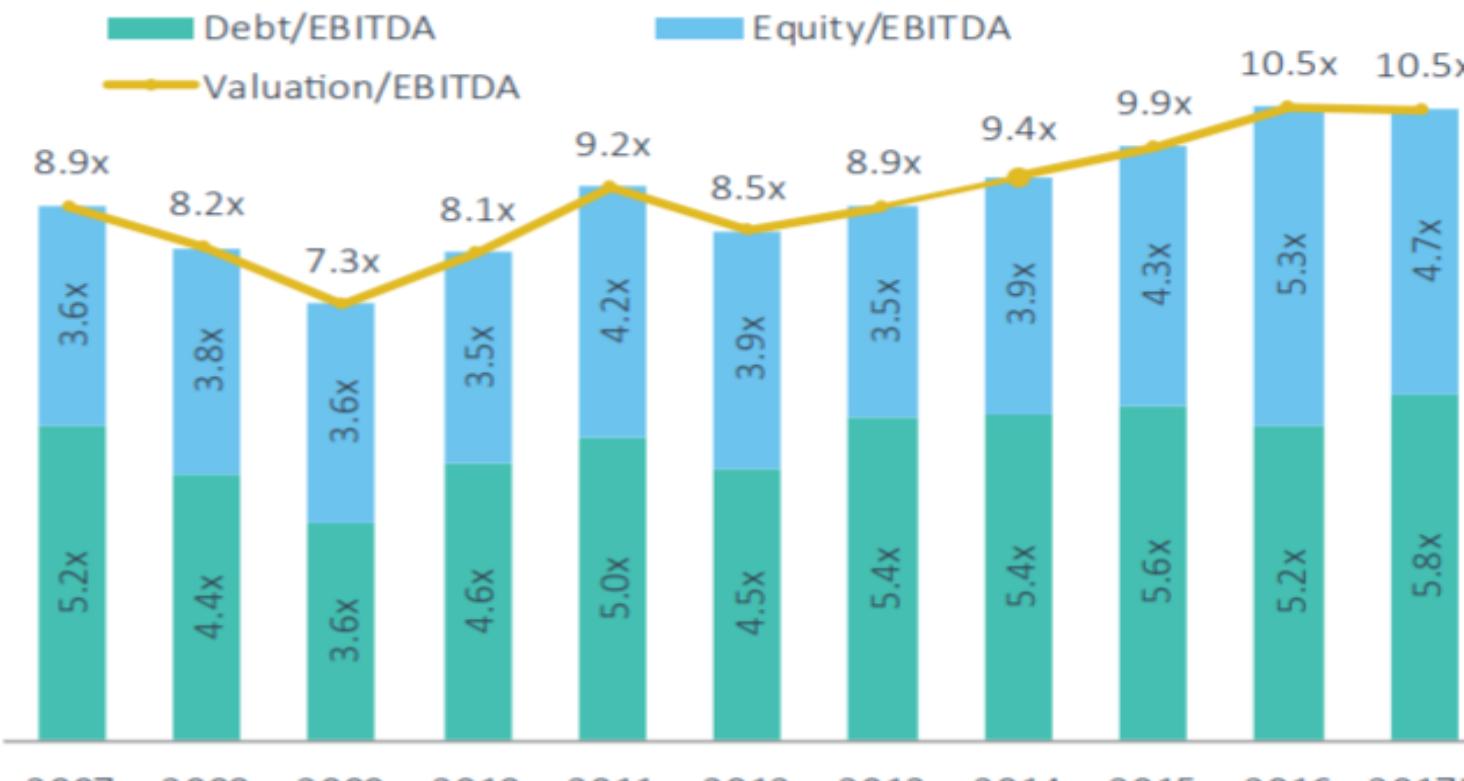
Fig. 28: Private Equity Dry Powder by Fund Type, 2008 - 2017



Source: Preqin Private Equity Online

Private Equity Buyout Multiples

Debt portions have notched an increase
US M&A (including PE buyouts) multiples



Source: PitchBook. *As of 9/30/2017

Outline

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

Outline

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

Commentary

Fixed Income

- We have an overweight allocation to Fixed Income with a recent weighting of 26.1% vs. the SAA target of 25.0%.
- The overweight in Fixed Income is entirely due to our allocation to Opportunistic Debt (4.1% vs. a 0.0% target). This reflects our view that select areas of the debt markets which are not encompassed in the SAA, such as distressed debt in the U.S. and Europe, offer attractive return opportunities over the long-term. We are underweight Interest Rate Sensitive Fixed Income (9.8% vs. a 11.6% target) and High Yield Fixed Income (0.8% vs. a 2.1% target).
- We continue to believe that the Private Debt asset class offers the most attractive opportunity in Fixed Income with double-digit yields and relatively stable investment performance available for investors willing to accept illiquidity. Investments in Private Debt represent approximately 11.4% of the total fund (vs. a target of 12% and a potential range of 8-16%).
- In order to take advantage of the attractive opportunity in Private Debt, over the past year, we increased our commitments to our Private Debt managers with current partnership commitments (adjusted for partnerships in liquidation) now representing approximately 15.5% of the total fund.

Outline

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

Rates

Interest Rate Sensitive Fixed Income

- We are underweight Interest Rate Sensitive Fixed Income (9.8% vs. a 11.6% 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.

Long Treasury

Bloomberg Barclays U.S. Long Treasury Index Yield 2013 – 2018



German Bund

10 Year German Bund Yield 2013 - 2018



Japanese Bonds

10 Year Japanese Government Bond Yield 2013 - 2018



5

Outline

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

High Yield

High Yield

- We have an underweight in High Yield Fixed Income (0.8% vs. a 2.1% target). In 2017, we reduced our weighting in the High Yield asset class to fund the expansion of our investments in Private Debt, an asset class which offers significantly higher expected returns with lower volatility.
- We have had an unusually long credit cycle, which began with an upturn in 2009. With corporate credits having a generally healthy outlook and strong global demand for yield buoying the high yield market, we believe that defaults will likely remain low over the intermediate term and the credit cycle will be elongated.
- Spreads and yields in the high yield market are generally at much lower levels than in the past. As a consequence, we do not view this asset class as being particularly attractive.

High Yield Credit Spread

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



High Yield Yield-to-Worst

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



Private Debt

Private Debt

- We believe the Private Debt asset class offers the most attractive opportunity in the fixed income markets with double-digit yields available for investors willing to accept illiquidity. 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.
- Over time, it is likely that the new Trump administration may ease some regulatory burdens on banks that could result in fewer opportunities for private lenders in some situations. However, we believe that the primary regulatory constraints on banks, which are driven by international banking requirements, will remain intact.
- In the past few years, 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.

Outline

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

Outline

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

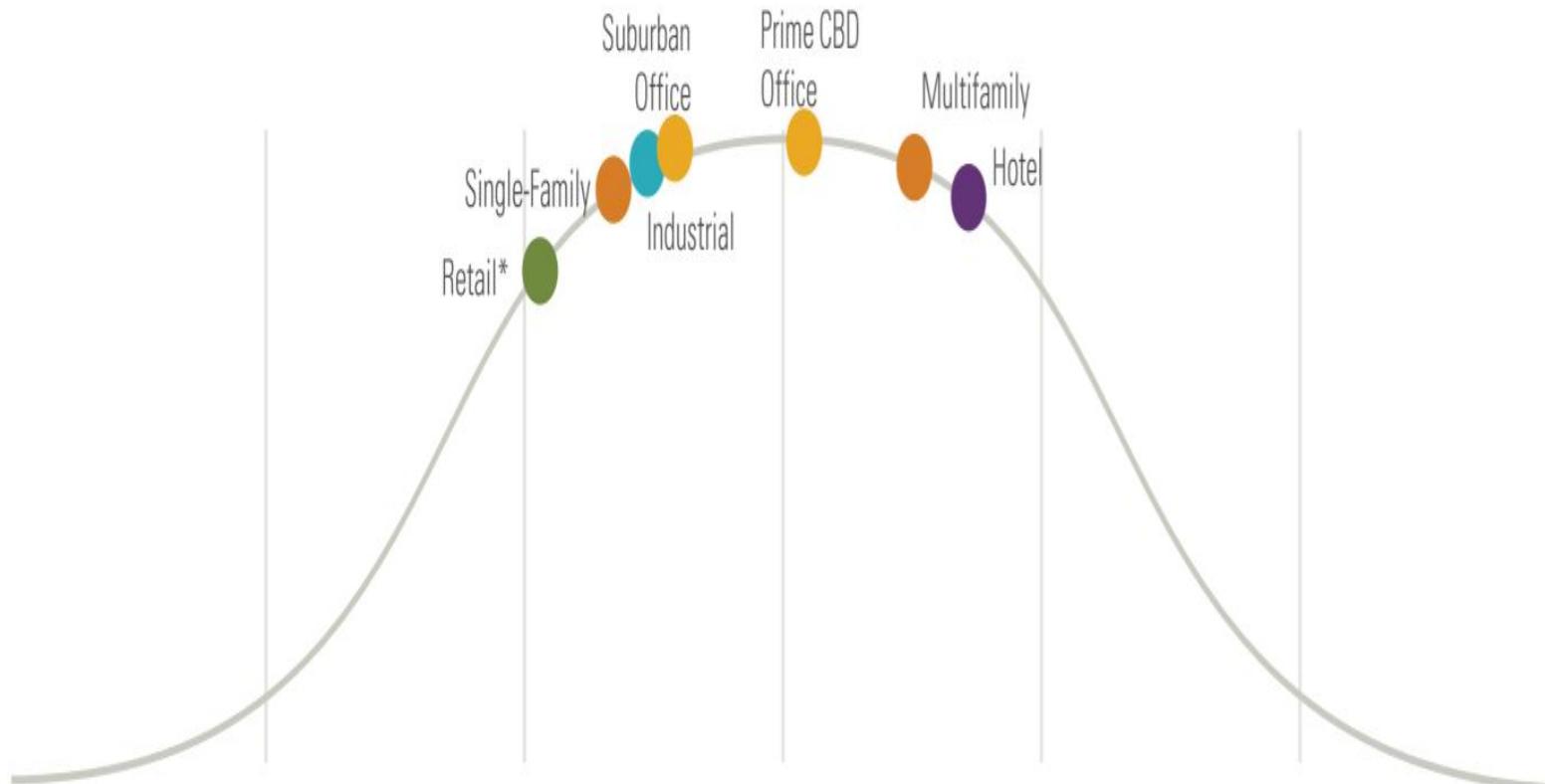
Commentary

- 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 due to a continued strong economy and healthy property market fundamentals
- 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 potential 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 **Fixed Income**
 - Commentary
 - Interest Rate Sensitive Fixed Income
 - High Yield and Private Debt
- 5 **Real Estate**
 - Commentary
 - **Trends**
 - Supply and Demand
 - Capital Markets Dynamics
- 6 **Commodities**
- 7 **Historic Data**

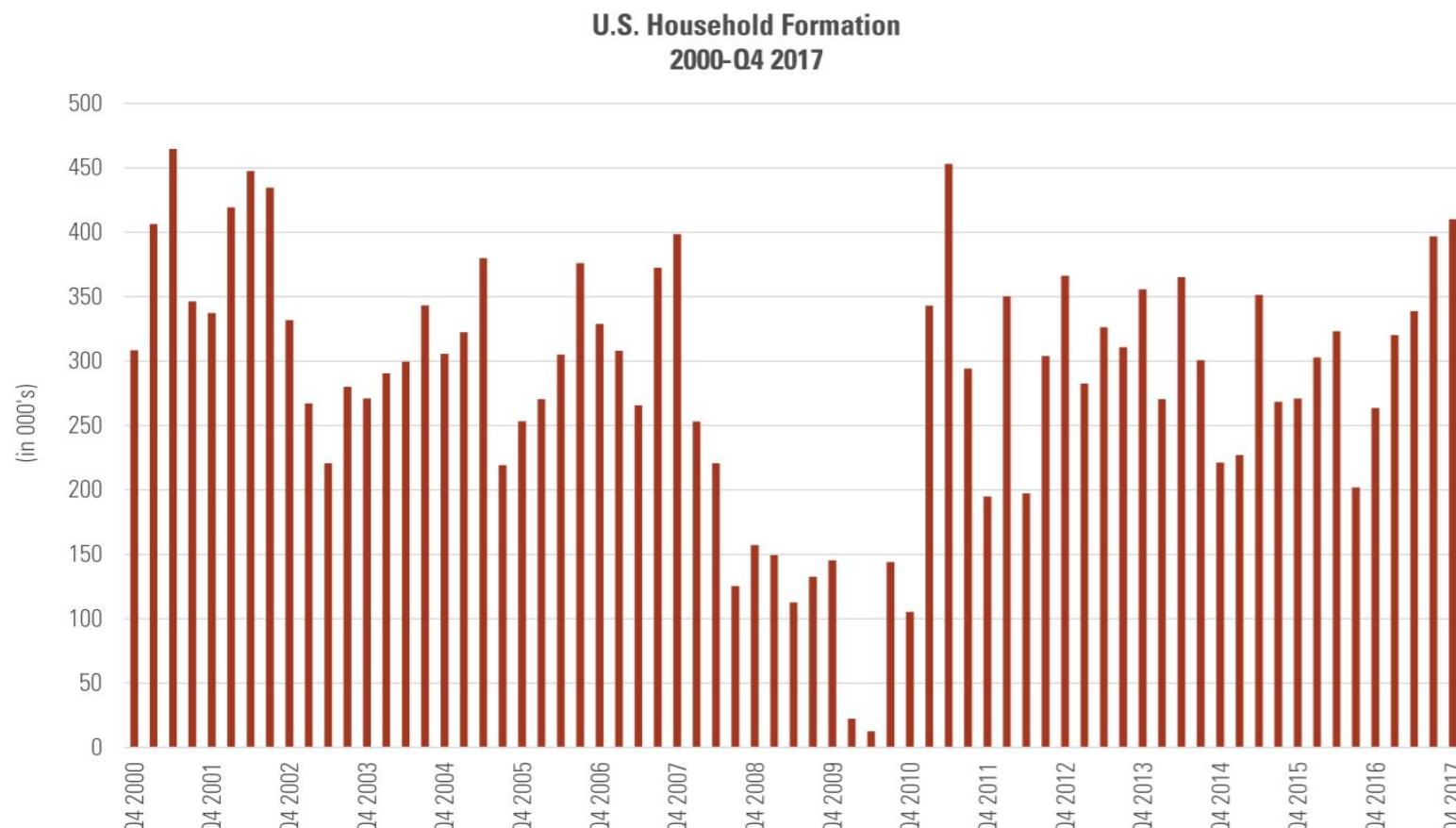
Real Estate Cycle Overview



RCLCO

*Community and neighborhood centers

New Household Formation



RCLCO

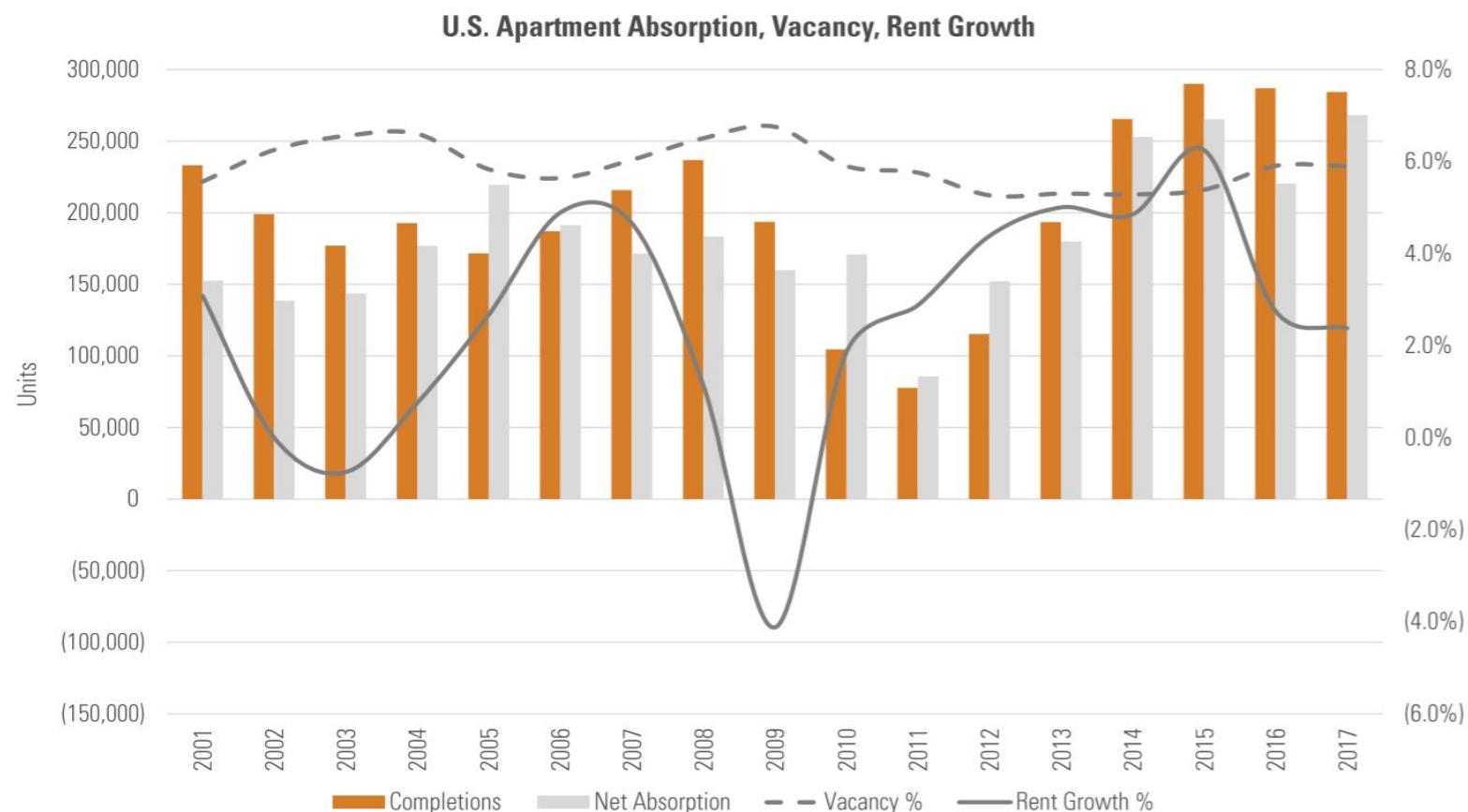
Source: Moody's Economy.com

Outline

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

Occupancy Trends and New Supply

Multifamily (As of 12/31/17)



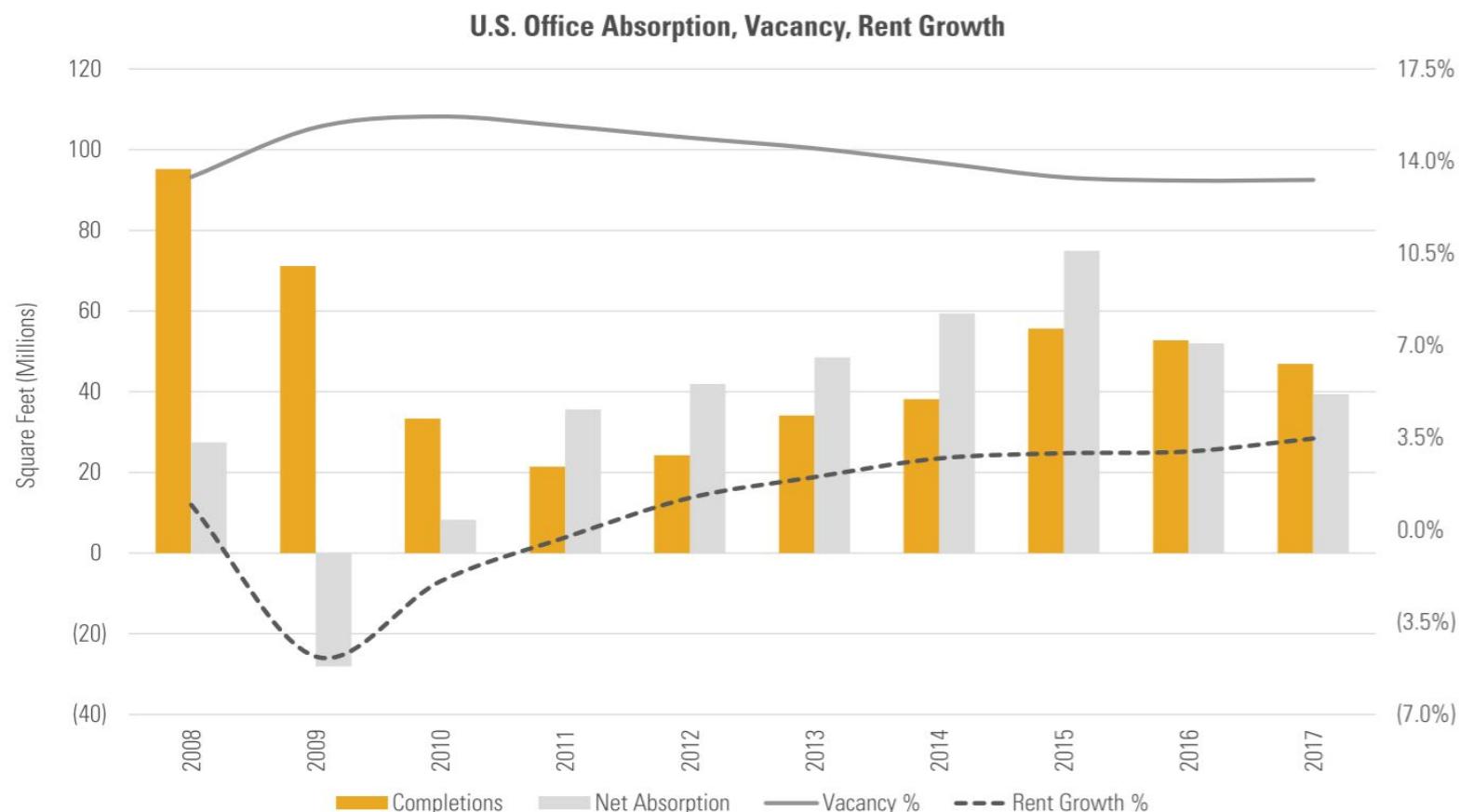
RCLCO

Notes: Apartment criteria filtered as follows: multifamily property (secondary type is apartment), 50+ units, and a 3-star or greater CoStar rating

Source: CoStar; RCLCO

Occupancy Trends and New Supply

Office (As of 12/31/17)



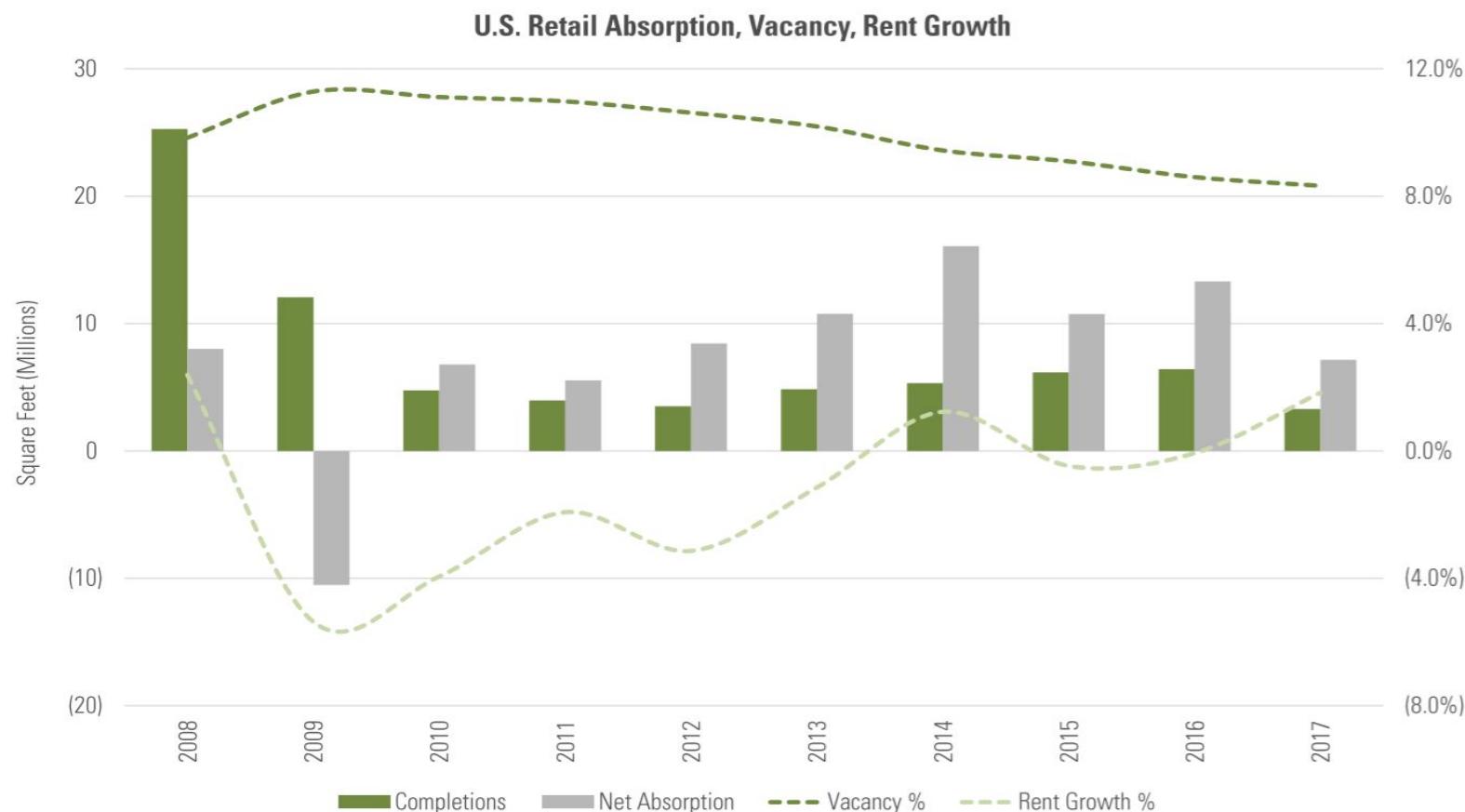
RCLCO

Note: Office criteria filtered as follows: office property, not owner occupied, 30,000+ SF, and a 3-star or greater CoStar rating.

Source: CoStar; RCLCO

Occupancy Trends and New Supply

Retail (As of 12/31/17)

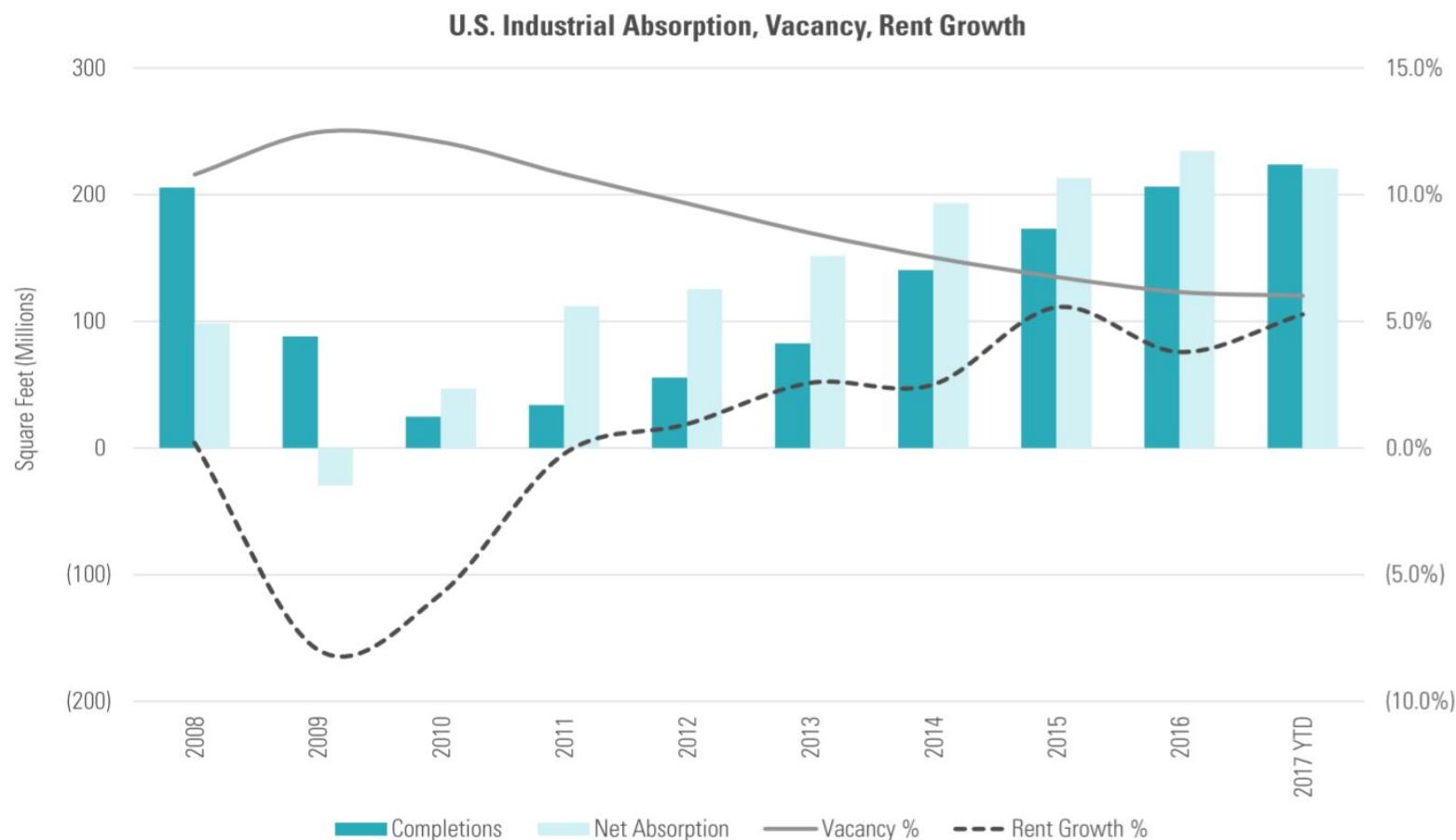


Notes: Above data is for neighborhood and community centers only; Retail criteria filtered as follows: retail property in a shopping center, not owner occupied, 30,000+ SF, multiple tenancy, and a 3-star or greater CoStar rating

Source: CoStar; RCLCO

Occupancy Trends and New Supply

Industrial (As of 12/31/17)



RCLCO

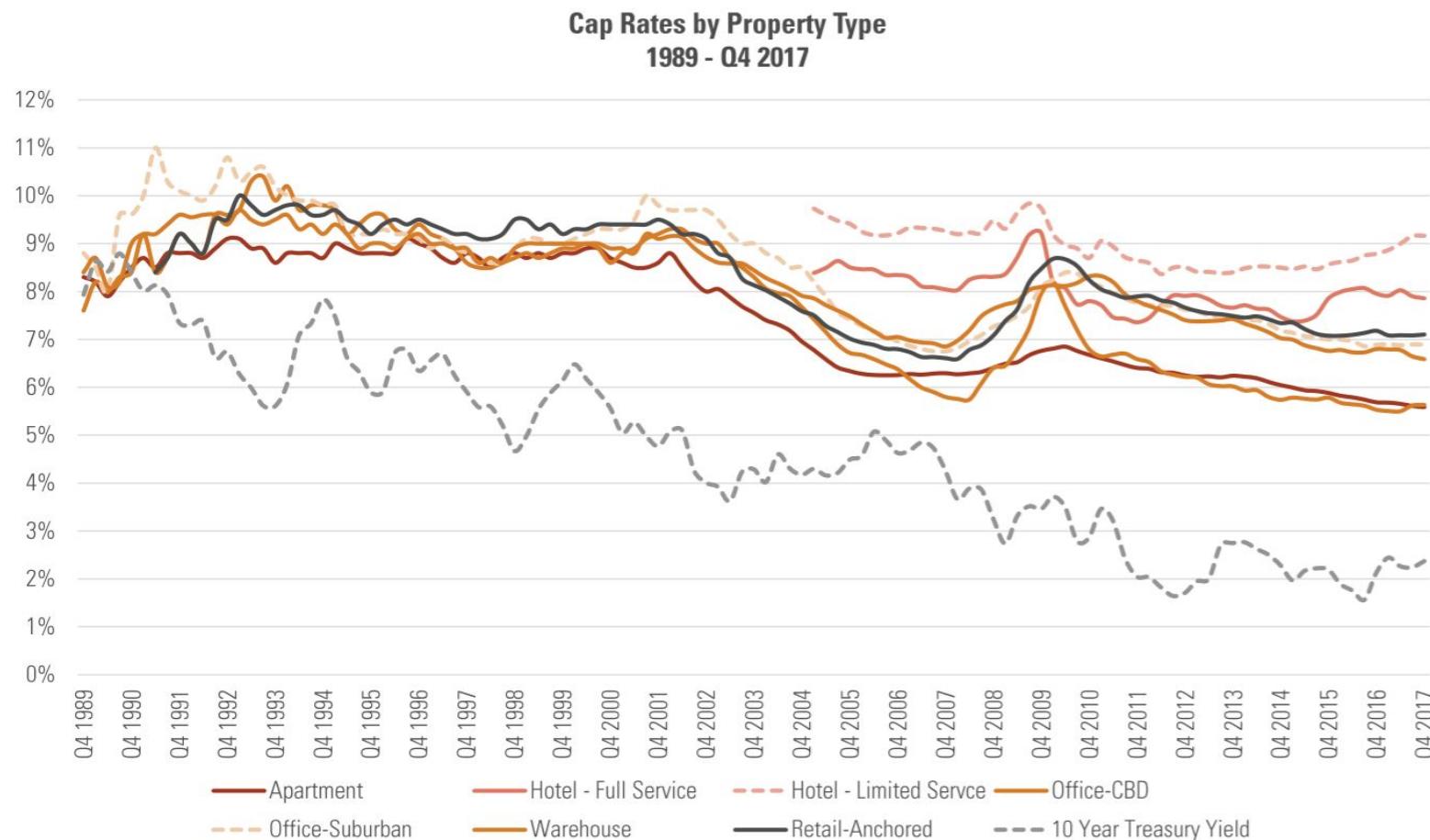
Note: Industrial criteria filtered as follows: industrial property (secondary type is either distribution or warehouse), 30,000+ SF, and a 3-star or greater CoStar rating.

Source: CoStar, RCLCO

Outline

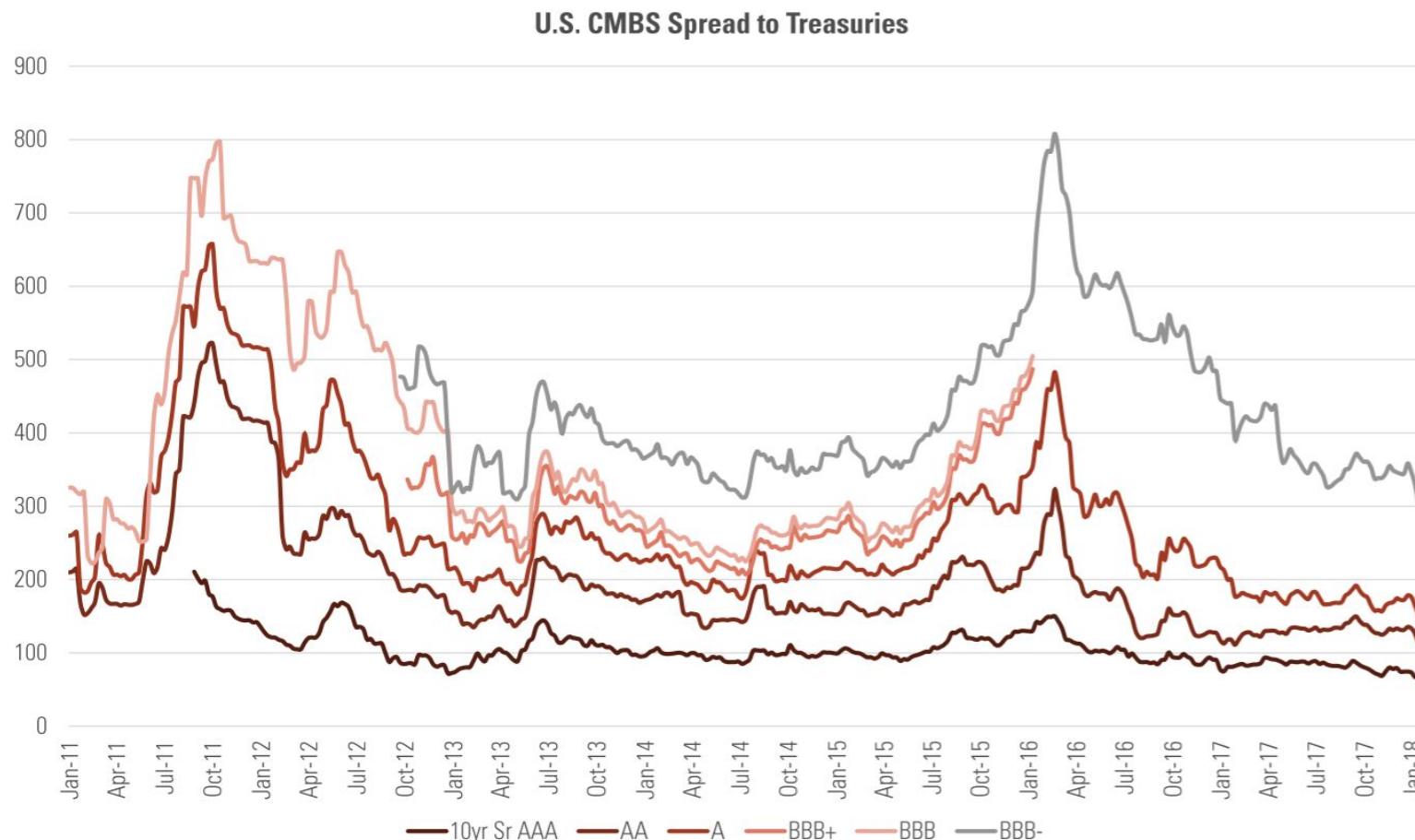
- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
 - Commentary
 - Trends
 - Valuation
 - Private Equity
- 4 Fixed Income
 - Commentary
 - Interest Rate Sensitive Fixed Income
 - High Yield and Private Debt
- 5 Real Estate
 - Commentary
 - Trends
 - Supply and Demand
 - Capital Markets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

Cap Rate Trends



Source: RERC; RCA

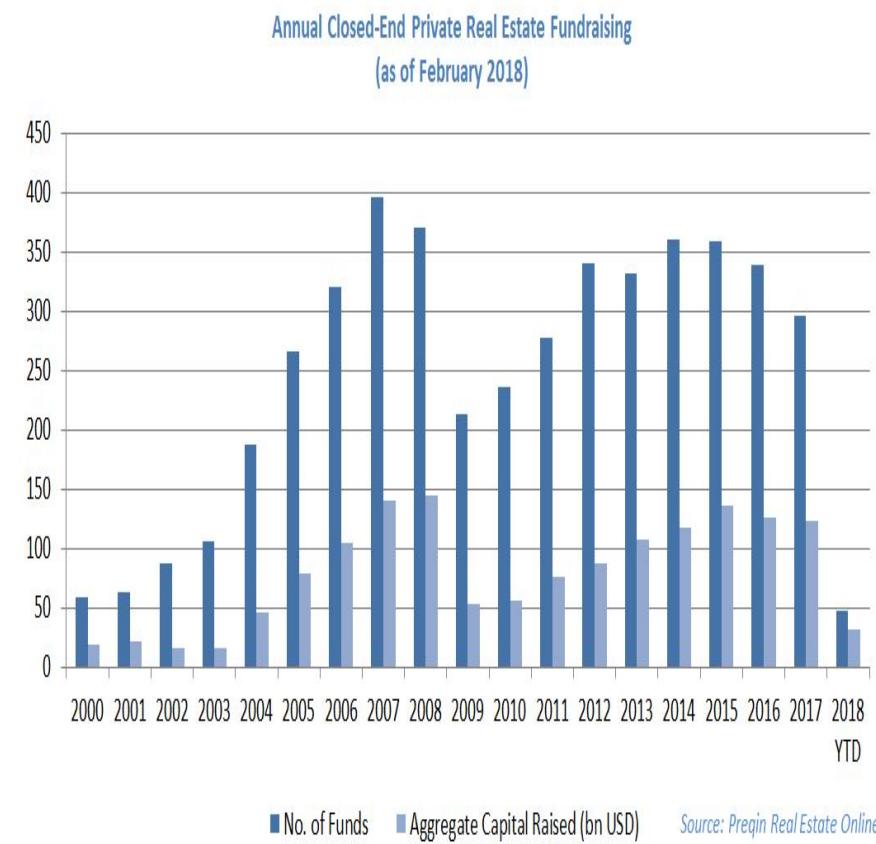
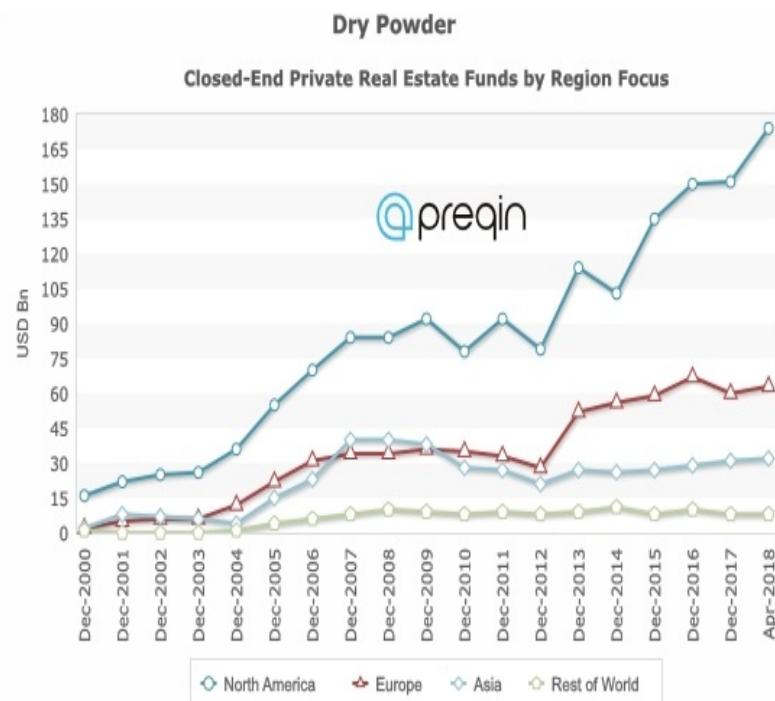
Credit Availability



RCLCO

Source: Commercial Real Estate Finance Council; JP Morgan; Urban Land Institute (ULI); RCLCO

Real Estate Dry Powder



Outline

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

Commentary

- Bottoms up model shows flat expected performance
 - Small decline in ags and small increase in livestock although recent tariff news likely to have negative impacts on both
- Top down model shows a moderate expected increase
 - Projected global growth and weak dollar are positive for commodities
- Index has been on a modest upward trend (albeit choppy) since the end of Q2 2017
 - We remain underweight in light of an expected strengthening of the dollar

Bottoms up model

1-3 month horizon											
as of:	Index DJUBS	Current price	60 day volatility	-1 st dev	+1 st dev	prob -	prob +	prob price	% ret	wght'd ret	
4/3/2018											
AGRICULTURE											
Corn	6.7%	382.25	5%	361	403	50%	50%	382	-2%	-0.1%	
Soybeans	5.2%	1004.50	7%	939	1,070	50%	50%	1,005	-1%	-0.1%	
Wheat	4.2%	457.75	11%	407	508	50%	50%	458	-4%	0.2%	
Soymean Meal	2.7%	380.00	9%	346	414	33%	67%	392	2%	0.1%	
Soybean Oil	2.5%	31.69	6%	30	34	50%	50%	32	-1%	0.0%	
Group SubTotal	21.4%									-0.3%	
ENERGY											
Crude Oil WTI	7.3%	63.07	9%	57	69	50%	50%	63	0%	0.0%	
Crude Oil Brent	8.5%	67.56	9%	62	74	50%	50%	68	1%	0.1%	
Heating Oil	4.2%	196.42	8%	180	212	50%	50%	196	0%	0.0%	
Natural Gas	6.5%	2.74	8%	2.52	2.95	50%	50%	3	-2%	-0.1%	
Unleaded Gas (RB)	3.8%	195.26	8%	179	211	50%	50%	195	0%	0.0%	
Group SubTotal	30.4%									0.0%	
INDUSTRIAL METALS											
Aluminum	5.6%	1965.25	7%	1,831	2,099	33%	67%	2,011	2%	0.1%	
Copper (NY)	9.1%	300.90	8%	277	325	50%	50%	301	0%	0.0%	
Nickel	2.9%	13419.50	13%	11,734	15,105	50%	50%	13,420	0%	0.0%	
Zinc	3.2%	3286.50	8%	3,019	3,554	50%	50%	3,287	0%	0.0%	
Group SubTotal	20.9%									0.1%	
LIVESTOCK											
Live Cattle	3.9%	99.15	6%	93	106	50%	50%	99	0%	0.0%	
Lean Hogs	2.2%	72.30	9%	66	79	50%	50%	72	15%	0.3%	
Group SubTotal	6.1%									0.3%	
PRECIOUS METALS											
Gold	11.6%	1338.40	5%	1,271	1,406	50%	50%	1,338	0%	0.0%	
Silver	4.0%	16.25	8%	15	18	50%	50%	16	0%	0.0%	
Group SubTotal	15.5%									0.1%	
FOODS & FIBERS											
Cotton	1.4%	79.76	9%	72	87	50%	50%	80	0%	0.0%	
Sugar	2.3%	12.22	12%	11	14	50%	50%	12	-1%	0.0%	
Coffee (ICE)	2.0%	116.70	7%	109	125	33%	67%	119	1%	0.0%	
Group SubTotal	5.7%									0.0%	
		100.0%							Total	0.1%	
								total weighted expected return:		bottoms up	

Source: Bloomberg data, ASRS analysis

Top down model

$$\Delta Price = -16.8 + 5.3 * \Delta WorldGDP - 0.9 * \Delta USDollar$$

$$wGDPchg = 0.038$$

$$USDchg = -0.011$$

The expected change in price equals 0.76 percent.

Source: <http://libertystreeteconomics.newyorkfed.org/2016/03/what-tracks-commodity-prices.html> and Bloomberg data, ASRS analysis

1 Year History



5 Year History



10 Year History



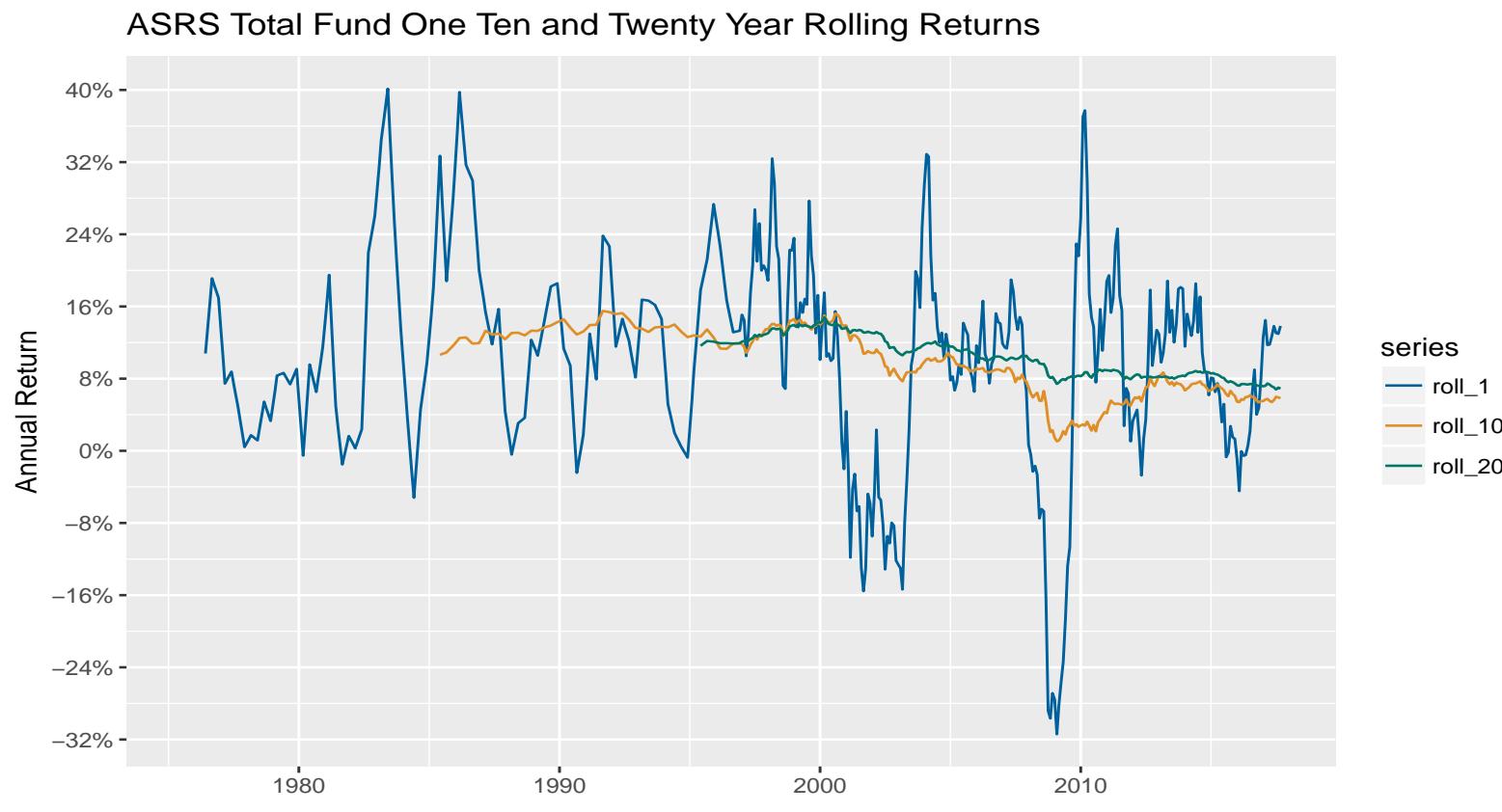
25 Year History



Outline

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

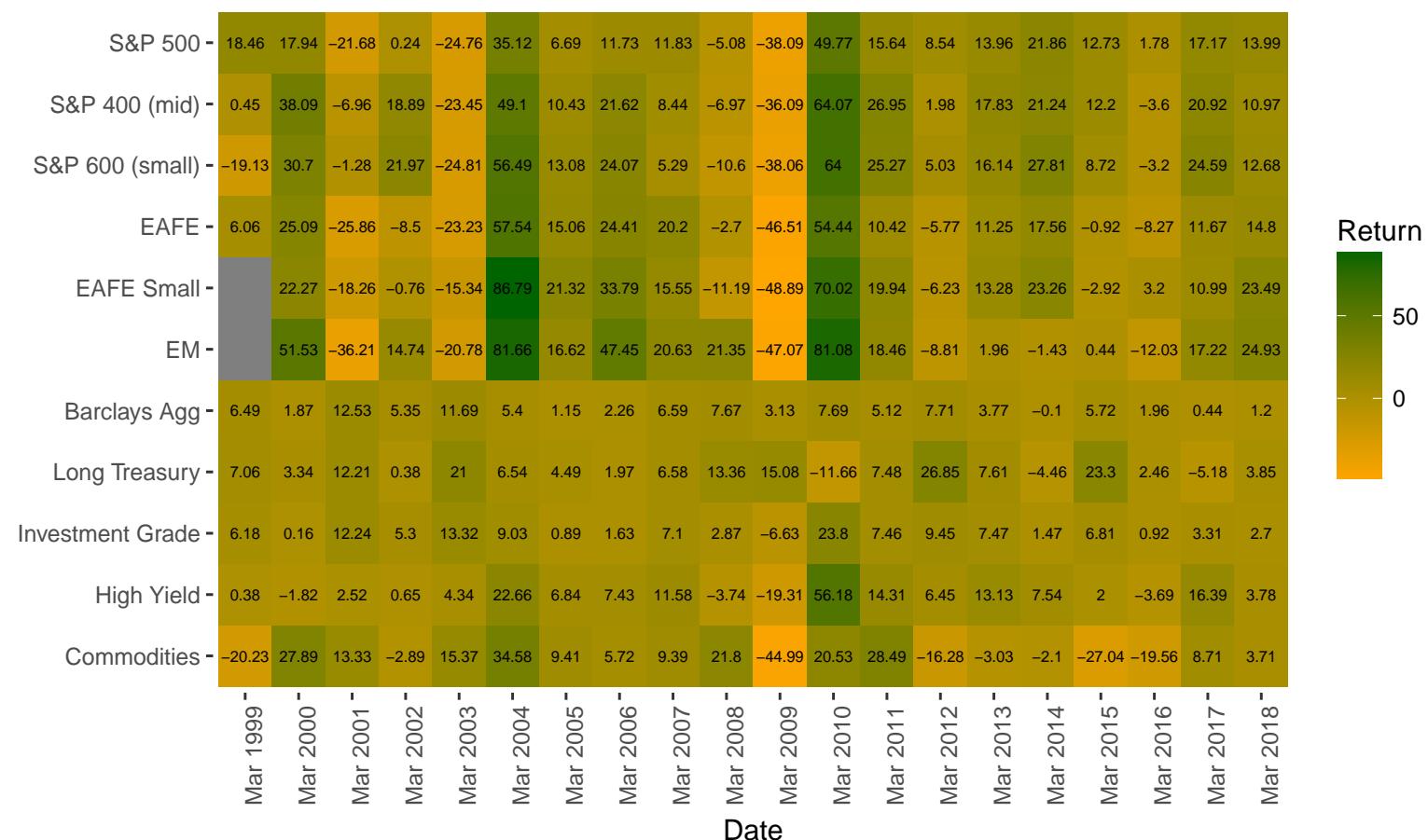
ASRS Returns



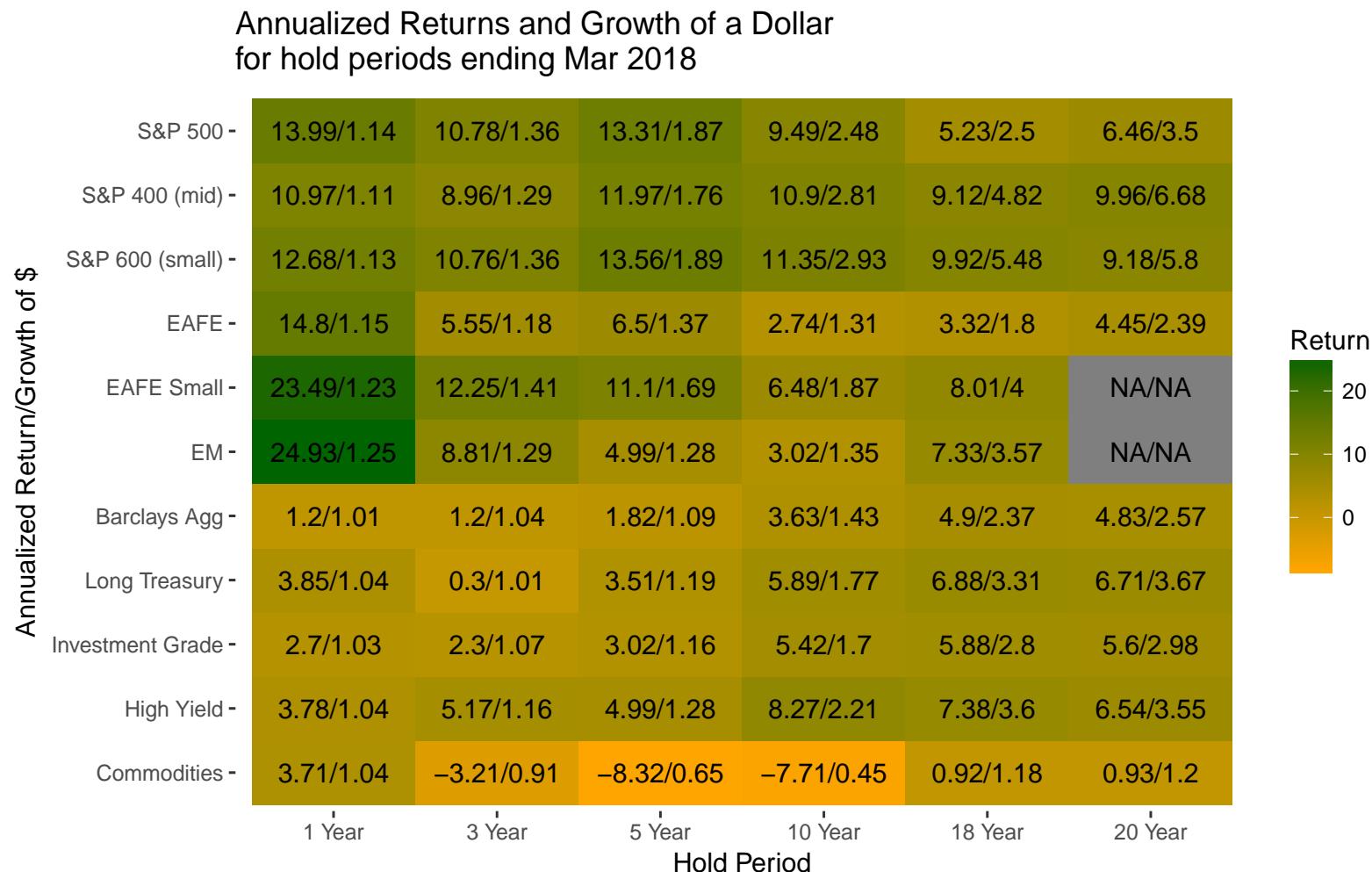
²Source: NEPC data, ASRS graphics

Asset Class One Year Returns

**One Year Returns
for indicated end dates**

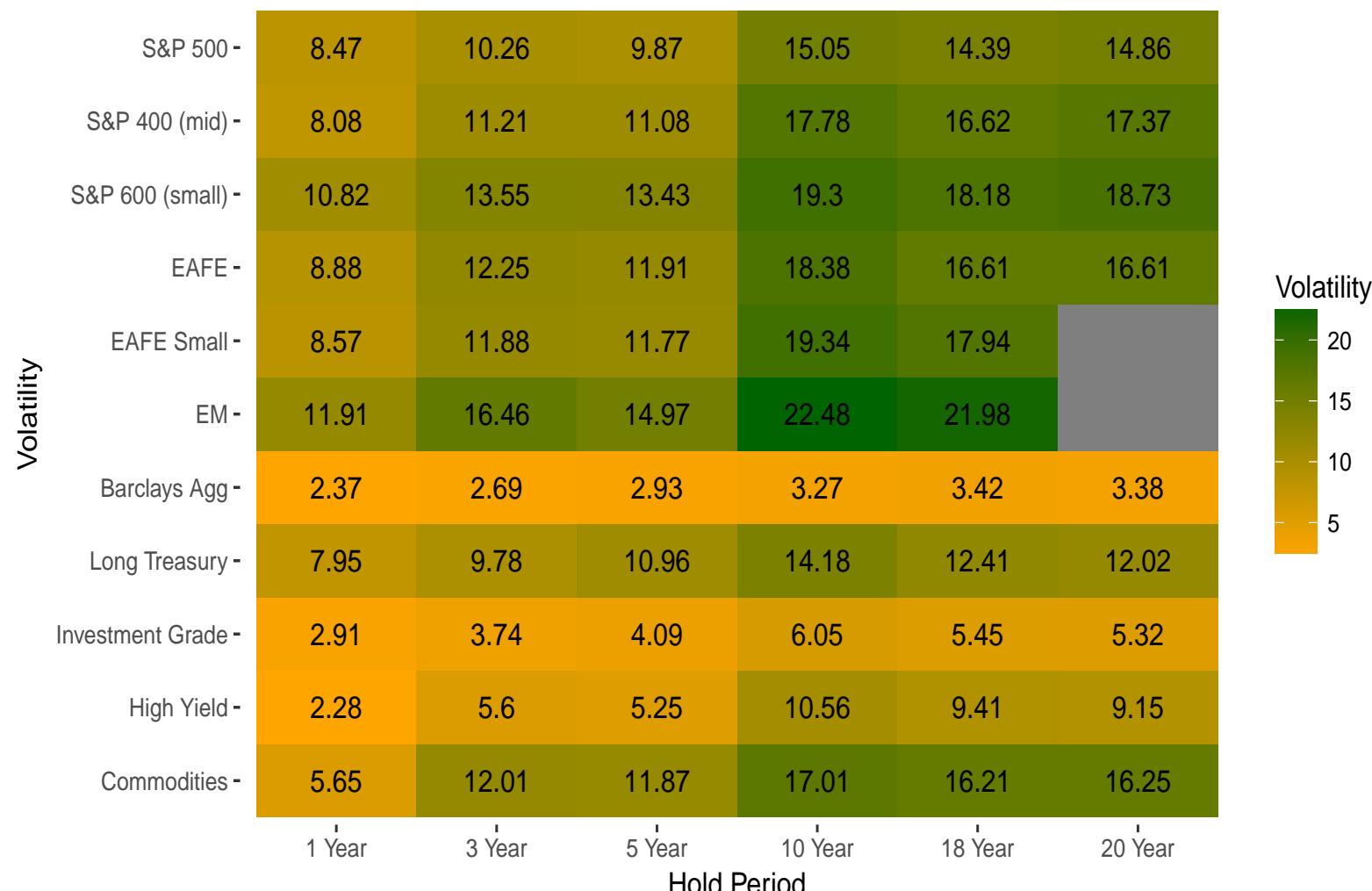


Asset Class Hold Period Returns



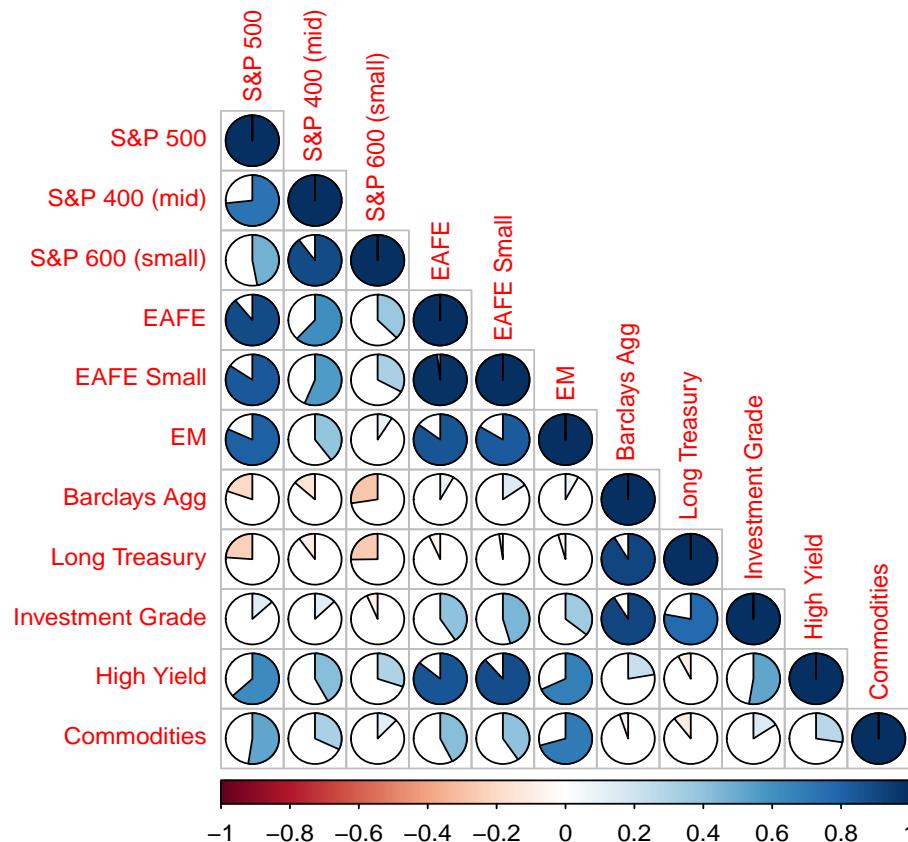
Asset Class Volatility

Volatility
for hold periods ending Mar 2018



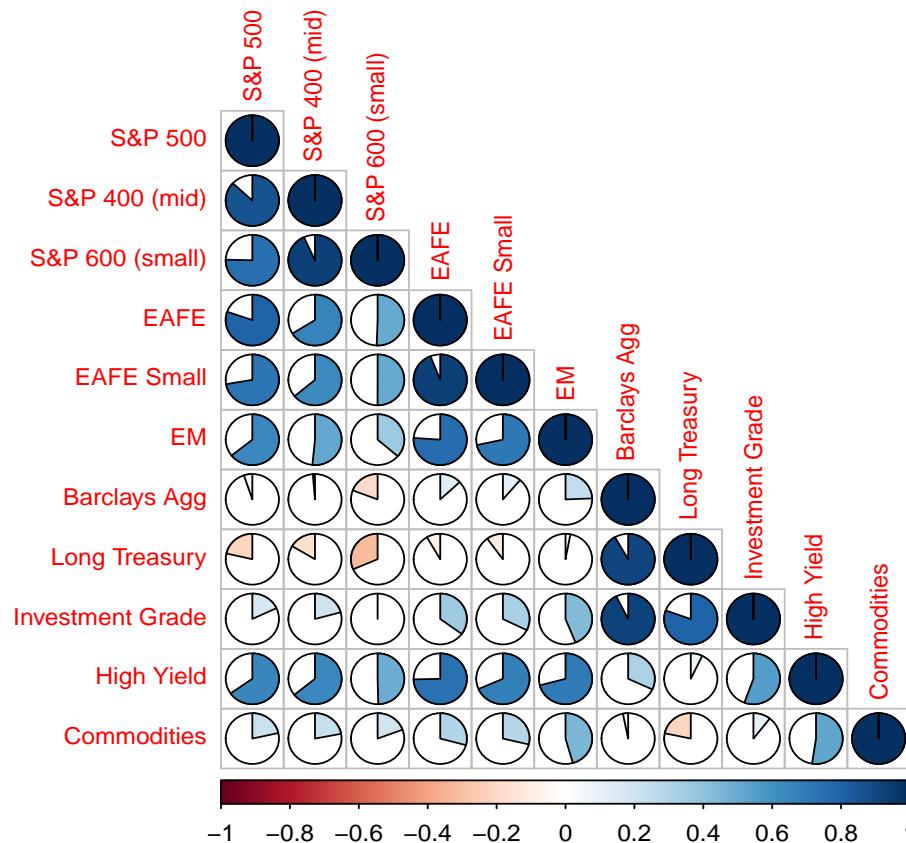
One Year Correlation

1 Year Correlation Matrix



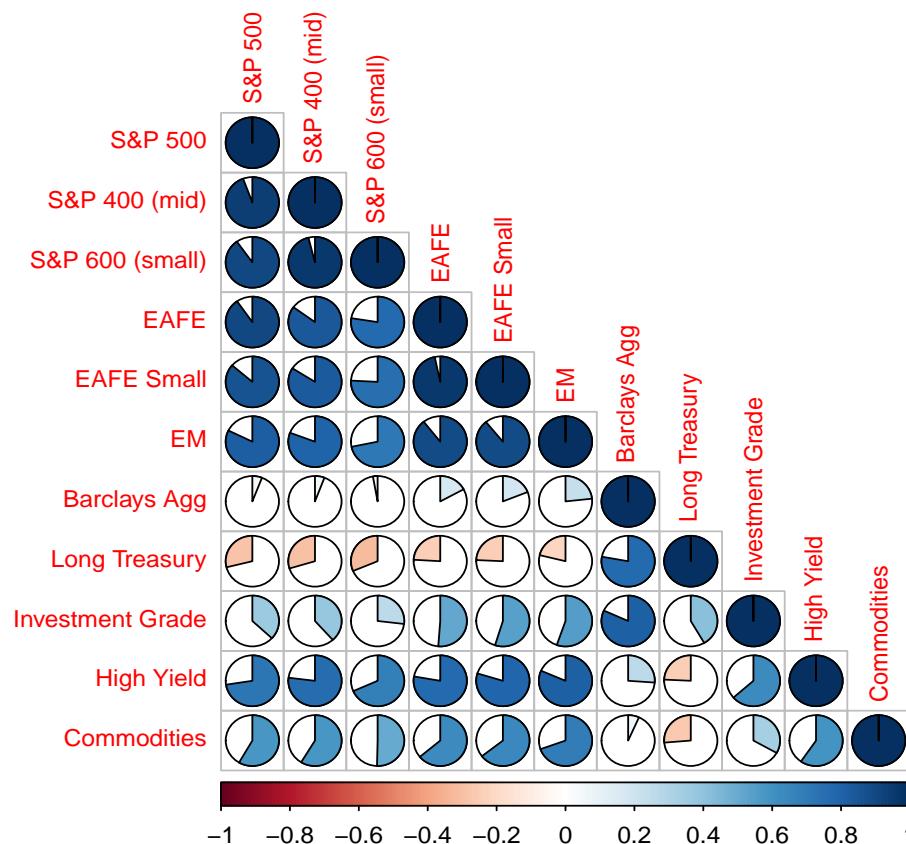
Five Year Correlation

5 Year Correlation Matrix



Ten Year Correlation

10 Year Correlation Matrix



Twenty Year Correlation

20 Year Correlation Matrix

