

# House Views and Portfolio Positioning

Arizona State Retirement System

August 9, 2016

# 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
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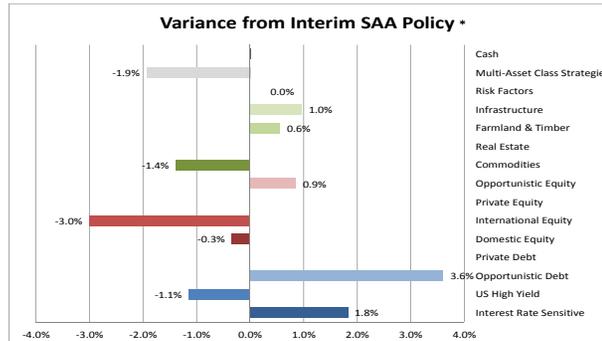
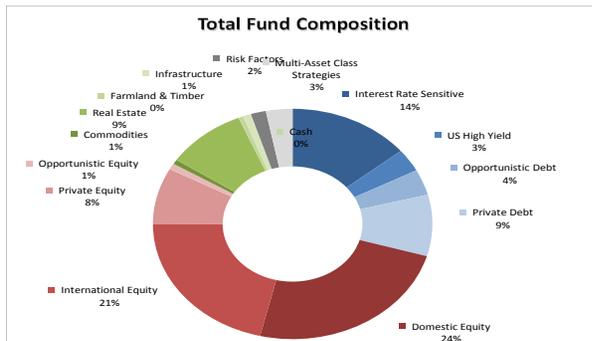
## Summary View

- Global economy continues to grow slowly with few warning signs of recession
- But. . .
  - Corporate profitability is soft
  - High levels of political and economic uncertainty in Europe
  - Slowing growth in China
  - Pricy valuations in US
  - Strong dollar is worrisome for US growth and problematic for international investments
- We think risks in equities are asymmetric to the downside
- Interest rates are likely to stay low and risks of inflation don't seem imminent
  - US rates are attractive compared to the rest of the world

# Portfolio Position

*We are positioned slightly defensively with excess liquidity available in core bonds ready to rebalance to equities should the opportunity arise.*

## Total Fund Positioning August 8, 2016



All Private Markets asset classes' market values are reported on a quarter-lag basis and adjusted to include the current quarter's cash flow.

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## Commentary

- Growth is slow globally
  - Picking up a bit in Japan and Europe but from a low starting point
  - Employment improving and becoming tight in some markets
  - China growth is slowing
- Inflation generally low
  - Wage inflation appearing in US
  - But moderated by low commodity costs
- Rates low everywhere as central banks attempt to stimulate

# Macro Indicators

*Slow growth, muted inflation but strong employment*

8/9/2016

<b>Economy</b>		Moving Average		
			2 Yr.	1 Yr.
EHUPUS Index	US Unemp	4.9	5.3	5.0
EHUPEUN Index	EUR Unemp	9.2	9.5	9.1
EHUPGB Index	UK Unemp	5.1	5.7	5.3
EHUPJP Index	Japan Unemp	3.2	3.4	3.3
GDP CYOY Index	US GDP	1.2	2.3	1.7
EHGDEUR Index	EUR GDP	1.6	1.6	1.9
EHGDGB Index	UK GDP	2.2	2.4	2.0
EHGDJP Index	Japan GDP	1.9	0.7	0.6
EHGDCN Index	China GDP	6.7	7.0	6.9
CPI YOY Index	US CPI	1.0	0.8	0.4
CPI XYOY Index	US CPI X fd nrg	2.3	1.9	2.0
CPEXEUY Index	EU CPI X fd nrg	0.8	0.9	0.9
JCPNEFEY Index	Jpn CPI X fd nrg	0.4	1.5	0.8
CNCPIYOY Index	China CPI	1.8	1.7	1.7

# Global Interest Rates

*Interest rates at or near record lows. Comparative attractiveness of US rates drawing foreign capital.*

August 9, 2016

		Price	100 day moving average	50 day moving average	30 day relative strength	Hurst Exponent
<b>Global Interest Rates</b>						
USGG10YR Index	US 10 Year	1.54	1.69	1.56	48	78
GDBR10 Index	German 10 Year	-0.08	0.06	-0.04	45	57
GUKG10 Index	UK 10 Year	0.58	1.20	0.95	34	32
JGBS10 Index	Japan 10 Year	-0.05	-0.14	-0.19	60	47

# Currency

*Strong dollar and yen, but euro, renminbi and pound are weak*

August 9, 2016

Currency		Price	200 day moving average	100 day moving average	50 day moving average	30 day relative strength	Hurst Exponent	6 month return	6 month volatility annualized	Momentum Index
EURUSD Curncy	Euro/USD	1.11	1.11	1.12	1.12	48	67	-1.25	9.42	-0.13
GBPUSD Curncy	GBP/USD	1.30	1.43	1.40	1.36	40	105	-10.15	15.39	-0.66
JPYUSD Curncy	Yen/USD	0.0098	0.0089	0.0094	0.0096	57	44	11.94	13.16	0.91
CNY BGN Curncy	CNY/USD	0.1502	0.1533	0.1522	0.1507	56	65	-2.40	3.43	-0.70

# Consensus Economic Forecasts

## Bloomberg

## 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)		
	16	17	18	16	17	18	16	17	18	16	17	18	16	17	18
LatAm	-1.26	1.85	2.34	25.43	19.95	5.84	9	9.28		-2.18	-2.03		-6.39	-5.72	
E. Europe	1.6	2.46	2.68	5.41	5.12	4.83	7.81	7.56	7.76	-0.03	0.03	0.03	-2.8	-2.42	-2.18
Middle East & Africa	2.43	2.88		3.84	4.01					-3.23	-0.15		-8.97	-5.22	
Asia	5.58	5.77	5.84	1.98	2.58	2.92	4.04	4.12	4.08	3.58	2.65	1.87	-2.5	-2.73	-3.21
China	6.5	6.2	6.2	2	2	2.55	4.1	4.2	4.2	2.8	2.5	2.15	-3.05	-3.5	-3.5
G-10	1.65	1.93	1.84	0.83	1.8	1.97	6.27	6.02	5.93	-0.21	-0.27	-0.58	-2.73	-2.51	-2.15
USA	1.9	2.3	2.1	1.3	2.3	2.3	4.8	4.6	4.6	-2.7	-2.8	-2.9	-2.9	-2.9	-3
Japan	0.6	0.8	0.6	0	0.9	1.5	3.2	3.1	3.2	3.7	3.3	3.55	-5.8	-5	-2
Euro	1.5	1.6	1.6	0.3	1.4	1.6	10.15	9.7	9.35	3	2.85	2.4	-1.9	-1.7	-1.4
United Kingdom	1.8	2.05	2.15	0.7	1.7	1.95	5.1	5	5	-4.9	-4.3	-4	-3.3	-2.5	-2.1
Canada	1.4	2	2.2	1.6	2	2	7.2	7.05	6.7	-3.15	-2.25	-2	-1.45	-1.4	-1
Australia	2.9	2.9	3	1.3	2.1	2.5	5.9	5.6	5.6	-4.3	-3.9	-3.8	-2.4	-2.1	-1.4
Sweden	3.5	2.6	2.1	0.9	1.7	2	6.9	6.7	6.8	5.8	5.5		-0.7	-0.75	
New Zealand	2.45	2.5	2.4	0.75	1.8	2	5.7	5.7	5.35	-4.35	-4.45	-3.75	-0.2	0.05	
Switzerland	1.2	1.6	1.75	-0.5	0.4	0.9	3.5	3.5	3.4	9.3	8.9	10.7	-0.2	-0.05	0.4
Denmark	1.2	1.8		0.6	1.4		4.2	4.1		6.7	6.65		-2.5	-2	
Norway	0.95	1.7	1.9	3	2.3	2.4	4.75	4.5	4.75	6.9	7.3	8	5.75	6.25	8
Germany	1.6	1.6	1.55	0.4	1.6	1.6	6.2	6.4	6.3	8.15	7.6	7.2	0.1	0.1	0.3
France	1.4	1.3	1.25	0.3	1.1	1.6	10.05	9.8	9.2	-0.1	0.1	-1	-3.3	-3	-2.7
Italy	1	1.1	1.1	0.1	1.2	1.5	11.4	11	11	2.2	1.9	2	-2.5	-2.1	-1.75
Europe	1.66	1.73	1.76	0.44	1.42	1.68	8.29	8.04	7.68	2.71	2.63	2.13	-1.91	-1.51	-1.16

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## Commentary

- We are 3.3% of total fund underweight equities with substantially all of the underweight in international equities
- On a valuation basis, US looks expensive vs ROW
- However. . .
  - Economic fundamentals of Europe are weak
  - Likelihood of continued strengthening of the dollar is negative for international equities
  - China is slowing and Latin America is troubled
  - rest of EM is commodity dependant
- Momentum measures favor US and are comparatively weak elsewhere
- Fund flows have favored US vs ROW
- Comparatively strong economic fundamentals justify, to some extent, the differential valuation between US and international equities

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# Equity Price Trends

## *US and EM outperforming Europe*

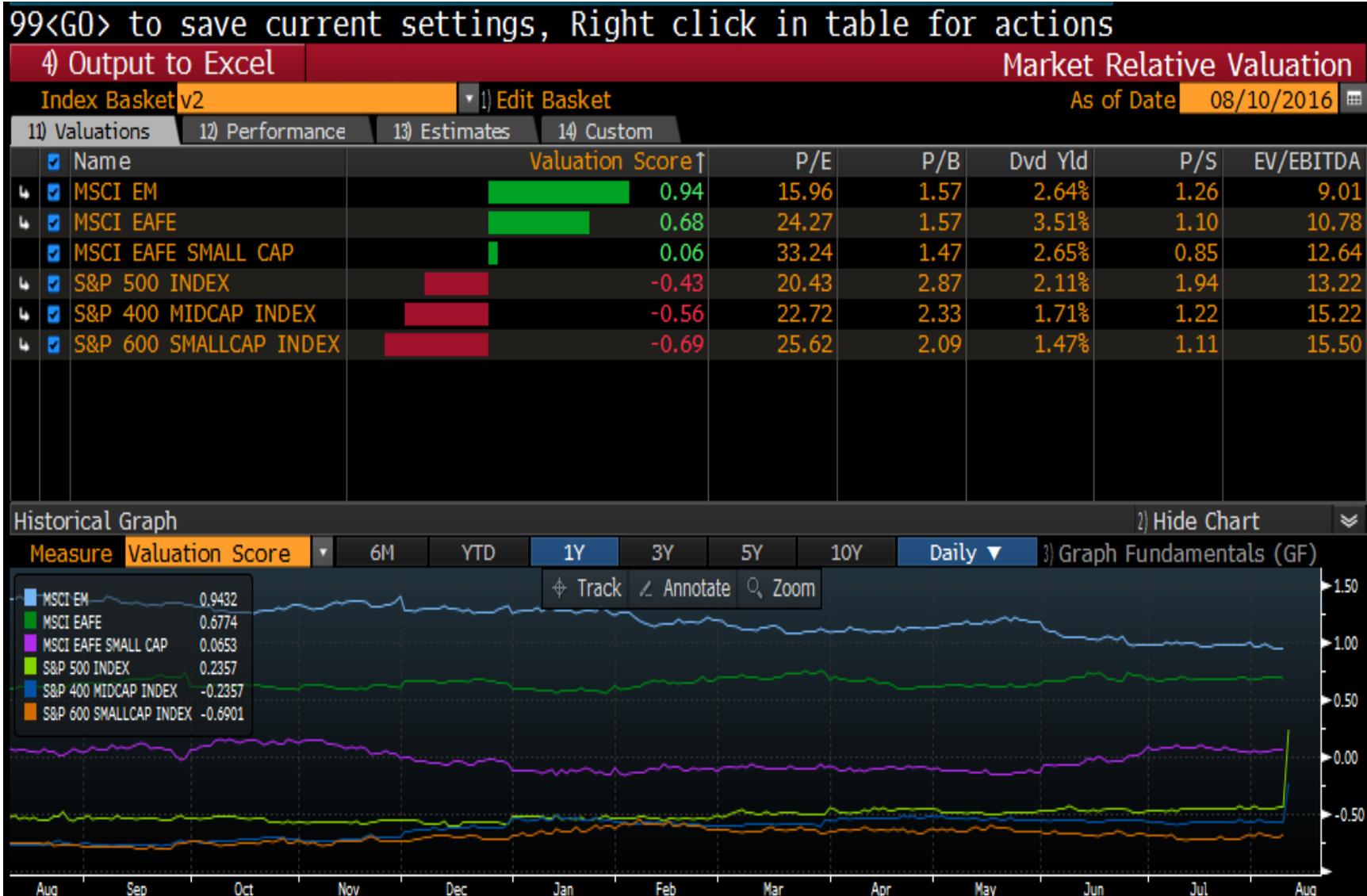
August 9, 2016

		Price	200 day moving average	100 day moving average	50 day moving average	30 day relative strength	Hurst Exponent	6 month return	6 month volatility annualized	Momentum Index
<b>Stocks</b>										
SPX Index	S&P 500	2182	2046	2093	2121	60	56	17.91	15.46	1.16
MID Index	S&P Mid	1563	1429	1483	1515	59	54	24.67	17.50	1.41
SML Index	S&P Small	746	680	703	721	59	91	25.17	19.02	1.32
MXEA Index	EAFE	1675	1646	1646	1637	54	47	10.52	19.86	0.53
MSDLEAFE Index	EAFE Local	965	955	940	937	55	78	9.98	18.84	0.53
MXEASC Index	EAFE Small	206	200	203	202	53	91	13.24	18.65	0.71
NCLDEAFE Index	EAFE Small Local	294	287	288	288	54	78	12.97	17.40	0.75
MXEF Index	EM	896	804	831	842	64	38	23.64	18.50	1.28
NDLEEGF Index	EM Local	451	413	424	430	64	46	18.60	13.92	1.34

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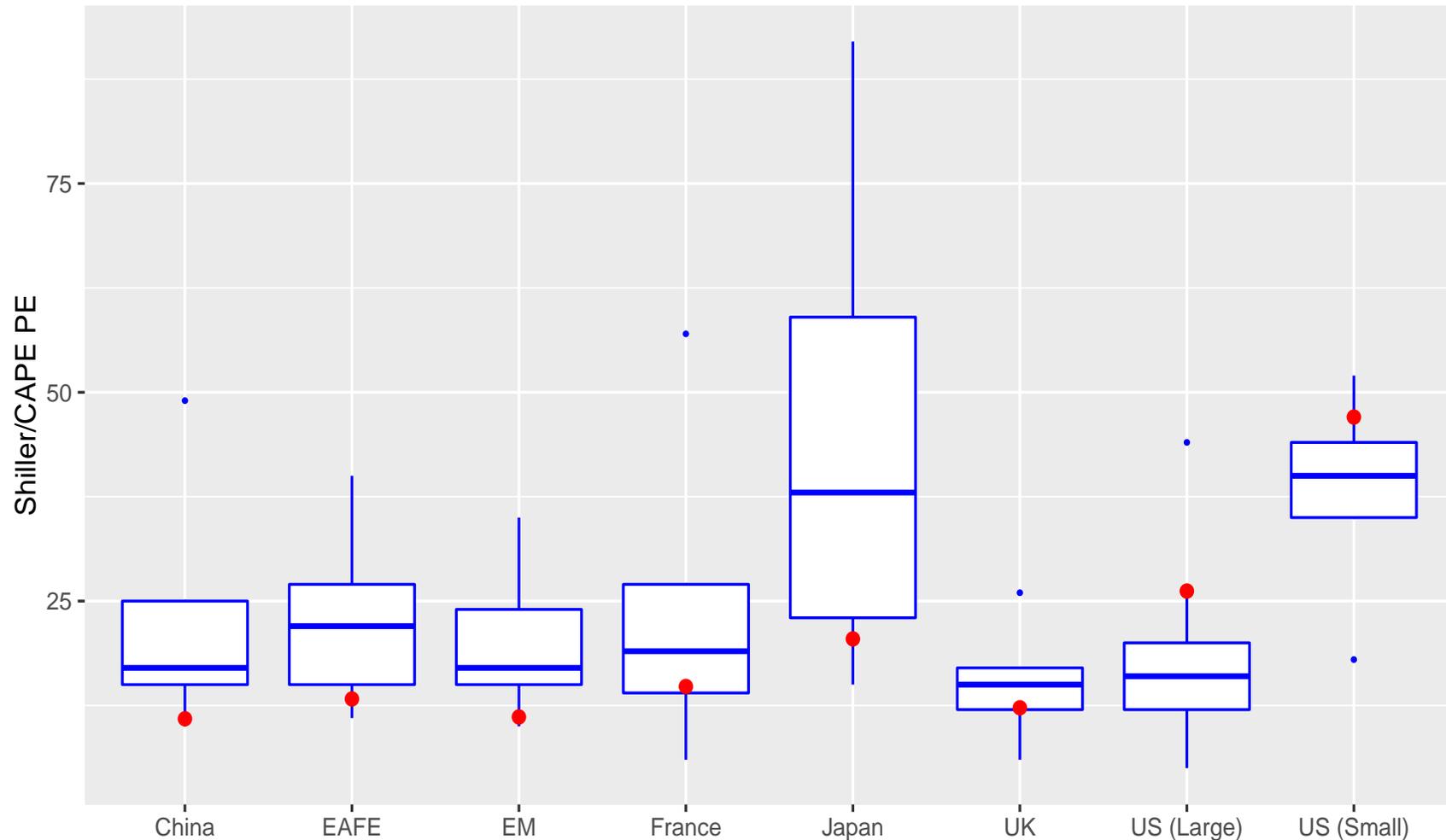
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# Relative Valuation of Global Indices



# Cyclically Adjusted PEs

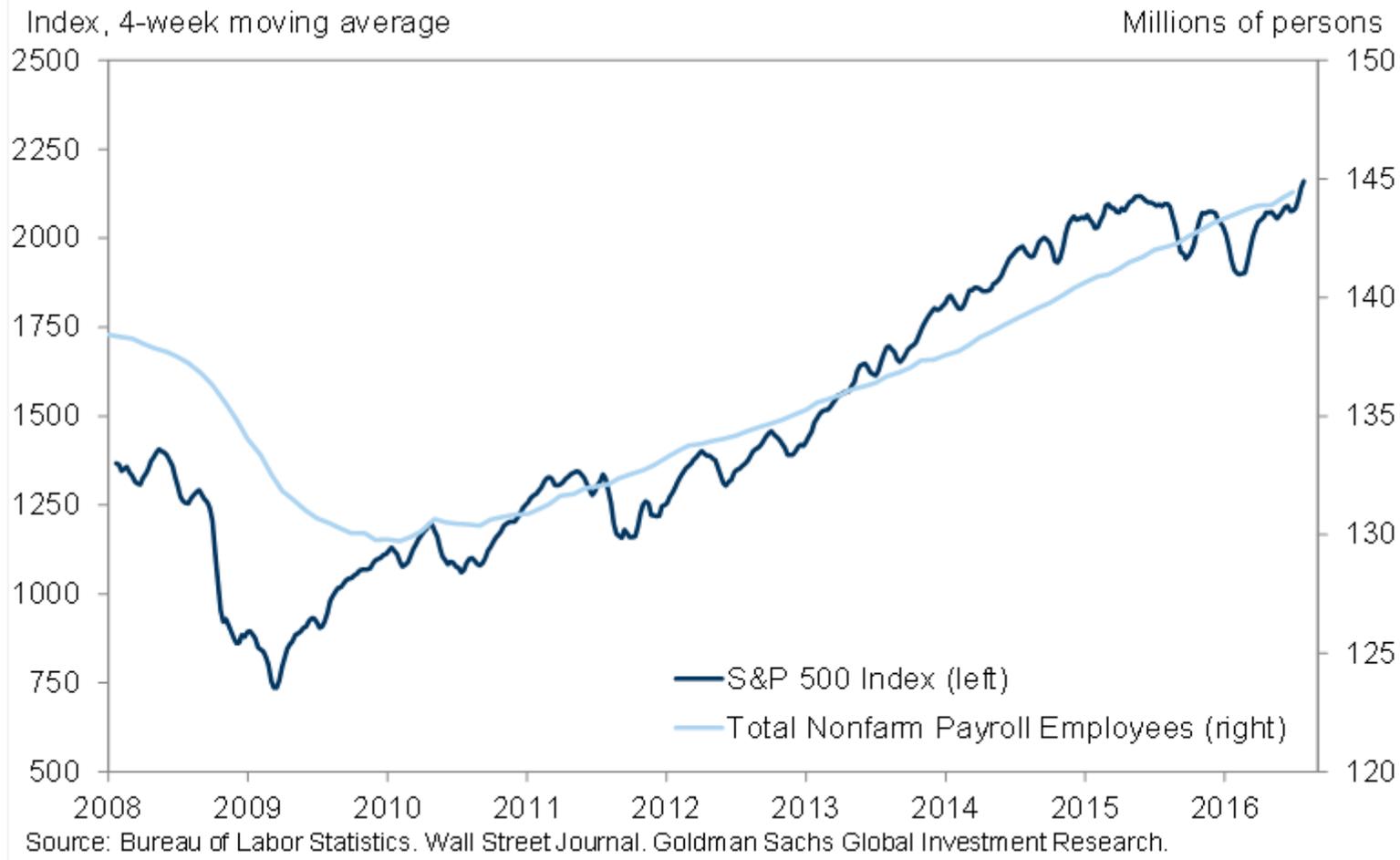
Comparative Shiller/CAPE PEs  
(red dot is value at 07/2016)



# Valuation Model with Currency

	Inter Asset Class Wghts	Valuation: avg Z Score	CAPE: Z score	Valuation & CAPE equal weighted Z score		Intra Asset Class Wghts	Valuation: avg Z Score	CAPE: Z score	equal weighted Z score		Currency Forecast vs Fwd
US	26%	-0.77	-0.71		Large	77%	-0.57	-0.71	-0.61	USD	
			-0.74		Mid	12%	-0.63				
			-0.37		Small	12%	-0.67	-0.37	-0.59		
EAFE	19%	0.25			Europe ex UK	30%	0.29	0.13	0.25	Euro	-2%
			0.56	0.33	Japan	24%	0.68	1.06	0.78	Yen	2%
					UK	19%	0.00	0.18	0.04	Pound	-2%
EM	5%	0.52	0.27	0.46	Asia ex Japan	63%	0.89	0.15	0.71	Remnimbi	0%

# Employment



# Fund Flows

99) Settings							ETF Flows			
View	Highest/Lowest	Chart	Netflow	Market	All	Period	3M	History	In Millions of USD	
Country	Netflow	Netflow	Flow%	Assets	#Funds	Inflow	In/Out	Outflow		
<b>Highest</b>										
10) United States		+74,695	+3.8	1,951,606	1,514	254,967		-180,278		
11) Japan		+6,510	+3.0	217,445	302	24,411		-17,901		
12) Canada		+3,647	+6.5	56,228	197	8,319		-4,672		
13) Asia Pac ex Japan*		+1,646	+10.1	16,339	46	2,172		-526		
14) Taiwan		+514	+5.5	9,351	31	2,494		-1,981		
15) United kingdom		+376	+1.2	30,264	110	3,155		-2,779		
16) Asia Pacific*		+297	+3.5	8,505	26	606		-309		
17) North America*		+280	+4.4	6,370	28	506		-227		
18) Australia		+241	+2.1	11,344	90	1,541		-1,300		
19) Singapore		+135	+7.9	1,717	9	194		-59		
<b>Lowest</b>										
20) Switzerland		-278	-1.7	16,540	50	867		-1,145		
21) Brazil		-349	-5.3	6,584	34	294		-642		
22) Spain		-405	-12.9	3,148	18	271		-676		
23) Russia		-409	-7.0	5,857	23	236		-646		
24) Italy		-685	-14.0	4,907	39	914		-1,599		
25) Mexico		-874	-22.3	3,922	26	529		-1,402		
26) Germany		-1,545	-3.6	42,960	151	3,296		-4,840		
27) Eurozone*		-3,530	-2.1	167,620	314	14,553		-18,084		
28) European Region*		-5,505	-5.4	102,838	331	10,786		-16,290		
29) China		-6,569	-7.1	92,138	298	12,583		-19,151		

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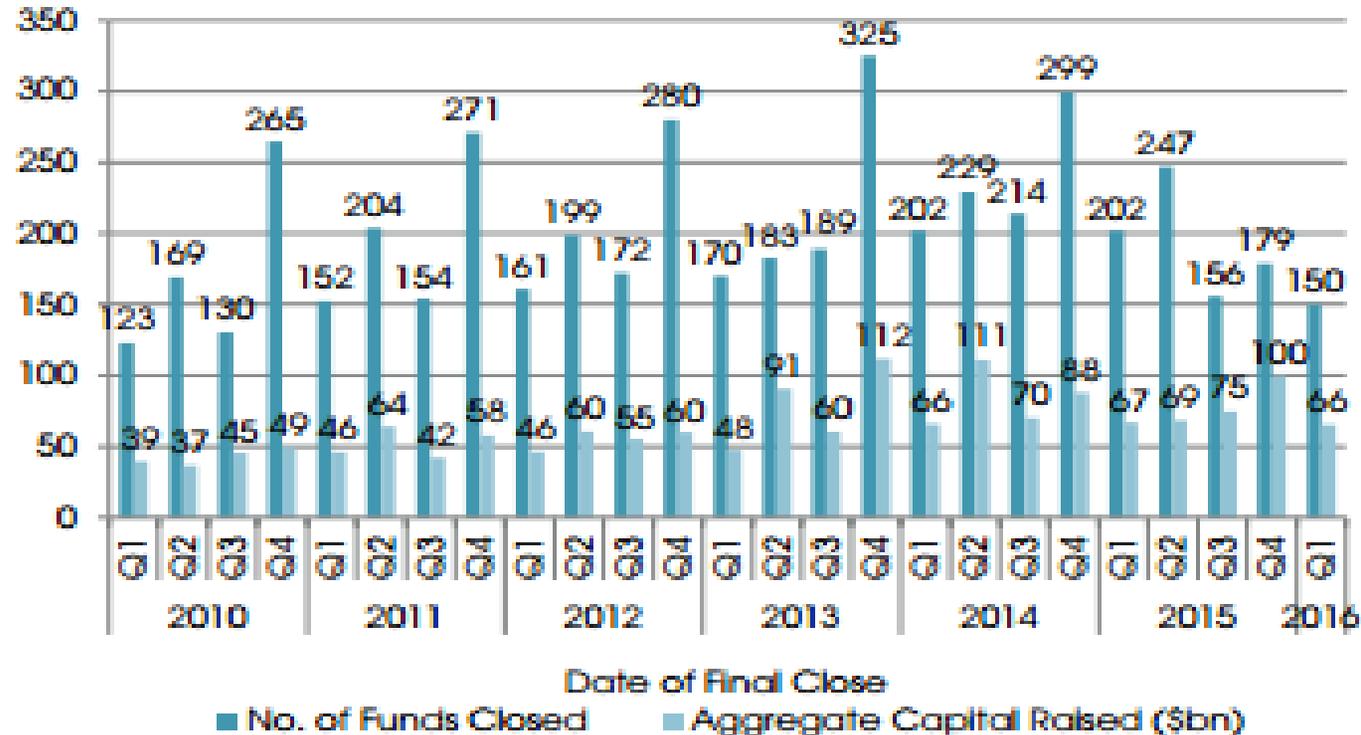
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# Private Equity Fund Raising

- Pace of fundraising has slowed
- Deal volume & size has also tapered
- While IPOs have fallen, other exit channels remain open
- Dry powder has steadily risen

# Private Equity Fund Raising

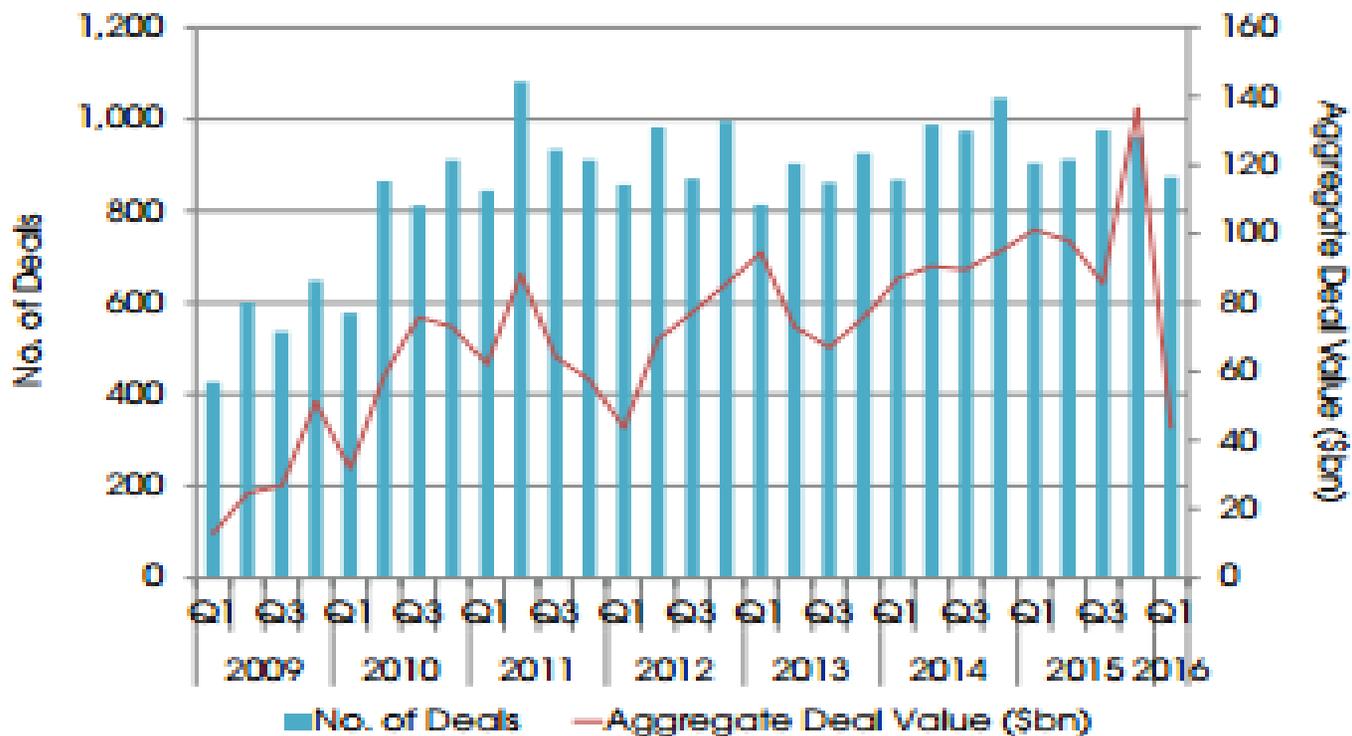
**Fig. 1: Global Quarterly Private Equity Fundraising, Q1 2010 - Q1 2016**



Source: Preqin Private Equity Online

# Private Equity M&A Deal Volume

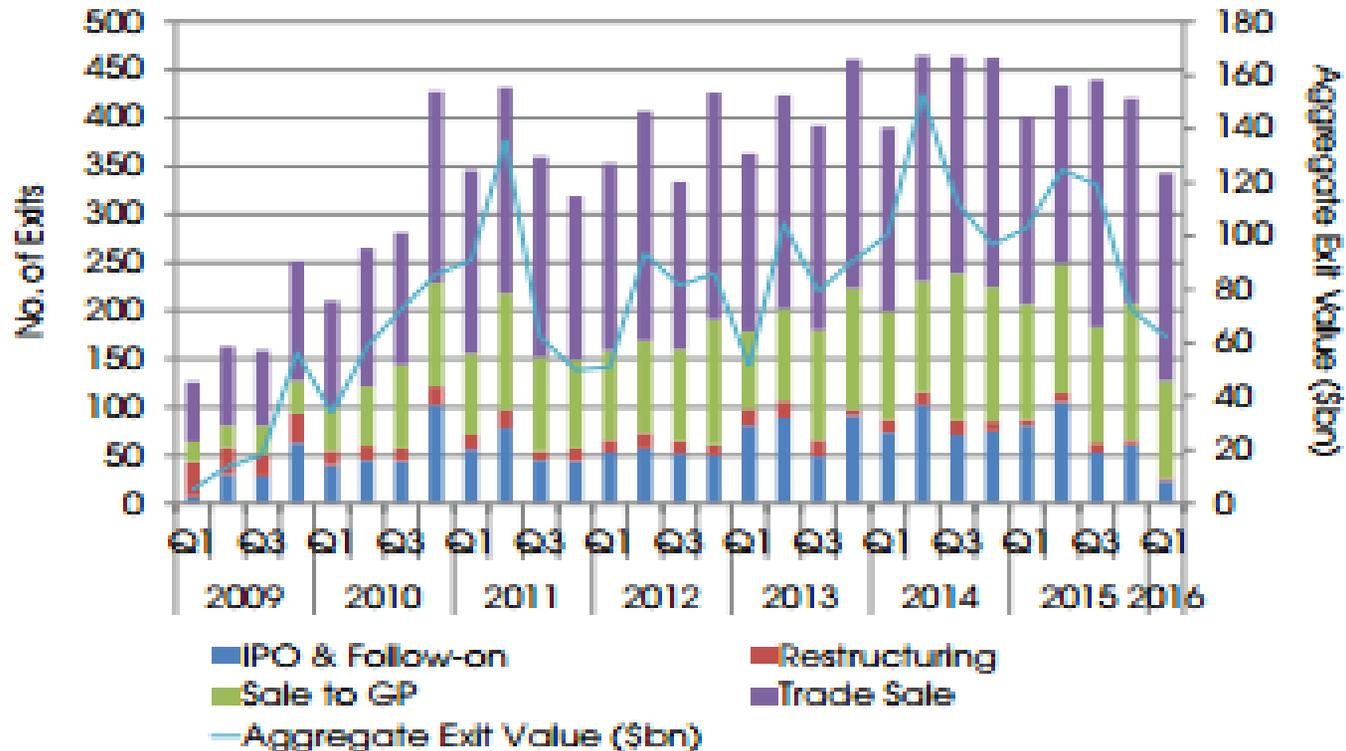
**Fig. 1: Quarterly Number and Aggregate Value of Private Equity-Backed Buyout Deals Globally, Q1 2009 - Q1 2016**



Source: Preqin Private Equity Online

# Private Equity Exits

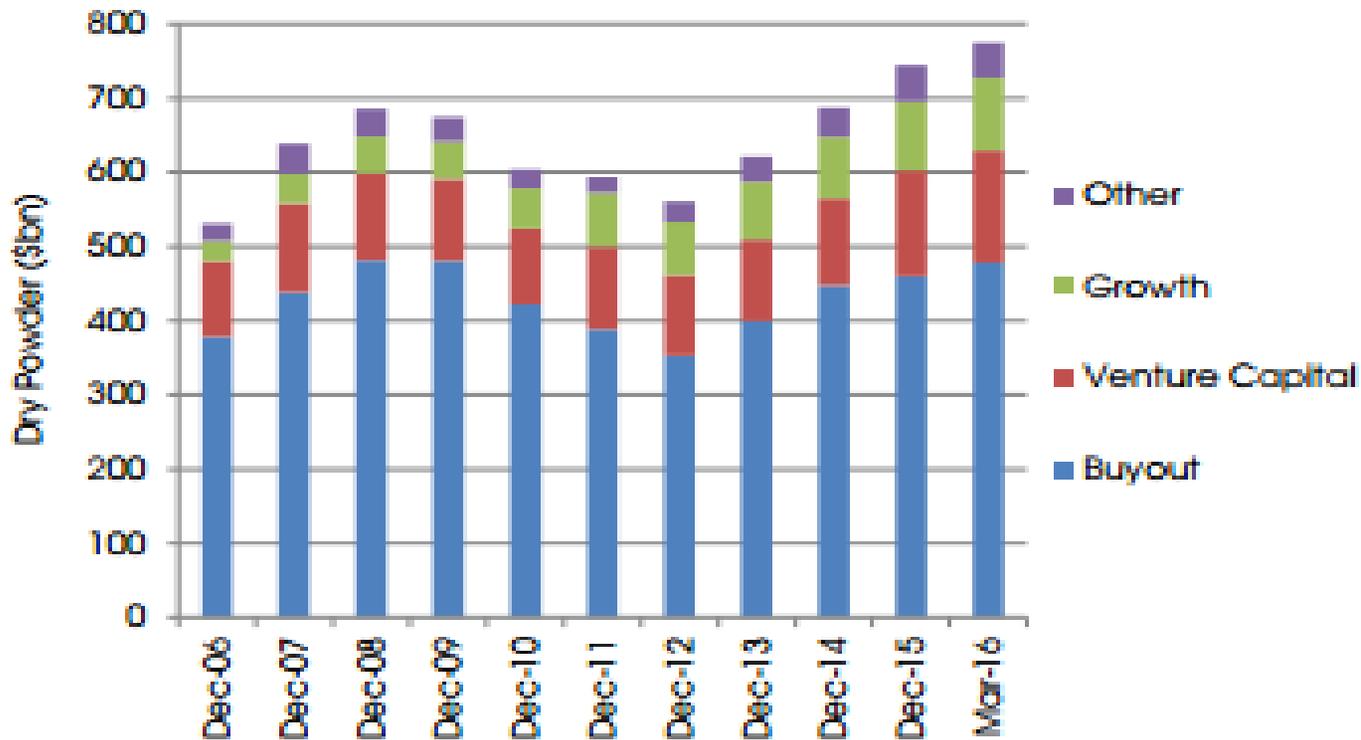
**Fig. 3: Global Number of Private Equity-Backed Exits by Type and Aggregate Exit Value, Q1 2009 - Q1 2016**



Source: Preqin Private Equity Online

# Private Equity Dry Powder

**Fig. 1: Private Equity Dry Powder by Fund Type, December 2006 - March 2016**



Source: Preqin Private Equity Online

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## Commentary

# Fixed Income

- In July, we increased our allocation in Fixed Income from neutral to overweight vs. the SAA target (29.7% vs. a 25.1% target). The increase reflects a reallocation from international equities to Interest Rate Sensitive Fixed Income as a defensive measure for the overall total fund following the Brexit vote in the United Kingdom.
- The overweight in Fixed Income reflects an overweight in Interest Rate Sensitive Fixed Income (14.6% vs. a 12.2% target), an underweight in High Yield Fixed Income (3.2% vs. a 4.4% target) and an overweight in Opportunistic Debt (3.5% vs. a 0.0% target).
- We continue to believe that the Private Debt asset class offers the most attractive opportunity in fixed income. We have increased our allocation to over 8% of the total fund vs. a SAA policy target of 10%. We hope to reach the 10% target in the first half of 2017. Our partnership commitments represent approximately 15% of the total fund.

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## Rates

# Interest Rate Sensitive Fixed Income

- Long-term U.S. interest rates have fallen significantly over the course of 2016 with the yield on the Barclays U.S. Long Treasury Index falling by approximately 90 bps. The decline reflects a combination of factors including slowing global growth expectations, aggressive monetary policies in Europe and Japan that has contributed to negative interest rates in competing “safe haven” sovereign debt markets, and benign inflation.
- We believe that long-term U.S. interest rates will likely remain relatively low by historical standards for the foreseeable future and may fall further as U.S. rates remain attractive in the global sovereign bond market.
- In early July, we increased our allocation to both Core Fixed Income and Treasuries (Long Duration) as a defensive measure for the overall total fund. We are now overweight Interest Rate Sensitive Fixed Income vs. the SAA target.

# Long Treasury

## Barclays U.S. Long Treasury Index Yield 2015 – 2016



3

# German Bund

## 10 Year German Bund Yield 2015 - 2016



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# Japanese Bonds

## 10 Year Japanese Government Bond Yield 2015 - 2016



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# High Yield

## High Yield

- Valuations as measured by credit spreads in the high yield bond market appear attractive relative to the tighter levels experienced in recent years; however, we believe the wider spreads primarily reflect deteriorating credit quality.
- Over the coming years, we expect both a rise in corporate defaults and ratings downgrades. Initially, this deterioration in credit quality is being led by sectors that have been adversely affected by the severe decline in global commodity prices including energy, energy services, metals and mining. However, as we are likely in the later stages of credit cycle (that began with an upturn in 2009), credit ratings will likely decline and defaults will likely increase in other sectors as well. We believe this may lead to a spike in defaults (probably in 2017) and further spread widening before the market bottoms. Higher defaults should create attractive investment opportunities for our managers in the Opportunistic Debt asset class.
- With this view, we are underweight High Yield vs. the SAA target.
- Our underweight also reflects our view that the Opportunistic Debt asset class will likely deliver higher returns over the long-term than the high yield bond market. ASRS' investments in Opportunistic Debt are primarily in distressed corporate debt that tends to exhibit a meaningful correlation with the broader credit markets including high yield bonds. Overall, we believe we have ample exposure to credit in the total fund.

# High Yield Credit Spread

## Barclays US Corporate High Yield Index Option Adjusted Spread (OAS) 2015 – 2016



7

# High Yield Yield-to-Worst

## Barclays US Corporate High Yield Index Yield-to-Worst 2015 – 2016



8

# 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 readily 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.
- The opportunity in Private Debt has become more attractive in the past few years.
- Regulatory constraints limiting banks ability to make below investment-grade, illiquid loans (typically to middle market companies) has become more severe due to a number of policies: the adoption of Basel III, Dodd-Frank financial regulation and new “Leveraged Lending Guidelines” of US bank regulators.
- Business Development Companies (“BDCs”), a competing source of illiquid loans, have pulled back on lending due to their depressed equity valuations.
- Anecdotally, expected returns for middle market loans appear to be 50 - 100 bps higher or more since a year ago in many situations while the credit quality of the underlying loans has either improved or not deteriorated.
- When the public credit markets have “seized up” as they did in the latter part of 2015 and in the first quarter of 2016, our private debt managers quickly capitalized on very attractive investment opportunities that materialized when borrowers were forced to turn to the much more expensive private markets for financing. Going forward, we expect these periods of dislocation in the public credit markets to happen from time-to-time particularly with a weakening global growth outlook and the prospect that we are in the late stages of a credit cycle in the U.S.

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- 5 **Real Estate**
  - **Commentary**
  - Supply and Demand
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## Commentary

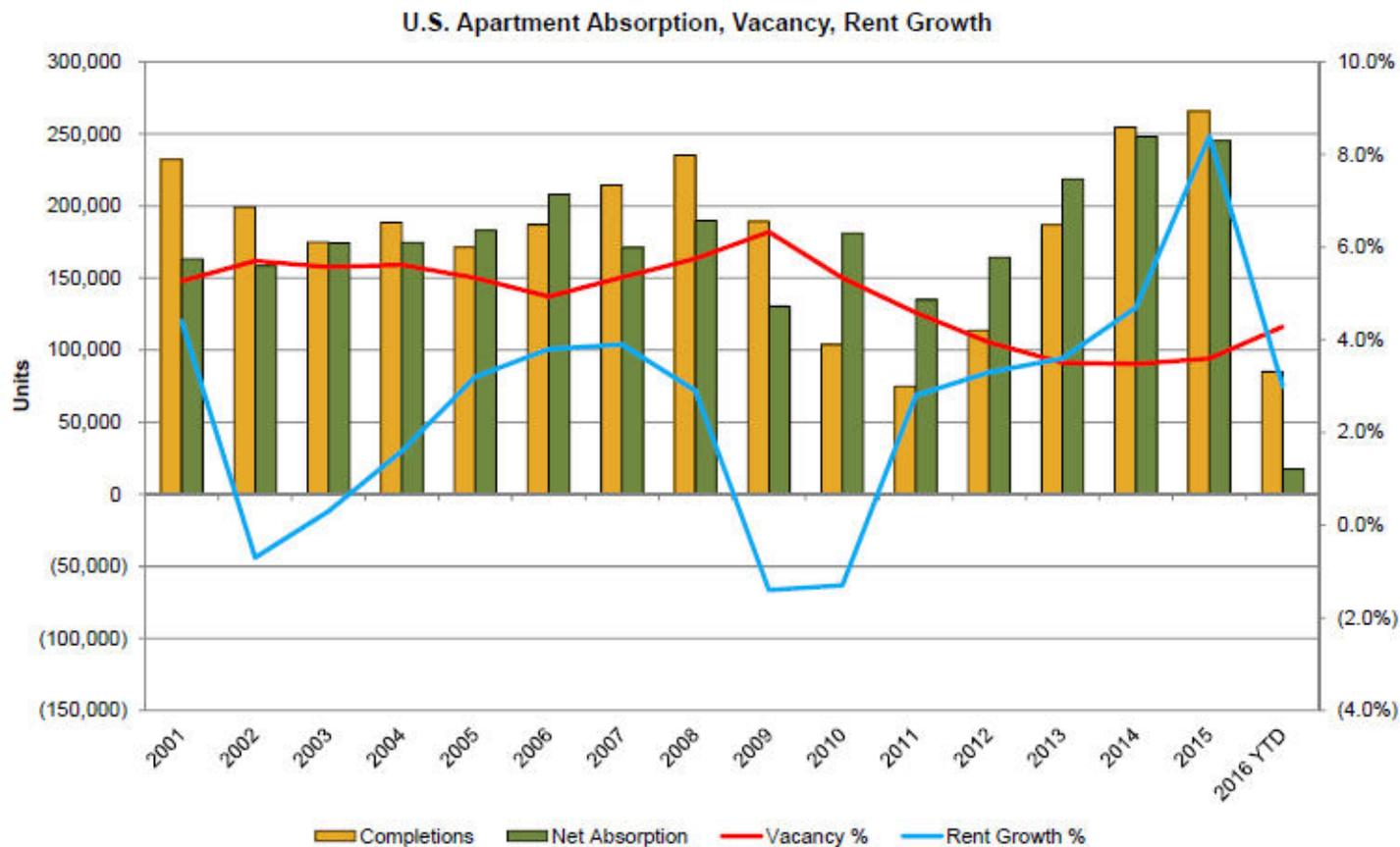
- Property markets are generally moving out of a recovery phase to a mature phase
- Fundamentals leads us to emphasize apartments, industrial properties, medical office buildings, senior housing, self-storage, and student housing for demographic and macro policy reasons
  - Suburban office and certain retail categories require a substantial discount because of weak demand fundamentals
  - For sale housing remains a potential target for opportunistic investing because financing and entitlement constraints have kept the market under-supplied
- CMBS spread widening has lead to a contraction in the availability of credit and reduced new issuance
- Dry powder remains robust at \$239 billion at 6/30/16 with 52% of funds closed in the first half of 2016 exceeded fundraising targets according to Preqin

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# Occupancy Trends and New Supply

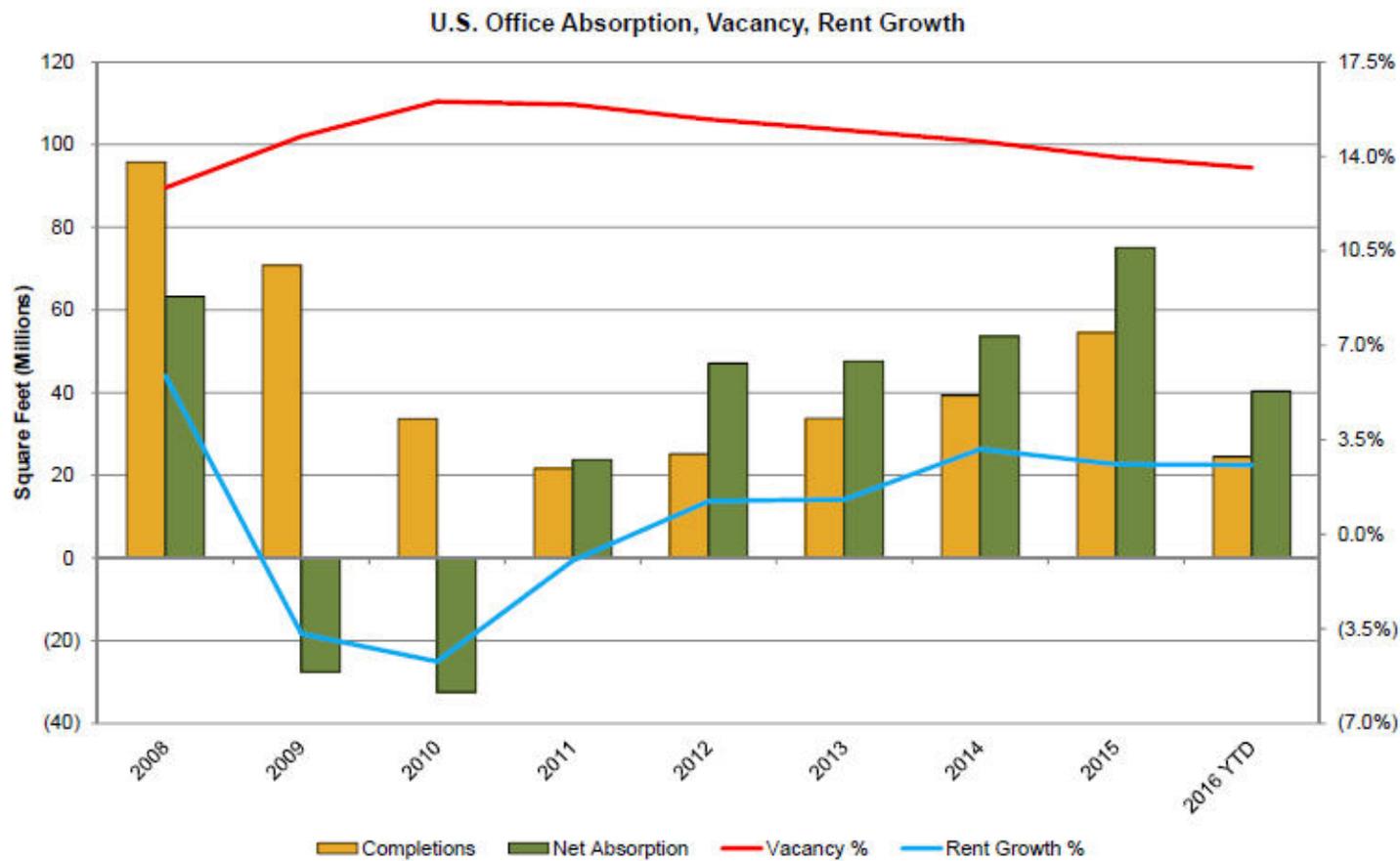
## Multifamily



Source: CoStar, RCLCO

# Occupancy Trends and New Supply

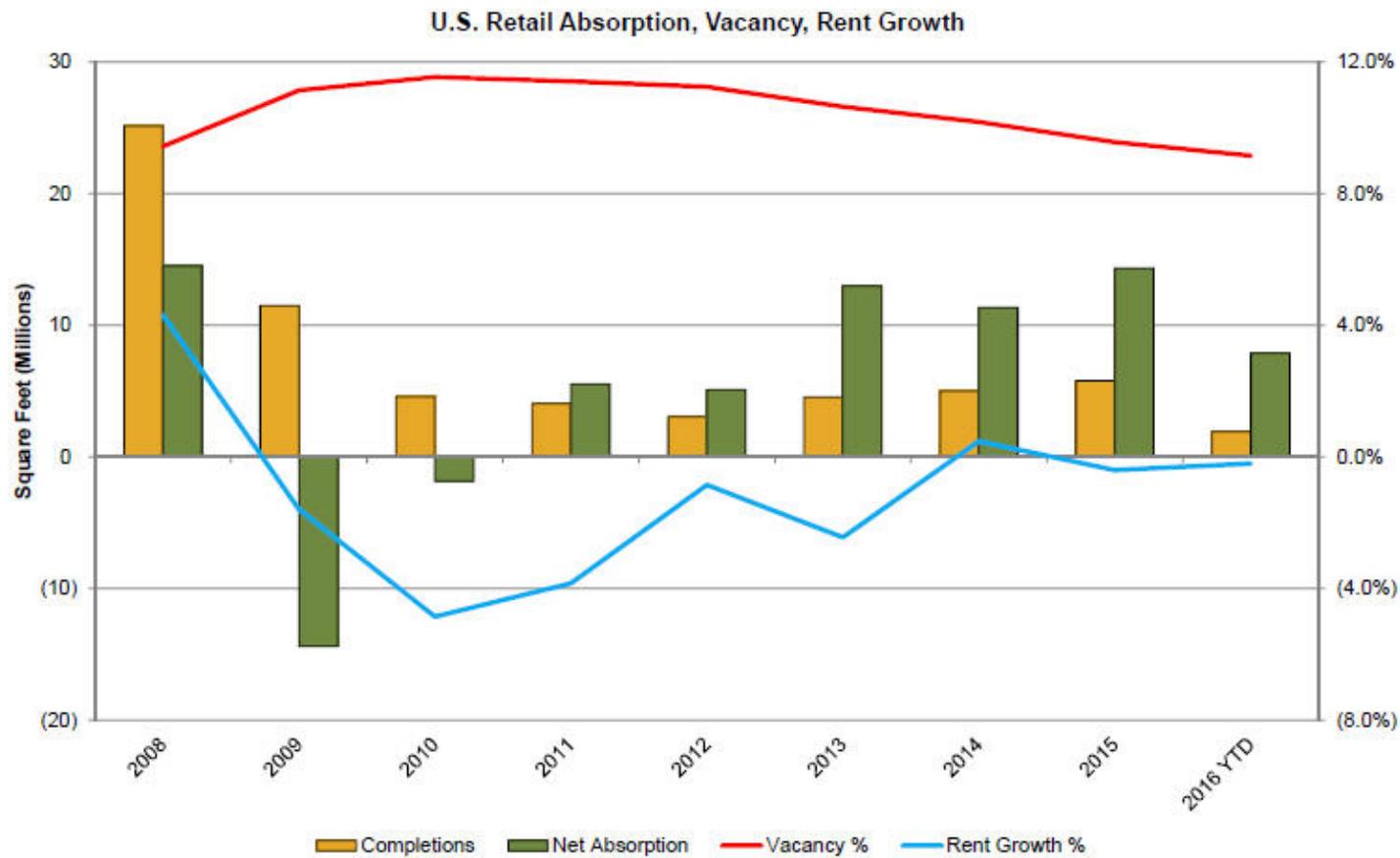
## Office



Source: CoStar, RCLCO

# Occupancy Trends and New Supply

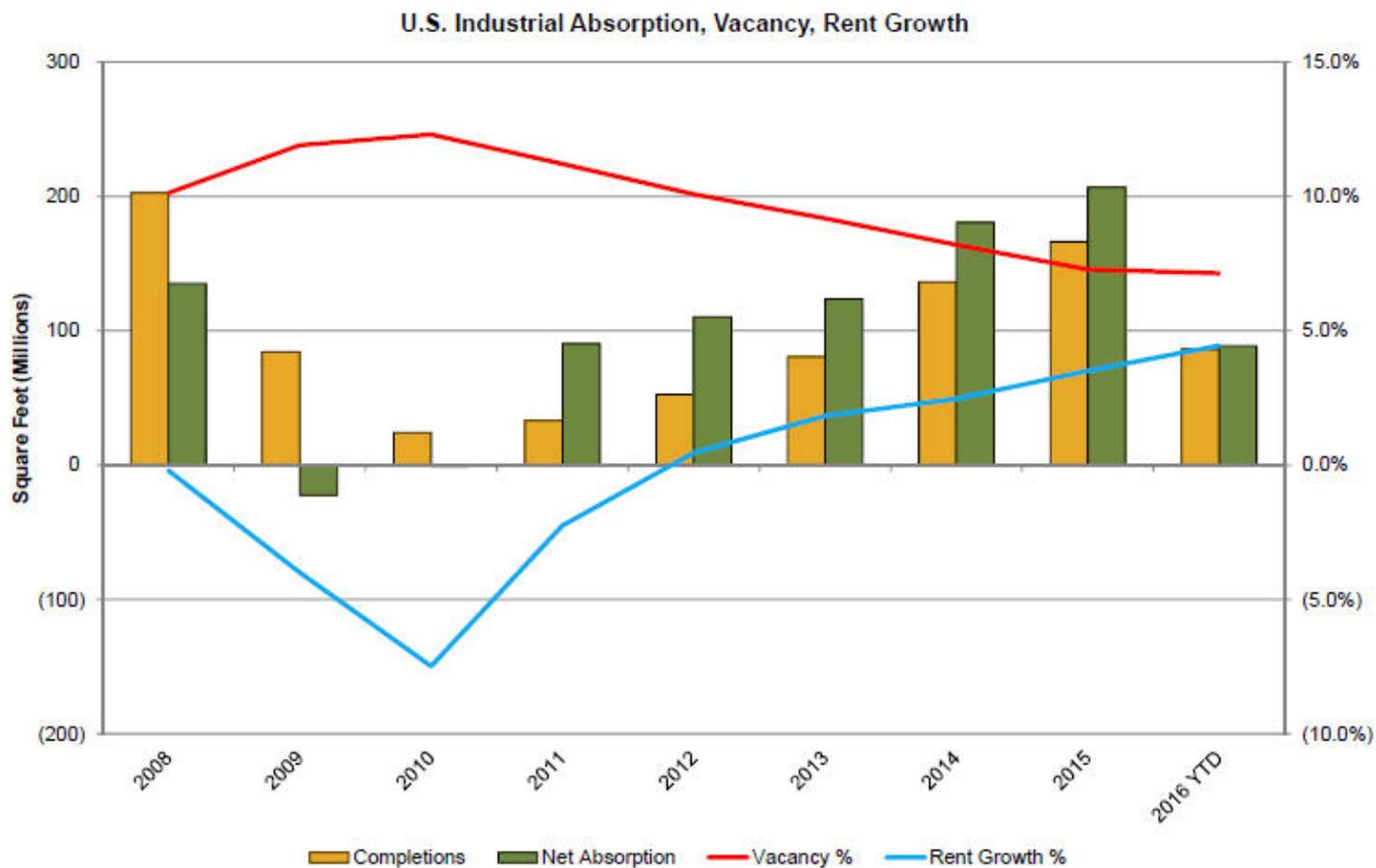
## Retail



Note: Above data is for neighborhood and community centers only  
 Source: CoStar, RCLCO

# Occupancy Trends and New Supply

## Industrial



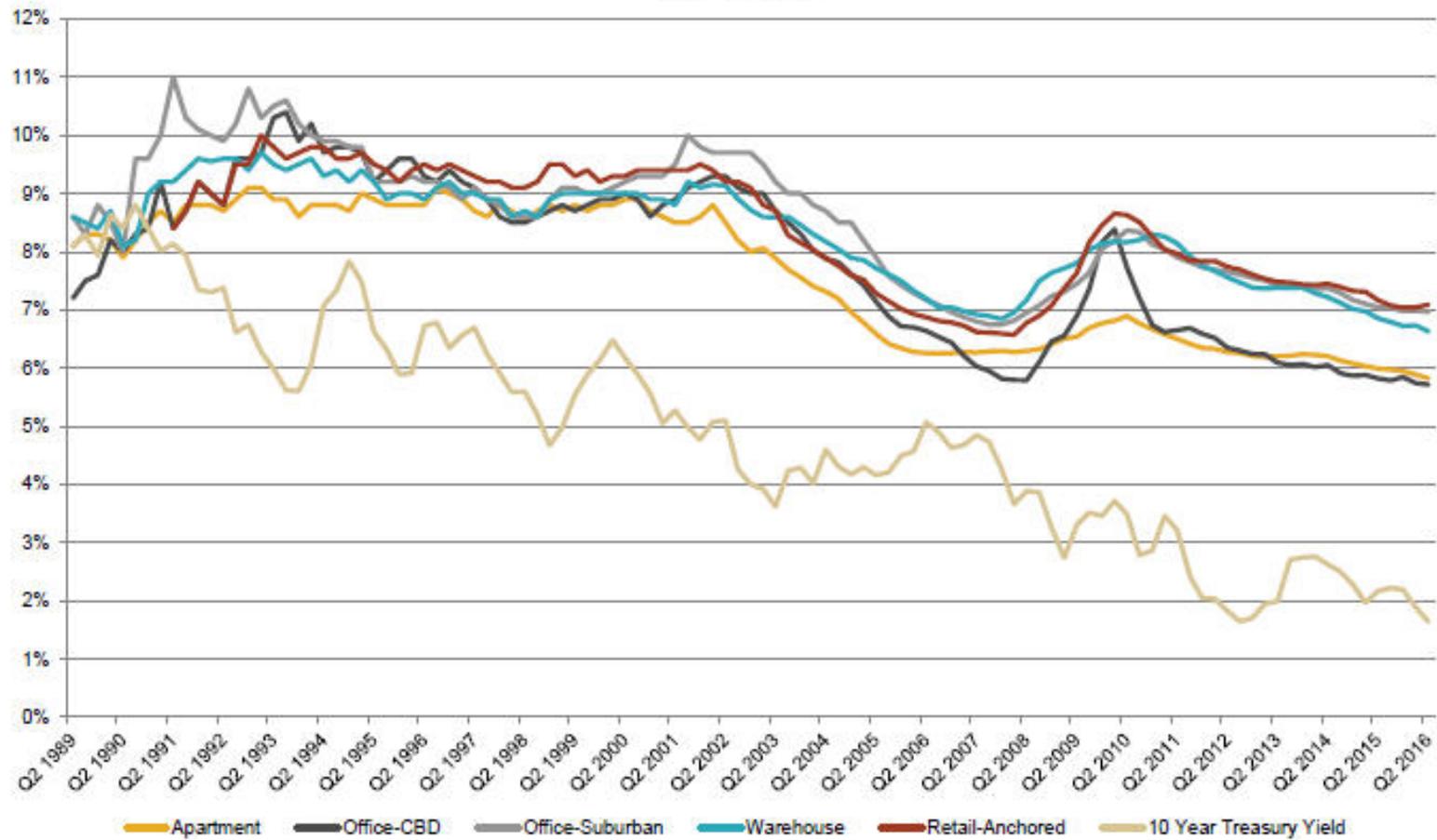
Source: CoStar; RCLCO

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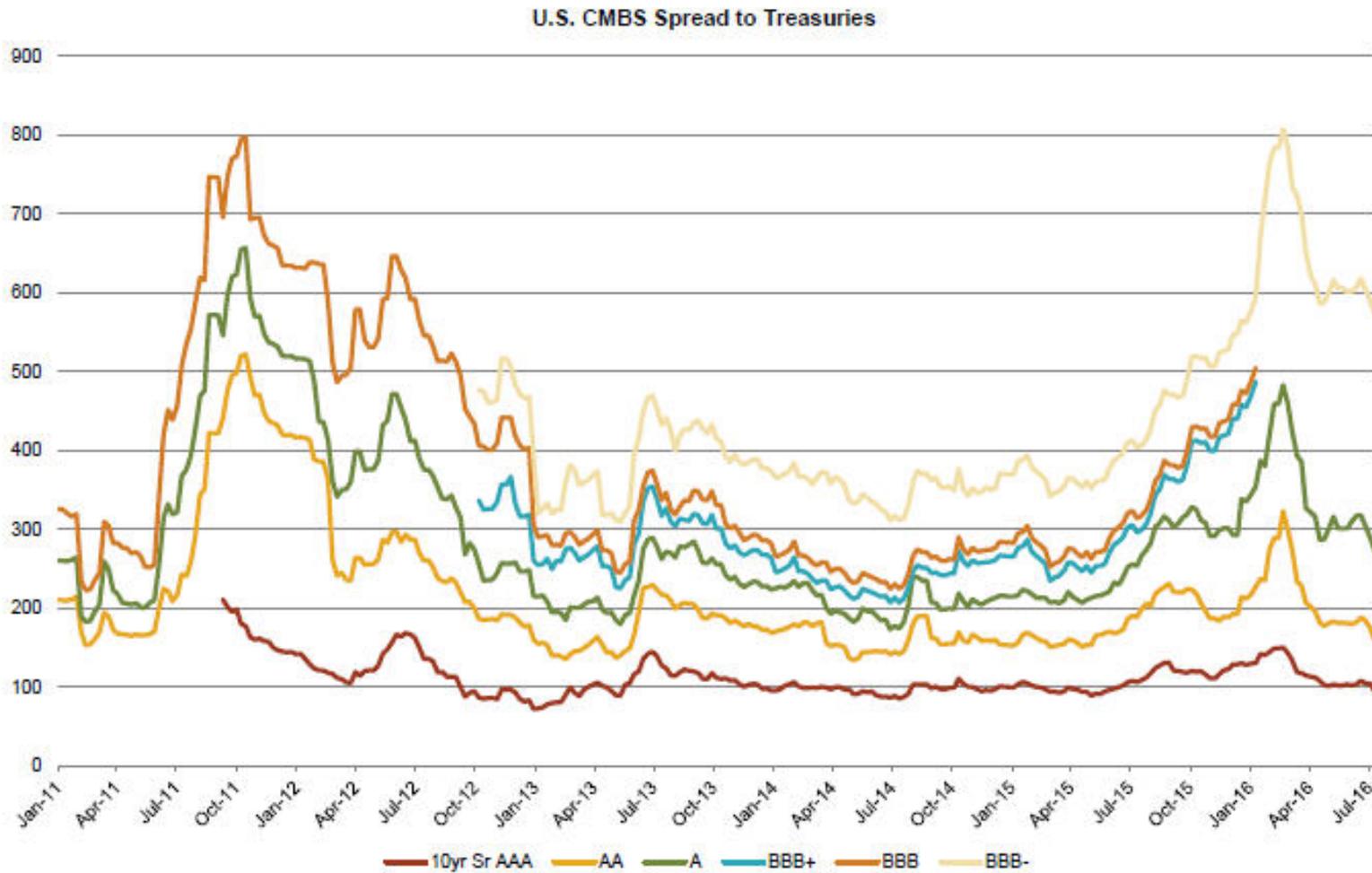
# Cap Rate Trends

Cap Rates by Property Type  
 1989 - Q2 2016



Source: RERC; RCA

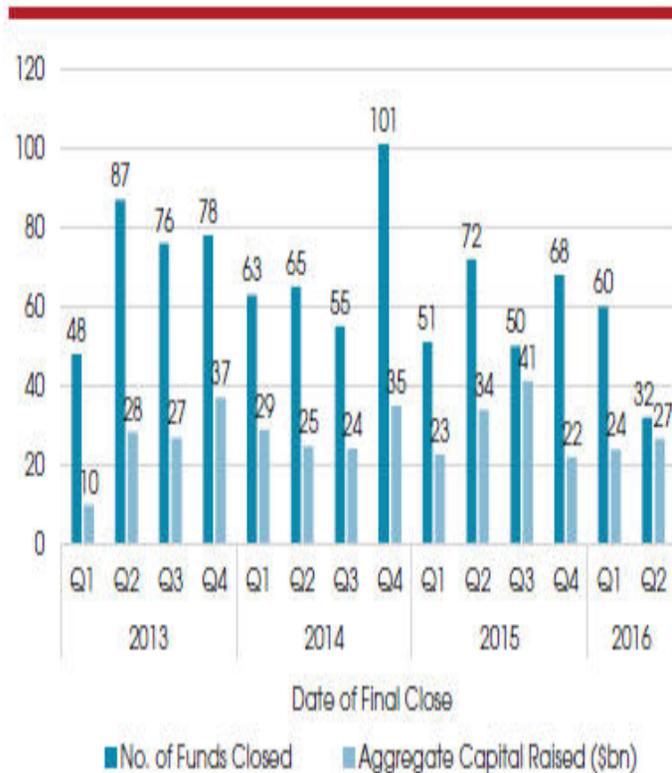
# Credit Availability



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

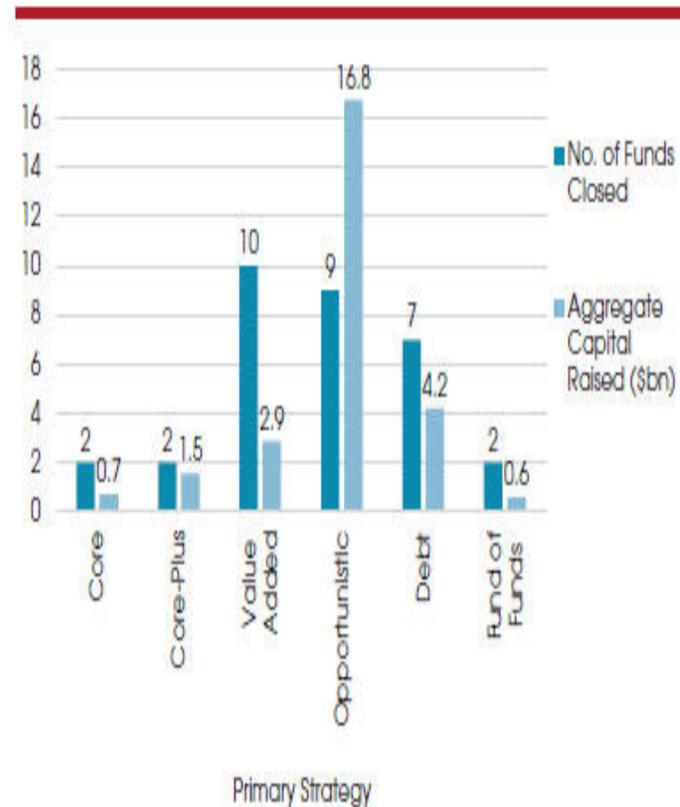
# Investor Demand

**Fig. 1: Global Quarterly Closed-End Private Real Estate Fundraising, Q1 2013 - Q2 2016**



Source: Preqin Real Estate Online

**Fig. 2: Closed-End Private Real Estate Fundraising in Q2 2016 by Primary Strategy**



Source: Preqin Real Estate Online

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## Commentary

- Bottoms up model shows a small expected decline
  - flat in energy markets
  - up in ags
  - down in metals
- Top down model also shows a small expected decline
  - dollar strength and slow projected global growth is negative for commodities

# Bottoms up model

1-3 month horizon as of:	8/9/2016	Index DJUBS	Current price	60 day volatility	-1 st dev	+1 st dev	prob +	prob -	prob price	% ret	wght'd ret		
<b>AGRICULTURE</b>													
Corn		8.0%	332.50	12%	293	372	60%	40%	340	2%	0.2%		
Soybeans		5.7%	988.00	13%	860	1,116	60%	40%	1,014	1%	0.0%		
Wheat		4.4%	417.00	11%	370	464	60%	40%	426	-2%	-0.1%		
Soybean Meal		2.5%	333.30	13%	290	377	60%	40%	342	2%	0.0%		
Soybean Oil		3.2%	31.65	9%	29	34	60%	40%	32	3%	0.1%		
<b>Group SubTotal</b>		<b>23.7%</b>											
<b>ENERGY</b>													
Crude Oil WTI		7.4%	42.68	15%	36	49	50%	50%	43	-2%	-0.1%		
Crude Oil Brent		6.3%	44.93	15%	38	52	50%	50%	45	-1%	-0.1%		
Heating Oil		3.1%	133.08	14%	114	152	50%	50%	133	-2%	-0.1%		
Natural Gas		8.8%	2.62	17%	2.18	3.06	50%	50%	2.62	-2%	-0.2%		
Unleaded Gas (RE)		4.2%	134.65	13%	117	152	60%	40%	138	8%	0.4%		
<b>Group SubTotal</b>		<b>29.8%</b>											
<b>INDUSTRIAL METALS</b>													
Aluminum		4.7%	1630.50	7%	1,523	1,738	40%	60%	1,609	-2%	-0.1%		
Copper (NY)		7.1%	214.90	8%	198	232	50%	50%	215	0%	0.0%		
Nickel		1.5%	10731.00	12%	9,409	12,053	40%	60%	10,467	-3%	0.0%		
Zinc		2.2%	2275.00	9%	2,074	2,476	33%	67%	2,207	-3%	-0.1%		
<b>Group SubTotal</b>		<b>15.5%</b>											
<b>LIVESTOCK</b>													
Live Cattle		3.3%	115.00	8%	105	125	50%	50%	115	0%	0.0%		
Lean Hogs		1.8%	58.20	9%	53	63	50%	50%	58	0%	0.0%		
<b>Group SubTotal</b>		<b>5.1%</b>											
<b>PRECIOUS METALS</b>													
Gold		12.7%	1346.40	7%	1,258	1,434	50%	50%	1,346	0%	0.1%		
Silver		4.3%	19.87	9%	18	22	40%	60%	19	-2%	-0.1%		
<b>Group SubTotal</b>		<b>17.0%</b>											
<b>FOODS &amp; FIBERS</b>													
Cotton		1.9%	73.05	10%	66	80	33%	67%	71	-3%	-0.1%		
Sugar		5.0%	20.39	12%	18	23	33%	67%	20	-6%	-0.3%		
Coffee (ICE)		2.0%	144.75	13%	126	163	40%	60%	141	-3%	0.0%		
<b>Group SubTotal</b>		<b>8.9%</b>											
											<b>100.0%</b>		
											Total	<b>-0.4%</b>	

total weighted expected return: bottoms up

## Top down model

$$\Delta p = -16.8 + 5.3 * \Delta \text{WorldGDP} - 0.9 * \Delta \text{Dollar}$$

1

2.9%	World GDP
1.2%	USD
-0.3%	expected price change

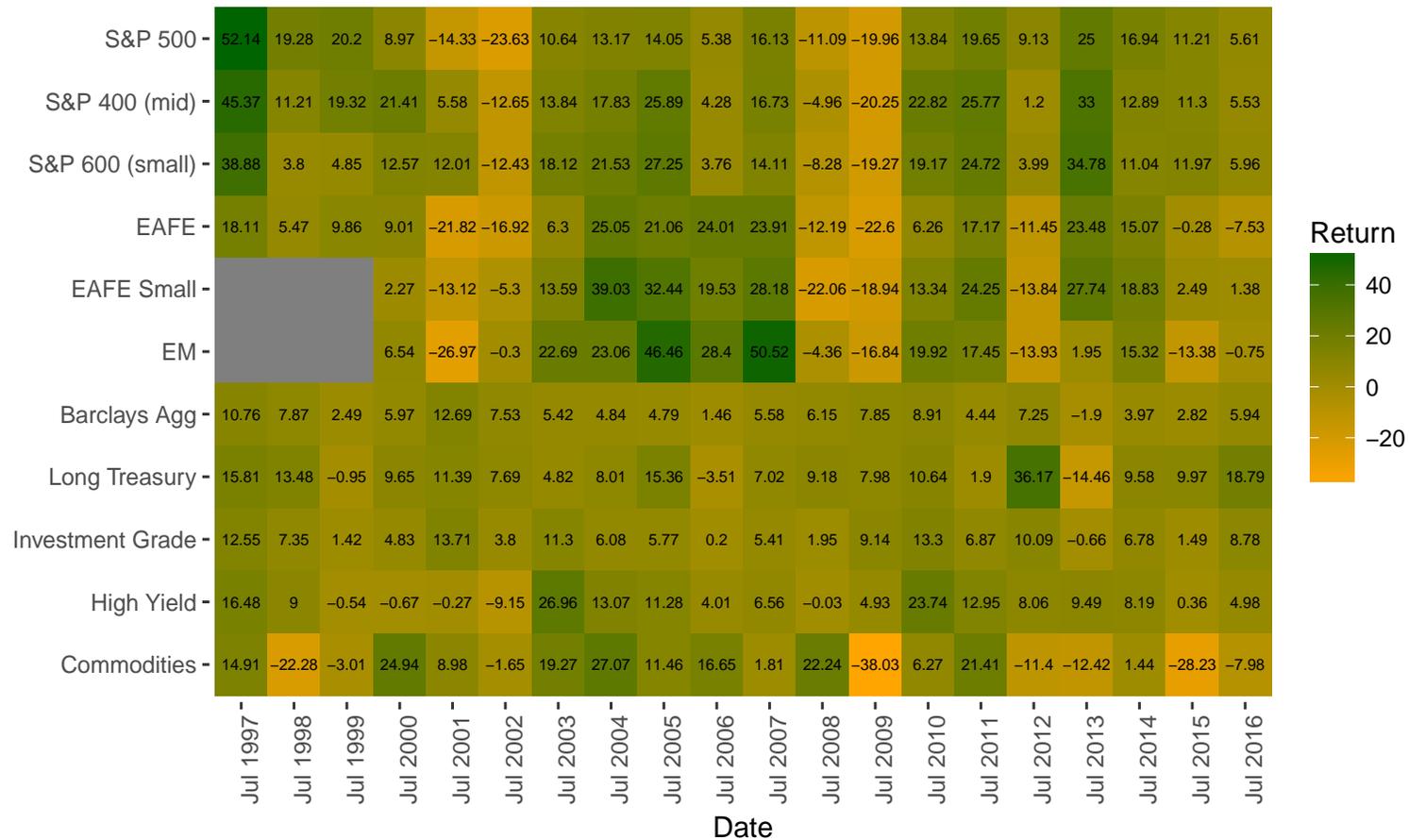
<sup>1</sup> <http://libertystreeteconomics.newyorkfed.org/2016/03/what-tracks-commodity-prices.html>

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# One Year Returns

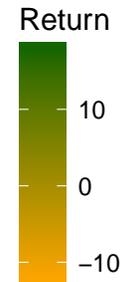
One Year Returns  
 for indicated end dates



# Hold Period Returns

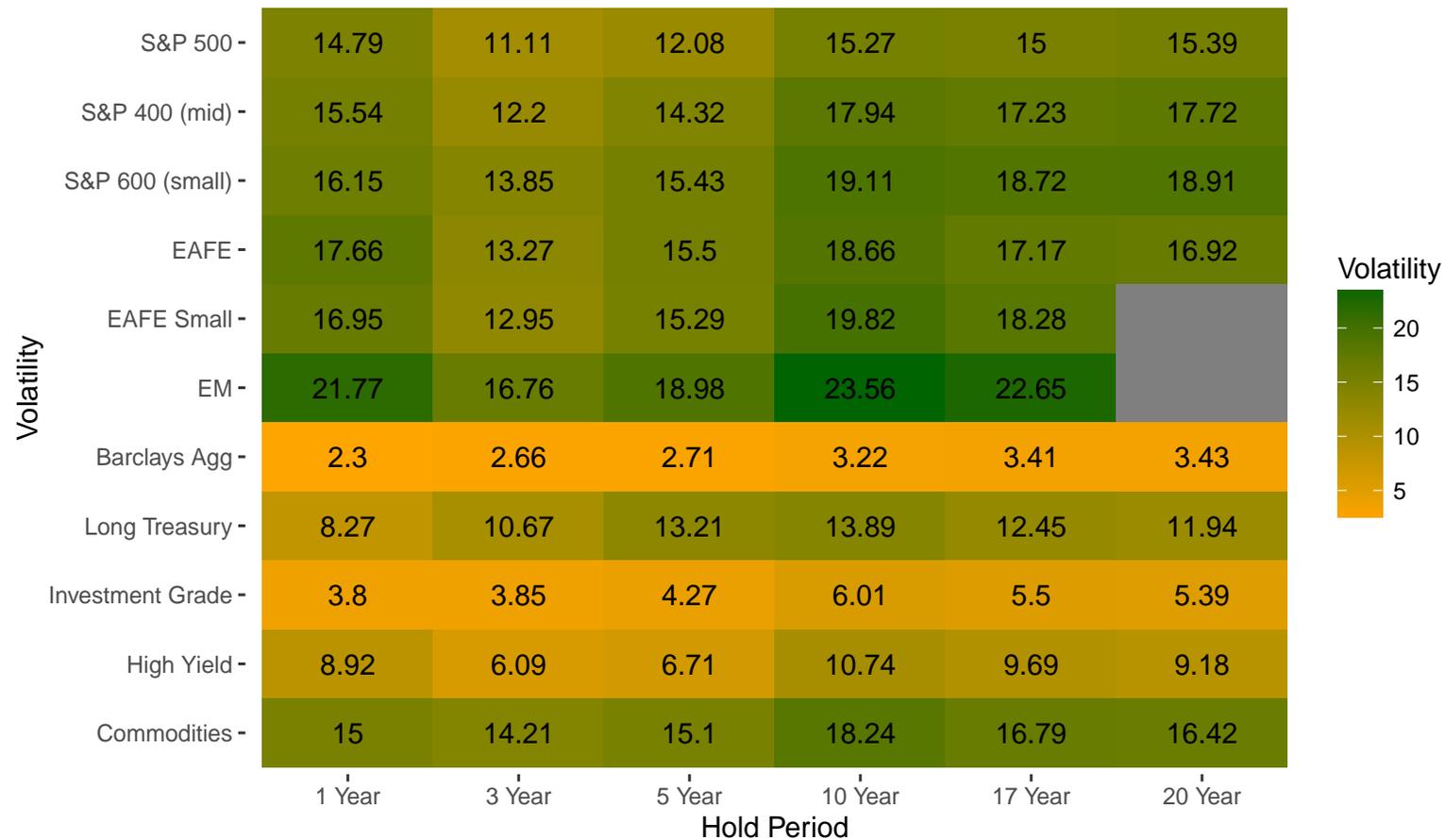
Annualized Returns and Growth of a Dollar  
 for hold periods ending Jul 2016

Annualized Return/Growth of \$	Hold Period					
	1 Year	3 Year	5 Year	10 Year	17 Year	20 Year
S&P 500 -	5.61/1.06	11.16/1.37	13.38/1.87	7.75/2.11	4.92/2.26	8.31/4.94
S&P 400 (mid) -	5.53/1.06	9.86/1.33	12.28/1.78	9.33/2.44	9.68/4.81	11.78/9.28
S&P 600 (small) -	5.96/1.06	9.62/1.32	13.05/1.85	8.77/2.32	9.74/4.85	10.48/7.33
EAFE -	-7.53/0.92	2/1.06	3.02/1.16	1.98/1.22	3.24/1.72	4.37/2.35
EAFE Small -	1.38/1.01	7.28/1.23	6.32/1.36	4.48/1.55	7.2/3.26	NA/NA
EM -	-0.75/0.99	-0.29/0.99	-2.75/0.87	3.91/1.47	7.14/3.23	NA/NA
Barclays Agg -	5.94/1.06	4.23/1.13	3.57/1.19	5.06/1.64	5.47/2.47	5.69/3.03
Long Treasury -	18.79/1.19	12.7/1.43	10.76/1.67	9.02/2.37	8.39/3.93	8.51/5.12
Investment Grade -	8.78/1.09	5.64/1.18	5.21/1.29	6.24/1.83	6.32/2.84	6.42/3.47
High Yield -	4.98/1.05	4.46/1.14	6.16/1.35	7.74/2.11	6.98/3.15	7.15/3.98
Commodities -	-7.98/0.92	-12.5/0.67	-12.27/0.52	-6.38/0.52	1.85/1.37	0.84/1.18



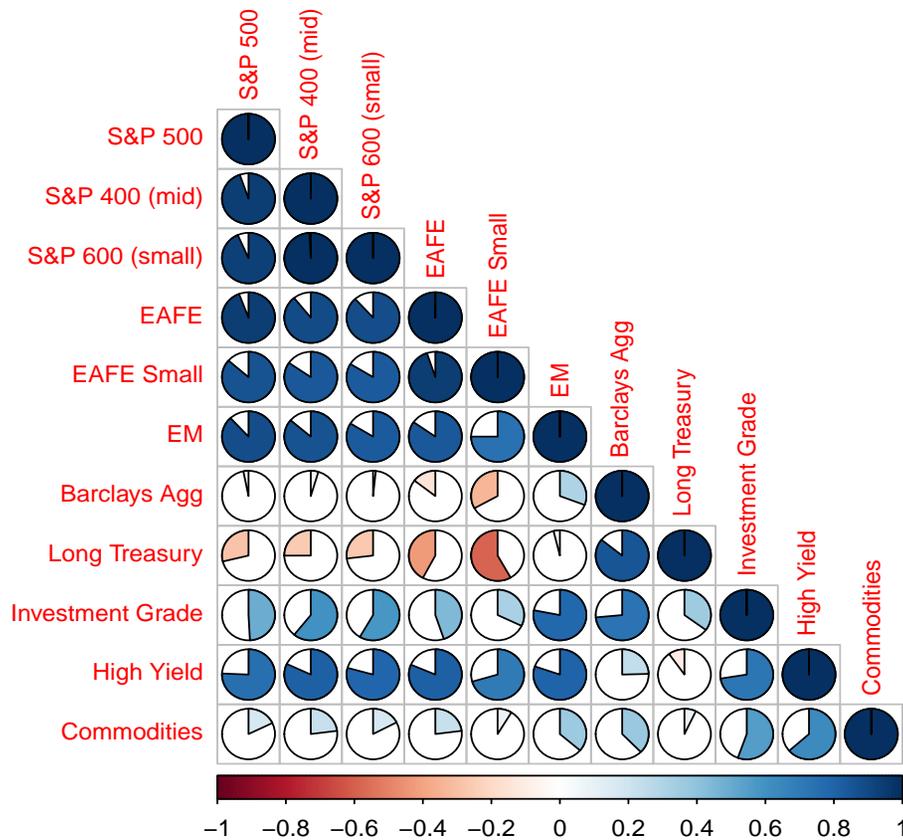
# Volatility

Volatility  
 for hold periods ending Jul 2016



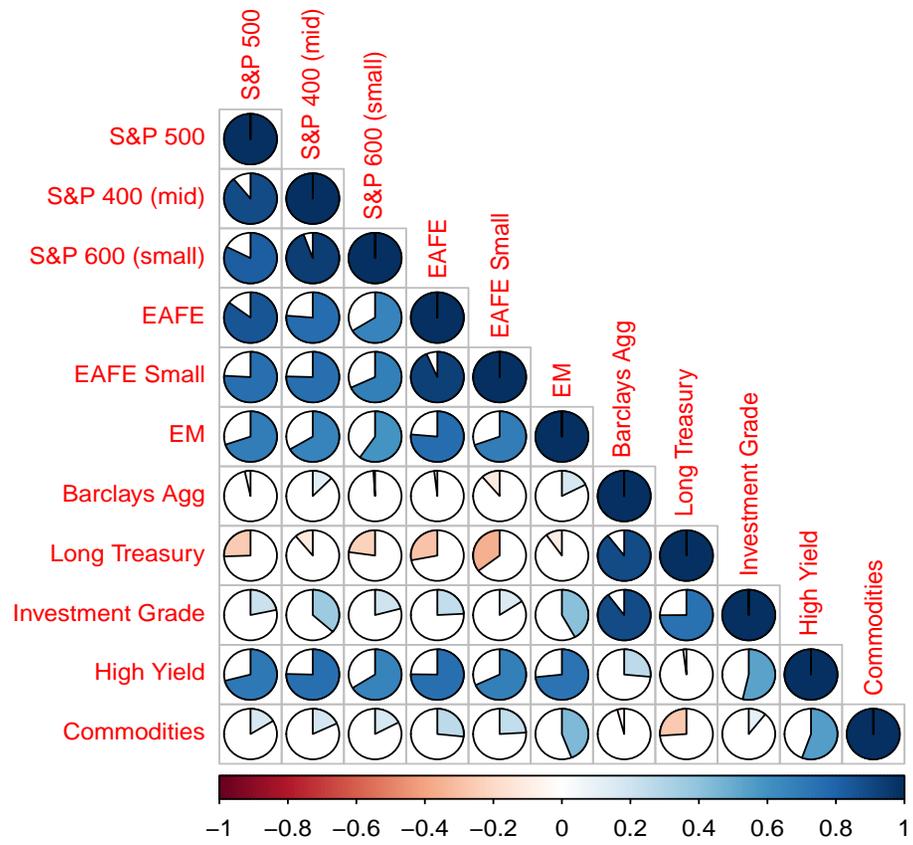
# One Year Correlation

1 Year Correlation Matrix



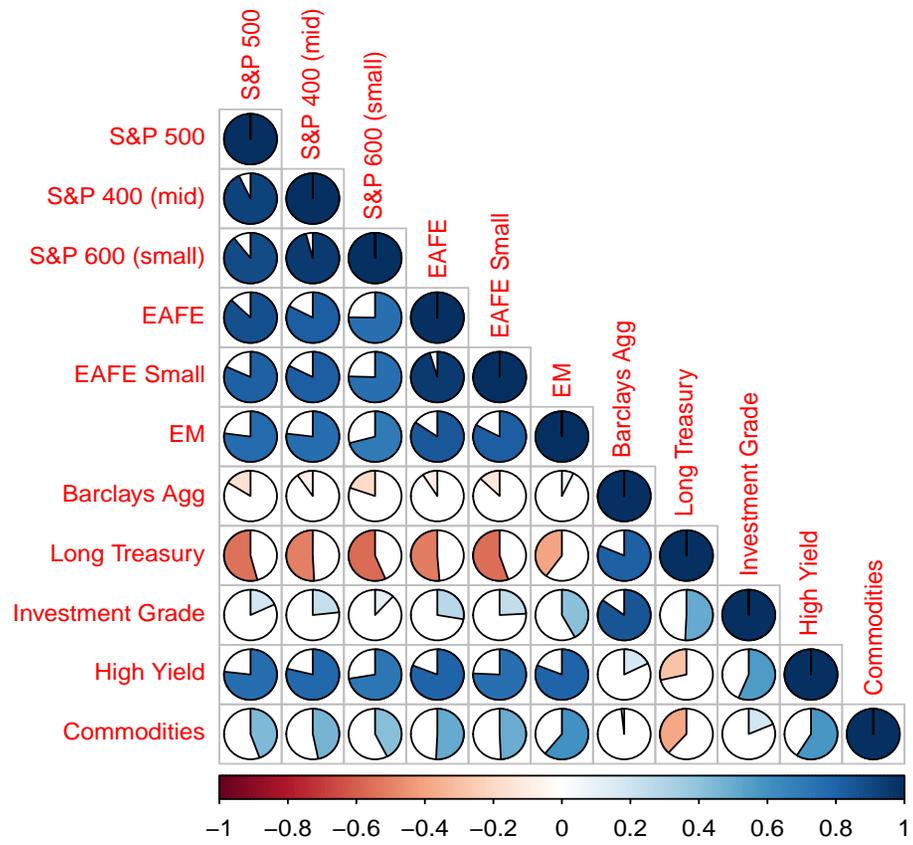
# Three Year Correlation

3 Year Correlation Matrix



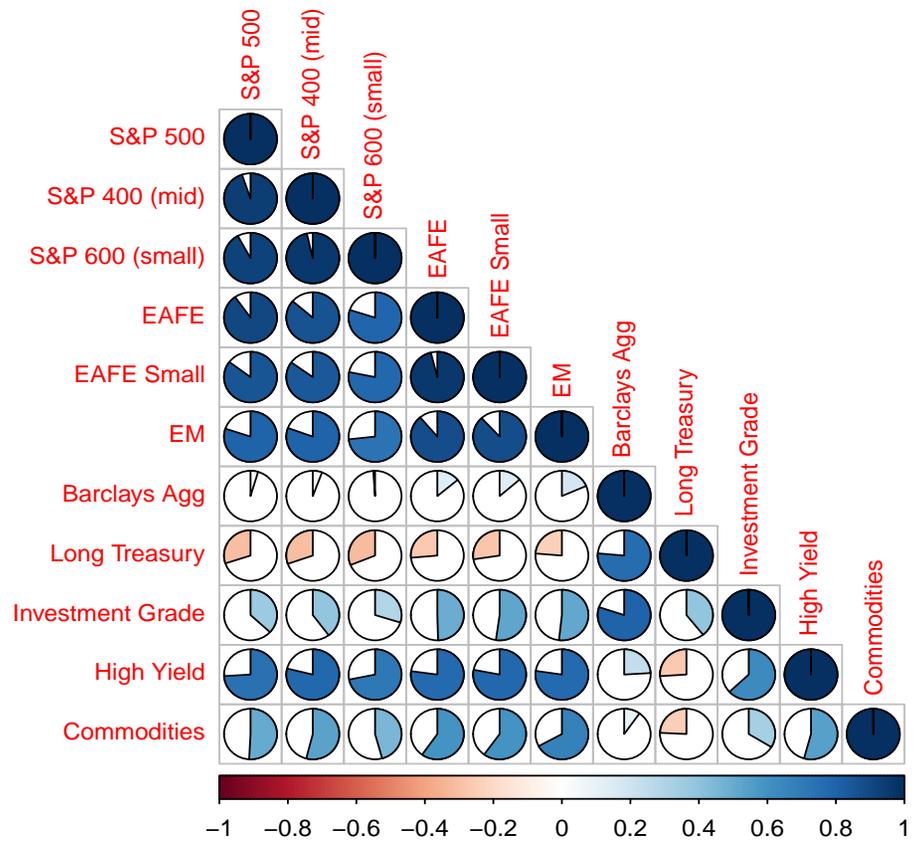
# Five Year Correlation

5 Year Correlation Matrix



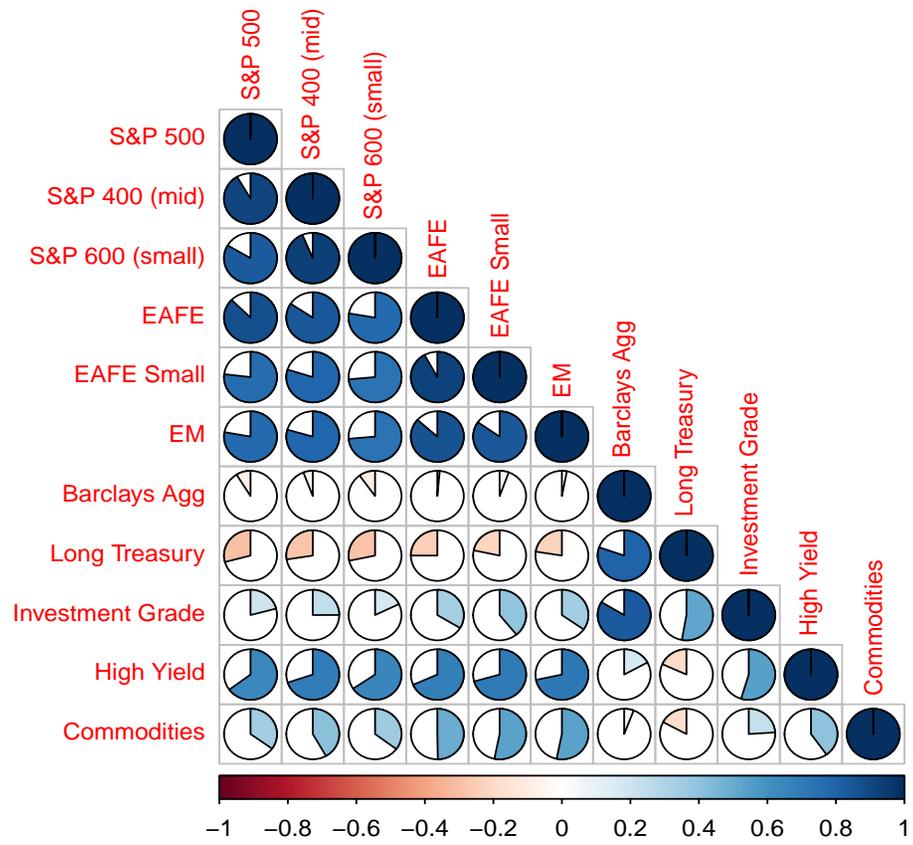
# Ten Year Correlation

10 Year Correlation Matrix



# Seventeen Year Correlation

17 Year Correlation Matrix



# Twenty Year Correlation

20 Year Correlation Matrix

