Wilshire

WILSHIRE ASSOCIATES

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Numbers in Context

Fourth Quarter 2017

Wilshire Consulting

ASSET CLASS PERFORMANCE

Wilshire

Annual Asset Class Returns - Best to Worst										
2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Emrg Mrkts 39.8%	Core Bond 5.2%	Emrg Mrkts 79.0%	MLPs 35.9%	MLPs 13.9%	Emrg Mrkts 18.6	U.S. Equity 33.1%	REITs 31.8%	REITs 4.2%	MLPs 18.3%	Emrg Mrkts 37.7%
Commodities 16.2%	T-Bills 2.1%	MLPs 76.4%	REITs 28.6%	U.S. TIPS 13.6%	Developed 17.9%	MLPs 27.6%	U.S. Equity 12.7%	U.S. Equity 0.7%	High Yield 17.1%	Developed 25.6%
MLPs 12.7%	U.S. TIPS -2.4%	High Yield 58.2%	Emrg Mrkts 19.2%	REITs 9.2%	REITs 17.6%	Developed 23.3%	Core Bond 6.0%	Core Bond 0.6%	U.S. Equity 13.4%	U.S. Equity 21.0%
U.S. TIPS 11.6%	High Yield -26.2%	Developed 32.5%	U.S. Equity 17.2%	Core Bond 7.8%	U.S. Equity 16.1%	High Yield 7.4%	MLPs 4.8%	T-Bills 0.1%	Commodities 11.8%	High Yield 7.5%
Developed 11.6%	Commodities -35.7%	REITs 28.6%	Commodities 16.8%	High Yield 5.0%	High Yield 15.8%	REITs 1.9%	U.S. TIPS 3.6%	Developed -0.4%	Emrg Mrkts 11.6%	REITs 4.2%
Core Bond 7.0%	MLPs -36.9%	U.S. Equity 28.3%	High Yield 15.1%	U.S. Equity 1.0%	U.S. TIPS 7.0%	T-Bills 0.1%	High Yield 2.5%	U.S. TIPS -1.4%	REITs 7.2%	Core Bond 3.6%
U.S. Equity 5.6%	U.S. Equity -37.2%	Commodities 18.9%	Developed 8.2%	T-Bills 0.1%	MLPs 4.8%	Core Bond -2.0%	T-Bills 0.0%	High Yield -4.5%	U.S. TIPS 4.7%	U.S. TIPS 3.0%
T-Bills 5.0%	REITs -39.2%	U.S. TIPS 11.4%	Core Bond 6.5%	Developed -11.7%	Core Bond 4.2%	Emrg Mrkts -2.3%	Emrg Mrkts -1.8%	Emrg Mrkts -14.6%	Core Bond 2.6%	Commodities 1.7%
High Yield 1.9%	Developed -43.1%	Core Bond 5.9%	U.S. TIPS 6.3%	Commodities -13.3%	T-Bills 0.1%	U.S. TIPS -8.6%	Developed -4.5%	Commodities -24.7%	Developed 1.5%	T-Bills 0.8%
REITs -17.6%	Emrg Mrkts -53.2%	T-Bills 0.2%	T-Bills 0.1%	Emrg Mrkts -18.2%	Commodities -1.0%	Commodities -9.5%	Commodities -17.0%	MLPs -32.6%	T-Bills 0.3%	MLPs --6.5%

Annualized 5-Year as of Dec 17'
U.S. Equity 15.7%
REITs 9.3%
Developed 8.4%
High Yield 5.8%
Emrg Mrkts 4.7%
Core Bond 2.1%
T-Bills 0.3%
U.S. TIPS 0.1%
MLPs -0.1%
Commodities -8.5%

Data sources: Wilshire Compass

Note: Developed asset class is developed equity markets ex-U.S., ex-Canada

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MARKET COMMENTARY

U.S. Equity

The U.S. stock market was up 6.4% for the fourth quarter of 2017. There was a relative lack of volatility during the year. The largest drawdown for the year was -2.75% and there were only 4 trading days where the market was down 1% or more. Several factors contributed to this success including a rebound in global economic growth and continued strength domestically.

The third quarter of 2017 was the second consecutive quarter of real GDP growth in excess of 3%, annualized. Businesses seem to be gaining confidence in the global economy and have been increasing spending on equipment while growing inventories during the quarter, contributing more than three-quarters of a percent to real GDP growth. Strong retail sales during the fourth quarter have helped raise expectations for economic growth during the final quarter of 2017.

Non-U.S. Equity

Equity markets outside of the U.S. produced strong returns during the fourth quarter of 2017, in both developed and emerging markets. Japan was one of the strongest developed markets during the quarter due to stimulative policies by both the Bank of Japan and the national government. Emerging Markets led all global equities during 2017 and produced their second consecutive positive annual gain.

Fixed Income

The U.S. Treasury yield curve continued to flatten during the quarter with short to intermediate term rates rising and long-term yields falling. The bellwether 10-year Treasury yield ended the quarter at 2.40%. The Federal Open Market Committee decided to increase its overnight rate by 25 basis points in December. Credit spreads continued to tighten during the quarter.

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DECEMBER 2017 ASSET CLASS ASSUMPTIONS

	EQUITY						FIXED INCOME						REAL ASSETS					
													REAL ESTATE					
	US STOCK	DEV EX-US STOCK	EMG MRKT STOCK	GLOBAL EX-US STOCK	GLOBAL STOCK	PRIVATE EQUITY	CASH	CORE BOND	LT CORE BOND	US TIPS	HIGH YIELD	NON-US BOND (HDG)	US RES	GLOBAL RES	PRIVATE RE	CMDTY	REAL ASSETS	US CPI
EXPECTED COMPOUND RETURN (%)	6.25	6.25	6.25	6.45	6.45	8.75	1.75	3.55	3.60	2.95	4.95	1.30	5.40	5.60	6.90	3.70	6.60	1.95
EXPECTED ARITHMETIC RETURN (%)	7.55	7.70	9.20	8.05	7.80	12.10	1.75	3.70	4.05	3.10	5.40	1.35	6.75	6.75	7.80	4.75	6.95	1.95
EXPECTED RISK (%)	17.00	18.00	26.00	18.75	17.15	28.00	1.25	5.15	9.85	6.00	10.00	3.50	17.00	15.80	14.00	15.00	8.40	1.75
CASH YIELD (%)	2.00	3.00	2.00	2.75	2.35	0.00	1.75	3.55	4.75	3.05	8.15	1.65	3.95	3.95	2.65	1.75	2.85	0.00
CORRELATIONS																		
US STOCK	1.00																	
DEV EX-US STOCK (USD)	0.81	1.00																
EMERGING MARKET STOCK	0.74	0.74	1.00															
GLOBAL EX-US STOCK	0.83	0.96	0.86	1.00														
GLOBAL STOCK	0.94	0.92	0.82	0.94	1.00													
PRIVATE EQUITY	0.74	0.64	0.62	0.67	0.74	1.00												
CASH EQUIVALENTS	-0.05	-0.09	-0.05	-0.08	-0.07	0.00	1.00											
CORE BOND	0.28	0.13	0.00	0.09	0.20	0.31	0.19	1.00										
LT CORE BOND	0.31	0.16	0.01	0.12	0.23	0.32	0.11	0.93	1.00									
US TIPS	-0.05	0.00	0.15	0.05	0.00	-0.03	0.20	0.60	0.47	1.00								
HIGH YIELD BOND	0.54	0.39	0.49	0.45	0.51	0.34	-0.10	0.25	0.32	0.05	1.00							
NON-US BOND (HDG)	0.16	0.25	-0.01	0.18	0.18	0.26	0.10	0.67	0.64	0.39	0.26	1.00						
US RE SECURITIES	0.59	0.47	0.44	0.49	0.56	0.50	-0.05	0.17	0.23	0.10	0.56	0.05	1.00					
GLOBAL RE SECURITIES	0.65	0.59	0.56	0.62	0.66	0.58	-0.05	0.17	0.22	0.11	0.62	0.03	0.94	1.00				
PRIVATE REAL ESTATE	0.54	0.44	0.44	0.47	0.52	0.51	-0.05	0.19	0.25	0.09	0.57	0.05	0.77	0.76	1.00			
COMMODITIES	0.25	0.34	0.39	0.38	0.32	0.27	0.00	-0.02	-0.02	0.25	0.29	-0.10	0.25	0.28	0.25	1.00		
REAL ASSET BASKET	0.42	0.43	0.50	0.48	0.47	0.43	0.01	0.24	0.25	0.41	0.53	0.06	0.65	0.69	0.69	0.59	1.00	
INFLATION (CPI)	-0.10	-0.15	-0.13	-0.15	-0.13	-0.10	0.10	-0.12	-0.12	0.15	-0.08	-0.08	0.05	0.03	0.05	0.44	0.26	1.00

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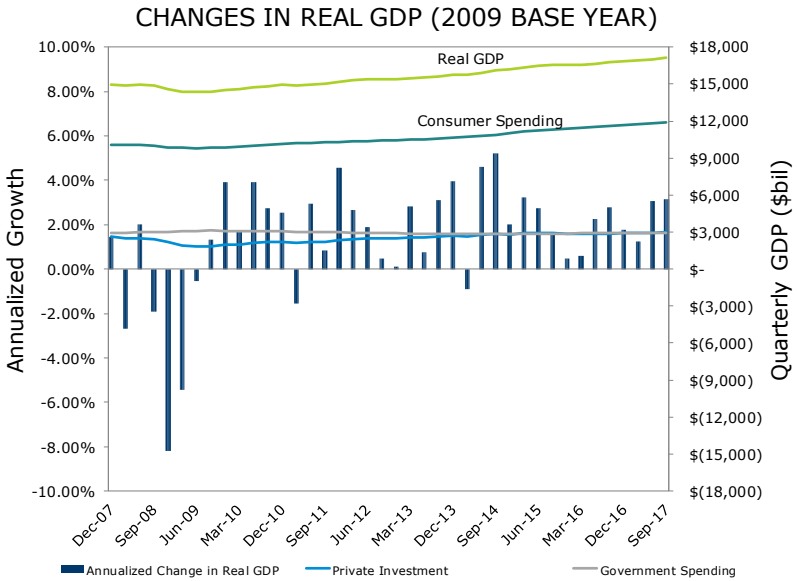
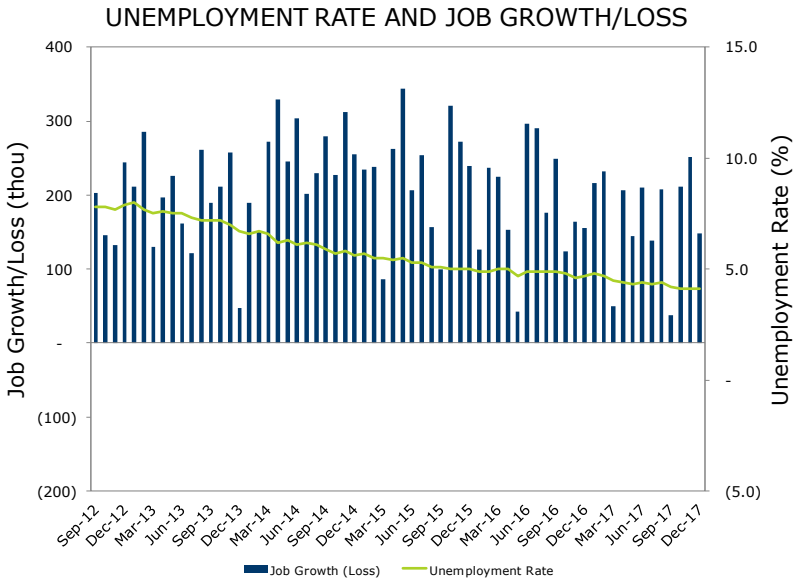
ECONOMIC REVIEW

AS OF DECEMBER 31, 2017	KEY ECONOMIC INDICATORS			
CPI (ALL ITEMS)	MONTHLY CHANGE		CUMULATIVE CHANGE	
SEASONALLY ADJUSTED	Dec-17	0.1	3-Mo.	0.6
	Nov-17	0.4	12-Mo.	2.1
	Oct-17	0.1	10-Yr. (Annual)	1.6
BREAKEVEN INFLATION	10-Yr.	2.0		
CONSUMER SENTIMENT	Dec-17	95.9		
U. OF MICHIGAN SURVEY	Nov-17	98.5		
	1-Yr. Ago	98.2	10-Yr. Avg	79.1
MANUFACTURING	Dec-17	59.7	CHANGE IN SECTOR	
INST. FOR SUPPLY MGMT	Nov-17	58.2	>50	Expansion
PURCHASING MNGRS' IDX	1-Yr. Avg.	57.6	<50	Contraction

Note: Seasonally adjusted CPI data is utilized to better reflect short-term pricing activity.





Data sources: Bureau of Labor Statistics, U.S. Treasury, University of Michigan, Institute for Supply Management, Bureau of Economic Analysis

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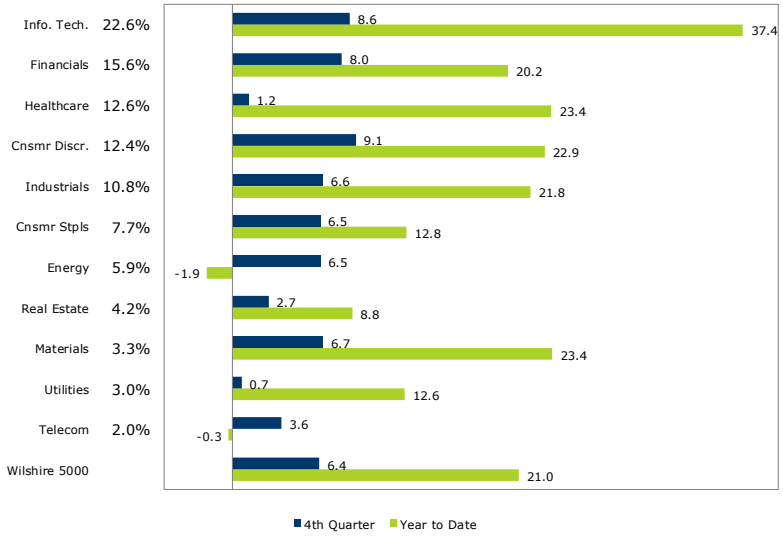
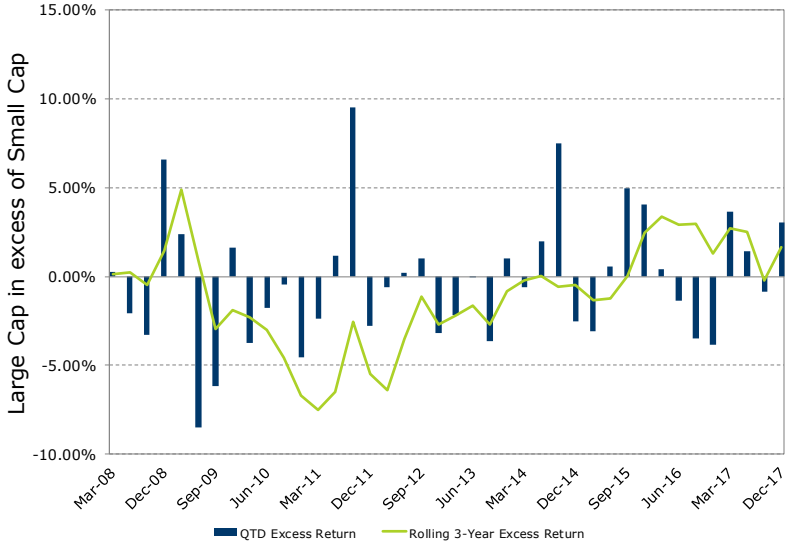
U.S. EQUITY MARKET

AS OF DECEMBER 31, 2017	QTR	YTD	1 YR	3 YR	5 YR	10 YR
WILSHIRE 5000 INDEX	6.4	21.0	21.0	11.4	15.7	8.6
WILSHIRE U.S. LARGE CAP	6.7	21.8	21.8	11.5	15.8	8.5
WILSHIRE U.S. SMALL CAP	3.6	13.5	13.5	9.7	14.4	9.9
WILSHIRE U.S. LARGE GROWTH	7.3	27.7	27.7	12.9	17.3	9.7
WILSHIRE U.S. LARGE VALUE	6.1	16.3	16.3	10.0	14.4	7.2
WILSHIRE U.S. SMALL GROWTH	4.2	19.6	19.6	9.8	14.9	9.9
WILSHIRE U.S. SMALL VALUE	3.0	7.4	7.4	9.5	13.9	9.8
WILSHIRE REIT INDEX	1.7	4.2	4.2	5.2	9.3	7.3
MSCI USA MIN. VOL. INDEX	5.2	18.4	18.4	10.9	14.5	8.8
FTSE RAFI U.S. 1000 INDEX	6.5	16.4	16.4	10.1	15.3	9.4

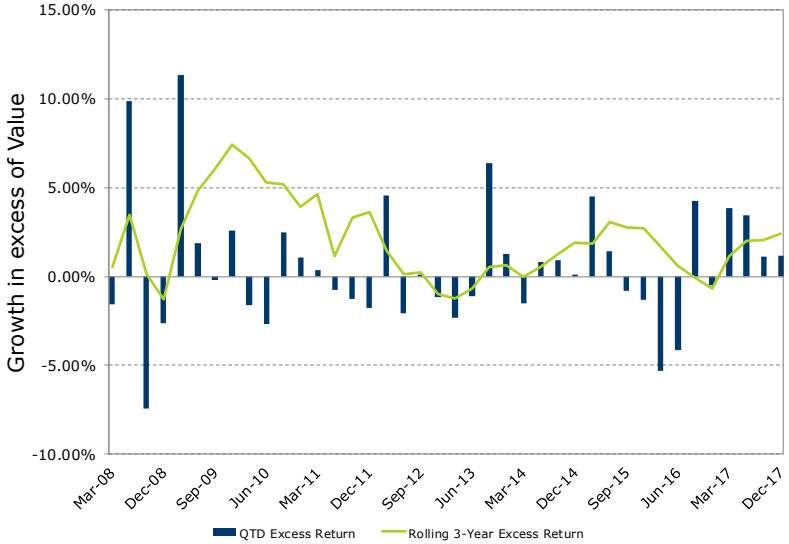
WILSHIRE 5000 SECTOR WEIGHT & RETURN (%)



LARGE CAP VS SMALL CAP



GROWTH VS VALUE



Data sources: Wilshire Compass, Wilshire Atlas

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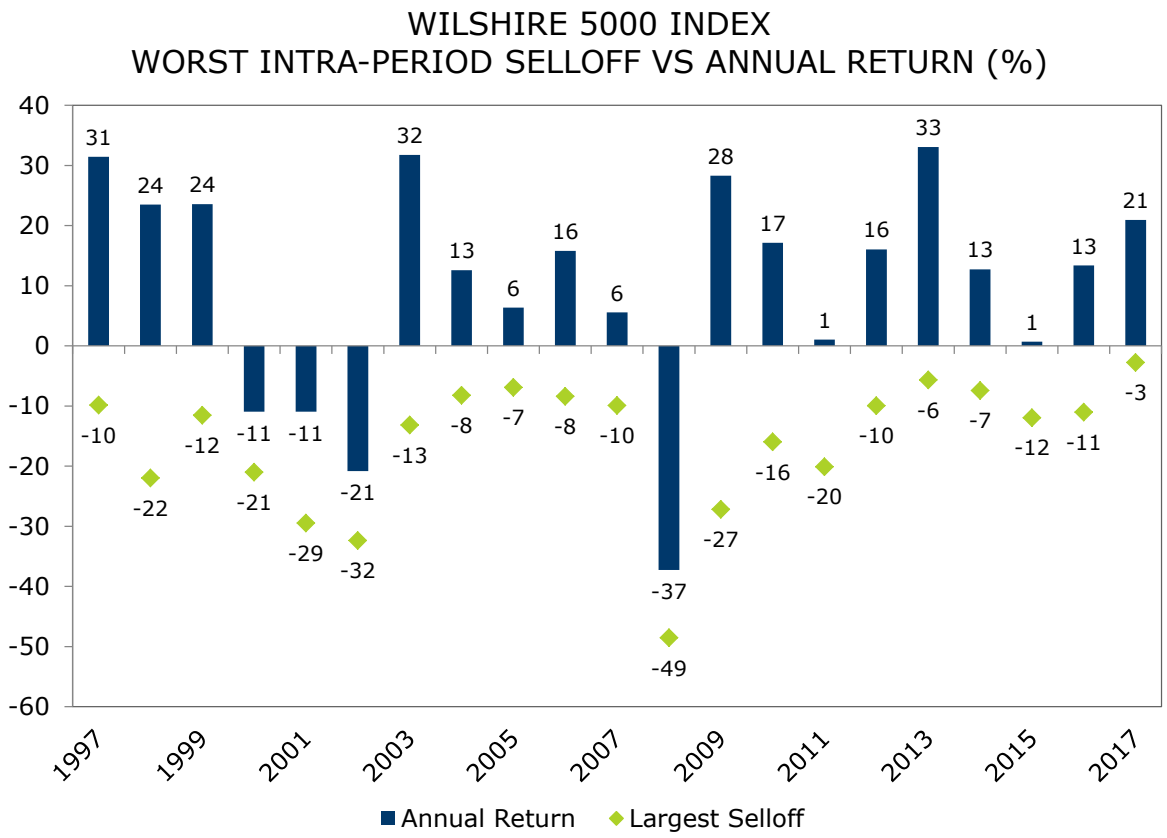
ANNUAL EQUITY RETURNS

- U.S. Equity has now produced 9 straight years of positive returns since 2008
- 2017 was one of the least volatile years in nearly four decades
  - Largest drawdown for the year was -2.75%
  - Only 4 trading days where the market was down 1% or more



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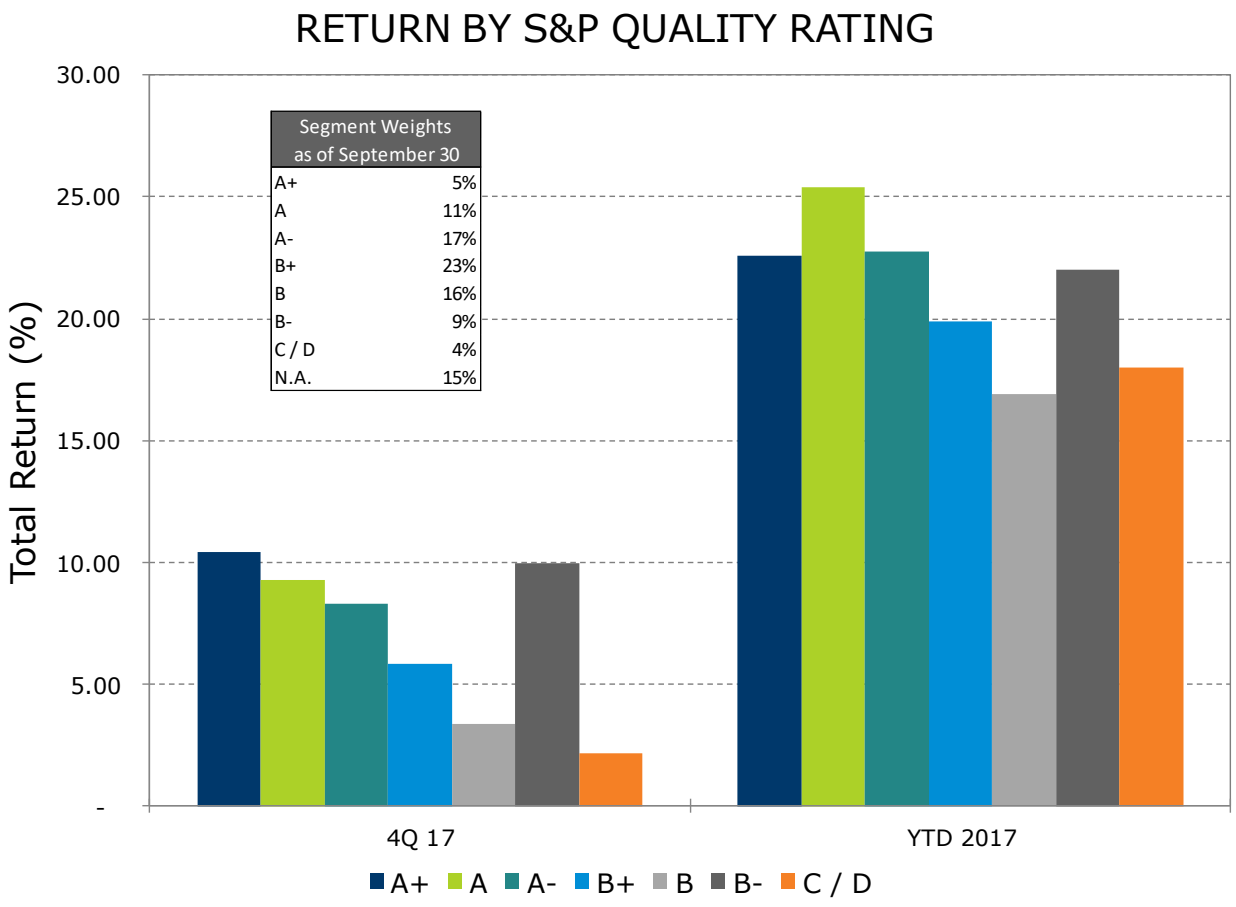
RETURNS BY QUALITY SEGMENT

Generally speaking, higher quality names led the market for both the fourth quarter and 2017



Data sources: Wilshire Atlas

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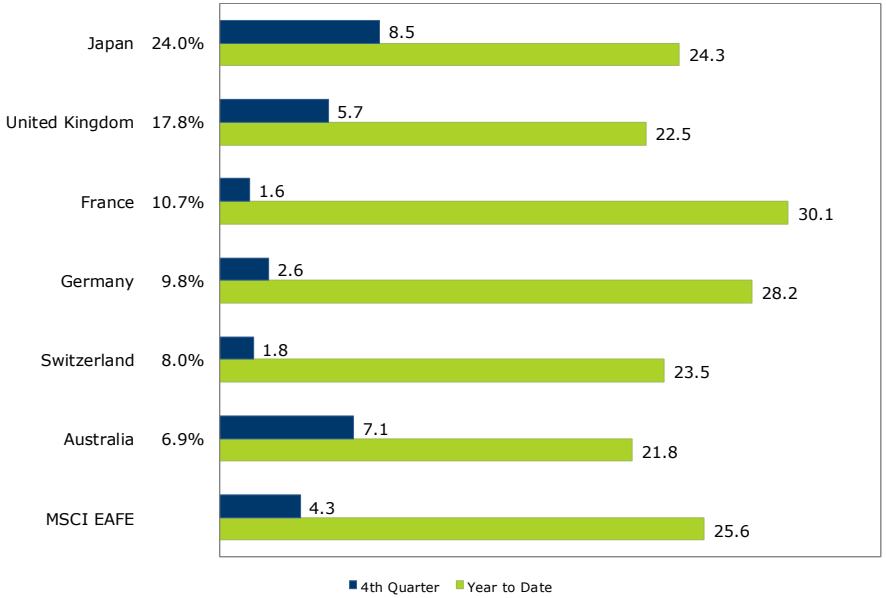
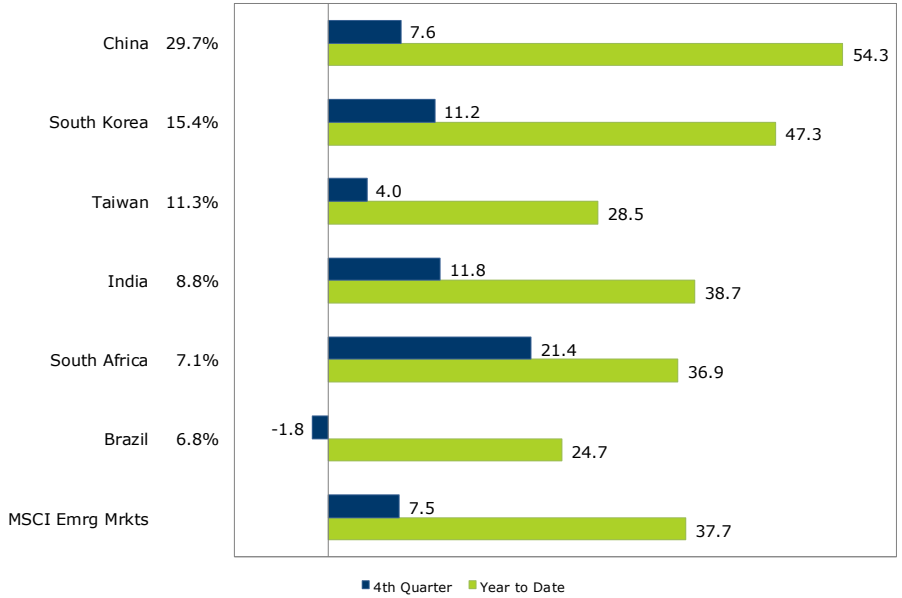
NON-U.S. EQUITY MARKET

AS OF DECEMBER 31, 2017	QTR	YTD	1 YR	3 YR	5 YR	10 YR
MSCI ACWI EX-US ($G)	5.1	27.8	27.8	8.3	7.3	2.3
MSCI EAFE ($G)	4.3	25.6	25.6	8.3	8.4	2.4
MSCI EMERGING MARKETS ($G)	7.5	37.7	37.7	9.5	4.7	2.0
MSCI FRONTIER MARKETS ($G)	5.6	32.3	32.3	5.5	9.7	-0.7
MSCI ACWI EX-US GROWTH ($G)	5.8	32.5	32.5	9.7	8.4	2.8
MSCI ACWI EX-US VALUE ($G)	4.3	23.4	23.4	6.9	6.2	1.8
MSCI ACWI EX-US SMALL ($G)	6.6	32.1	32.1	12.5	10.5	5.2
MSCI EAFE MINIMUM VOLATILITY	3.6	22.2	22.2	9.3	9.9	5.2
FTSE RAFI DEVELOPED EX-US	4.7	25.7	25.7	8.7	8.9	2.8
MSCI EAFE LC (G)	3.7	15.8	15.8	9.0	11.9	3.8
MSCI EMERGING MARKETS LC (G)	5.7	31.0	31.0	10.9	8.4	4.5

MSCI EAFE: LARGEST COUNTRIES & RETURN (USD)



MSCI EM: LARGEST COUNTRIES & RETURN (USD)



Data sources: Wilshire Compass

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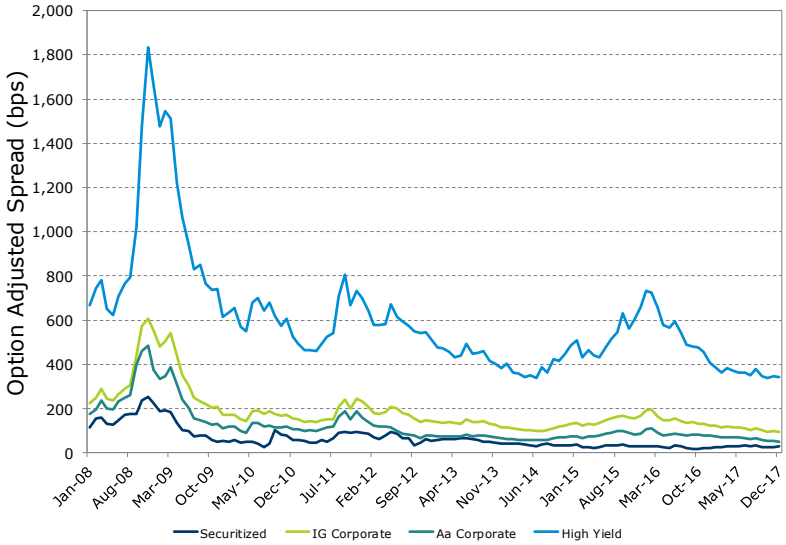
U.S. FIXED INCOME

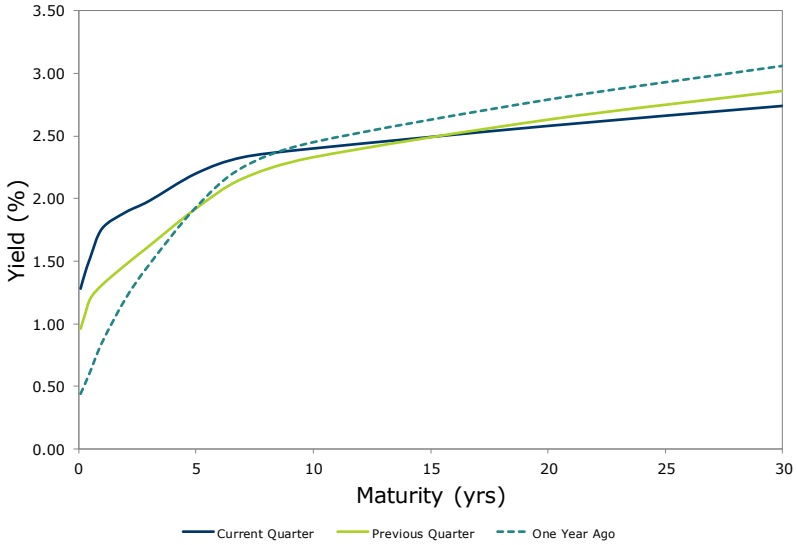
AS OF DECEMBER 31, 2017	YTM	DURATION	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS AGGREGATE	2.7	6.0	0.4	3.6	3.6	2.2	2.1	4.0
BLOOMBERG BARCLAYS TREASURY	2.2	6.2	0.1	2.3	2.3	1.4	1.3	3.3
BLOOMBERG BARCLAYS GOV'T-REL.	2.7	5.5	0.3	4.2	4.2	2.2	1.9	3.7
BLOOMBERG BARCLAYS SECURITIZED	2.9	4.4	0.2	2.5	2.5	1.9	2.0	3.8
BLOOMBERG BARCLAYS CORPORATE	3.3	7.6	1.2	6.4	6.4	3.9	3.5	5.7
BLOOMBERG BARCLAYS LT G/C	3.5	15.4	2.8	10.7	10.7	4.5	4.4	7.3
BLOOMBERG BARCLAYS LT TREASURY	2.7	17.6	2.4	8.5	8.5	2.8	3.5	6.6
BLOOMBERG BARCLAYS LT GOV't-REL.	4.0	12.6	2.1	11.9	11.9	4.5	4.1	7.0
BLOOMBERG BARCLAYS LT CORP.	4.0	14.3	3.3	12.1	12.1	5.9	5.3	7.8
BLOOMBERG BARCLAYS U.S. TIPS *	2.4	7.7	1.3	3.0	3.0	2.0	0.1	3.5
BLOOMBERG BARCLAYS HIGH YIELD	6.2	3.9	0.5	7.5	7.5	6.3	5.8	8.0
TREASURY BILLS	1.4	0.25	0.3	0.8	0.8	0.4	0.3	0.4

* Yield and Duration statistics are for a proxy index based on similar maturity, the Bloomberg Barclays U.S. Treasury 7-10 Year Index

BLOOMBERG BARCLAYS FIXED INCOME INDEXES



TREASURY YIELD CURVE



Data sources: Wilshire Compass, Bloomberg Barclays, U.S. Treasury

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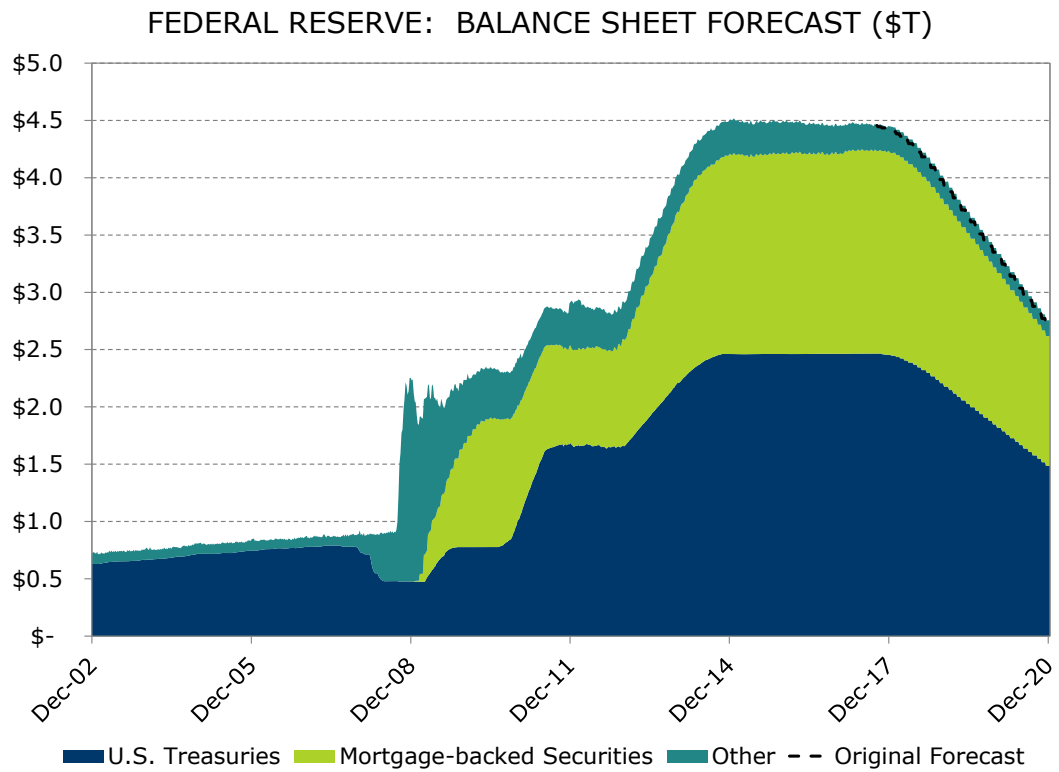
FEDERAL RESERVE

- Federal Reserve began their balance sheet normalization program during Q4; targeting $10B in reductions per month with the goal of reaching $50B per month in Q4 2018

- Total reductions have equaled only $17B through mid-January 2018



Data sources: Federal Reserve

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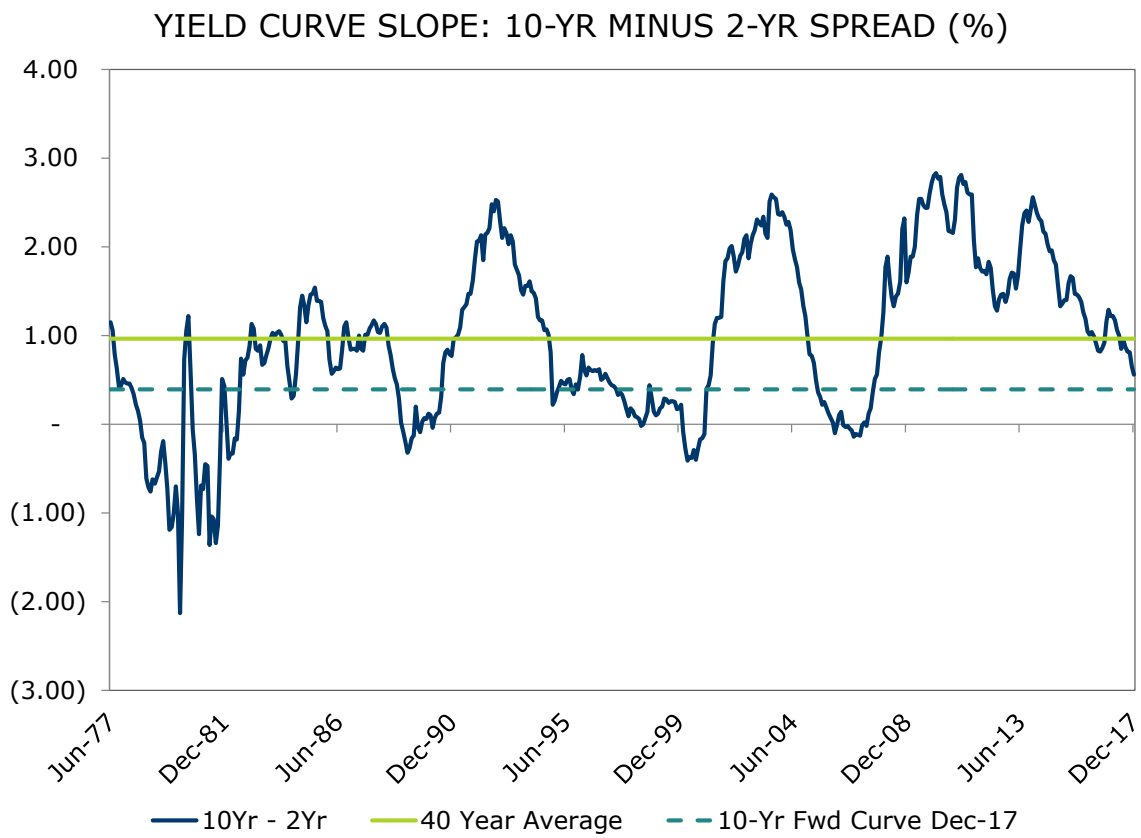
U.S. YIELD CURVE

- Shape of the curve had been steep since the global financial crisis; has recently flattened
- Current spread between 10-year and 2-year Treasury is well below average (0.56% vs. 0.96%)
- Tight spread present in 10-year forward curve as well (0.39%)
- Continued strong economic growth will put upward pressure on the long end of the curve



Data source: Federal Reserve

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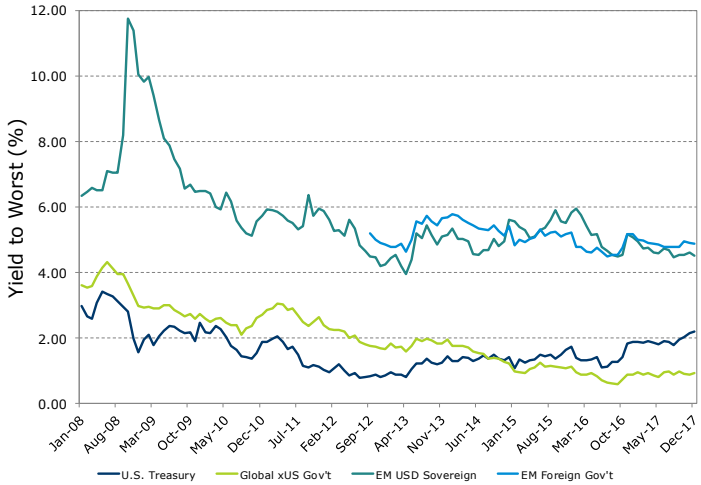
NON-U.S. FIXED INCOME

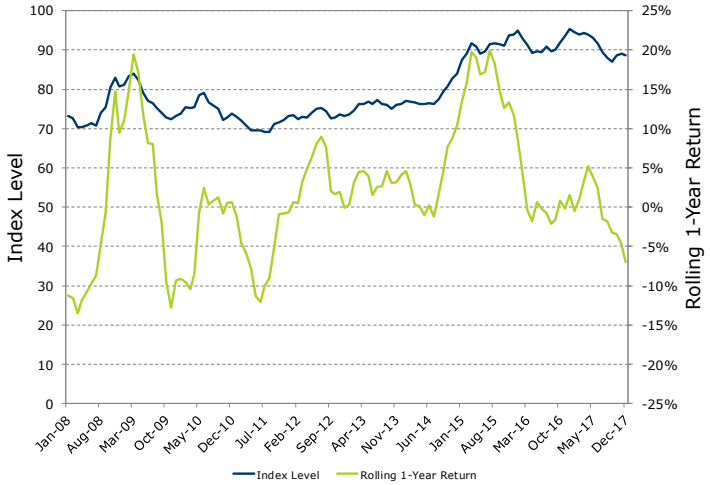
AS OF DECEMBER 31, 2017	QTR	YTD	1 YR	3 YR	5 YR	10 YR
DEVELOPED MARKETS						
BLMBRG BRCLYS GLBL AGGREGATE xUS	1.6	10.5	10.5	1.8	-0.2	2.4
BLMBRG BRCLYS GLBL AGGREGATE xUS *	1.1	2.5	2.5	2.9	3.7	4.2
BLMBRG BRCLYS GLOBAL INF LNKD xUS	3.9	12.8	12.8	2.6	2.4	3.3
BLMBRG BRCLYS GLOBAL INF LNKD xUS *	3.4	3.3	3.3	5.7	5.8	5.8
EMERGING MARKETS (HARD CURRENCY)						
BLMBRG BRCLYS EM USD AGGREGATE	0.6	8.2	8.2	6.4	3.9	7.0
EMERGING MARKETS (FOREIGN CURRENCY)						
BLMBRG BRCLYS EM LOCAL CURR. GOV'T	2.2	14.3	14.3	2.7	0.3	n.a.
BLMBRG BRCLYS EM LOCAL CURR. GOV'T *	0.0	3.6	3.6	2.3	1.8	n.a.
EURO vs. DOLLAR	1.6	13.8	13.8	-0.3	-1.9	-2.0
YEN vs. DOLLAR	-0.1	3.5	3.5	2.1	-5.2	-0.1
POUND vs. DOLLAR	0.8	9.5	9.5	-4.6	-3.6	-3.8

* Returns are reported in terms of local market investors, which removes currency effects.

BLOOMBERG BARCLAYS FIXED INCOME INDEXES



U.S. DOLLAR INDEX: MAJOR CURRENCIES



Data sources: Wilshire Compass, Bloomberg Barclays, Federal Reserve Bank of St. Louis

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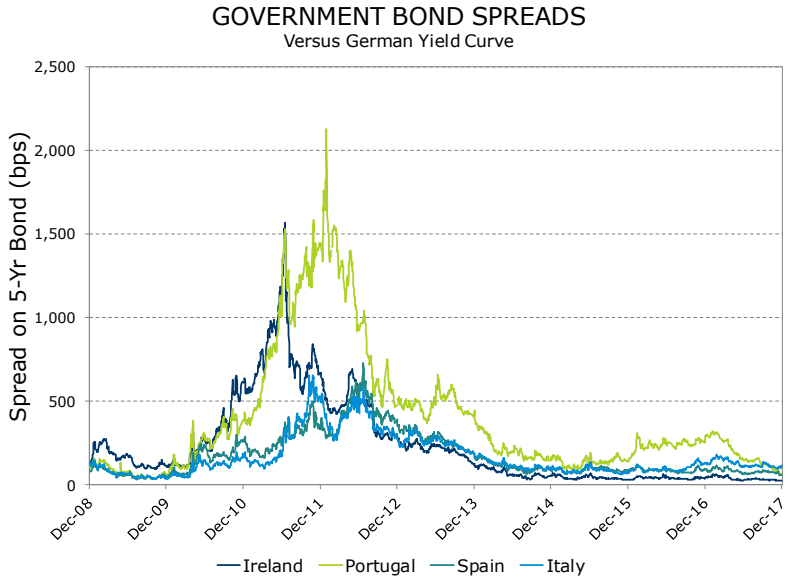
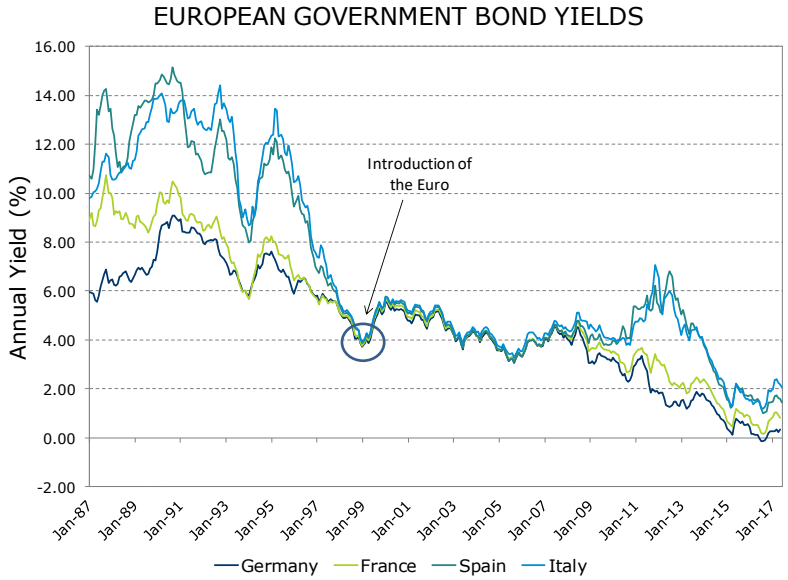
EUROPEAN DEBT

- Yields on Portugal's debt are down in the midst of a strong economic recovery and rating upgrades during the fourth quarter



- Yields on government bonds remain low globally



Data sources: Bloomberg Barclays, International Monetary Fund

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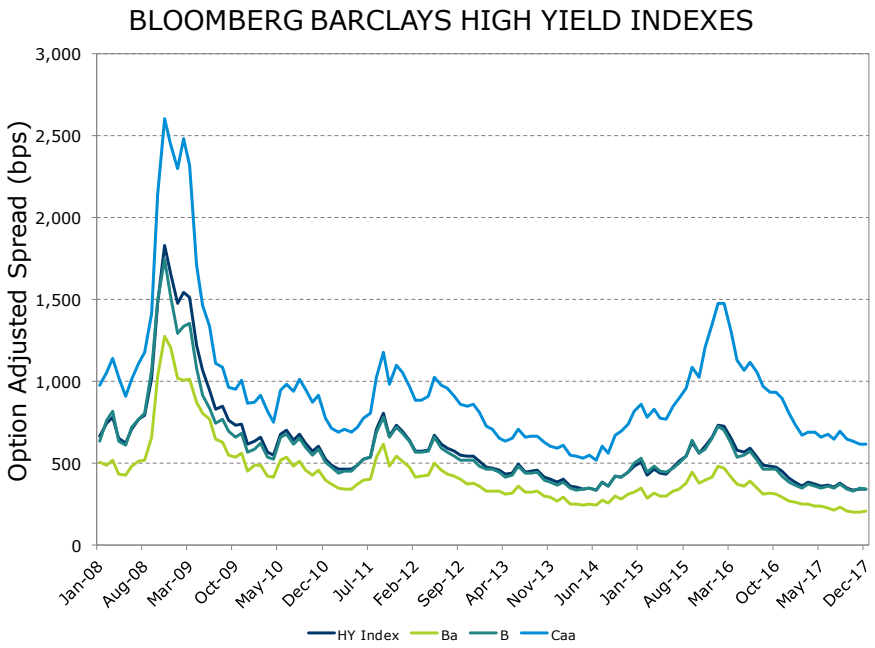
HIGH YIELD BOND MARKET

AS OF DECEMBER 31, 2017		QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS HIGH YIELD		0.5	7.5	7.5	6.3	5.8	8.0
CREDIT SUISSE LEVERAGED LOAN		1.2	4.2	4.2	4.5	4.3	4.6
HIGH YIELD QUALITY DISTRIBUTION	WEIGHT						
Ba U.S. HIGH YIELD	44.1%	0.4	7.3	7.3	6.2	5.8	8.4
B U.S. HIGH YIELD	40.3%	0.4	6.5	6.5	5.5	5.1	6.5
Caa U.S. HIGH YIELD	14.4%	1.0	10.4	10.4	8.4	7.5	7.8
Ca to D U.S. HIGH YIELD	1.1%	0.8	13.8	13.8	-3.0	-10.1	-0.4
Non-Rated U.S. HIGH YIELD	0.2%	-2.0	9.2	9.2	-2.5	0.9	1.3



Data sources: Wilshire Compass, Bloomberg Barclays

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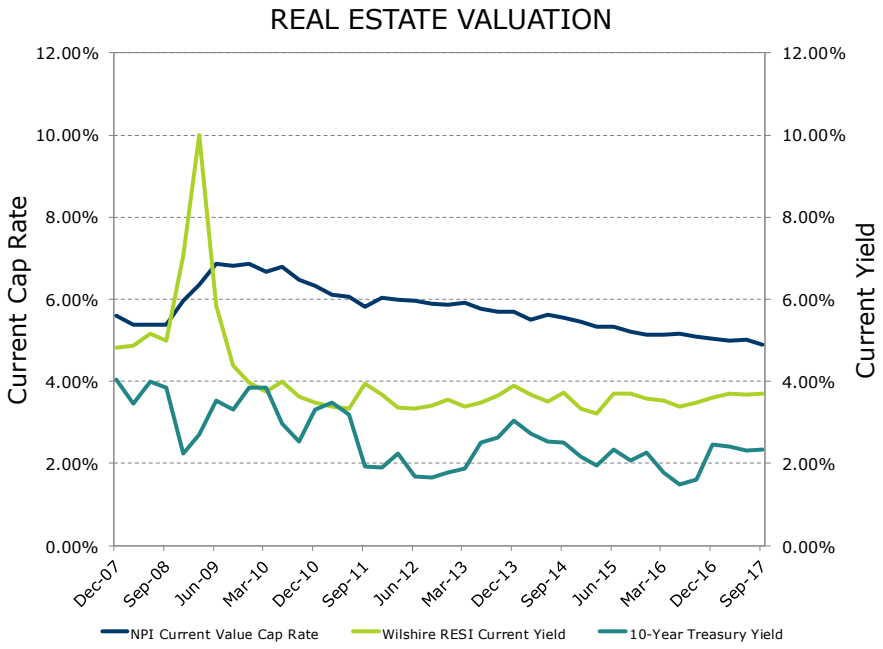
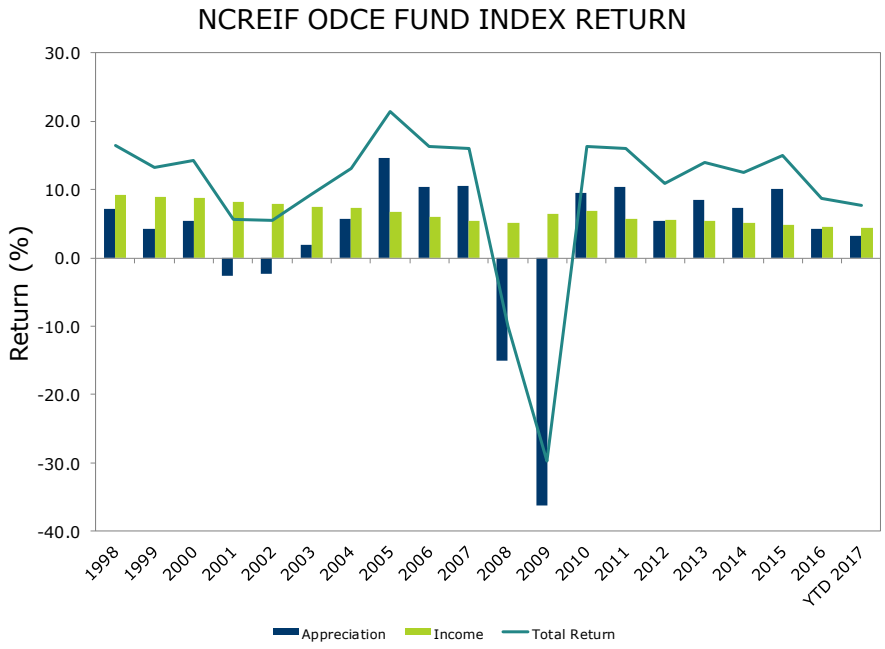
REAL ASSETS

AS OF DECEMBER 31, 2017	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS U.S. TIPS	1.3	3.0	3.0	2.0	0.1	3.5
BLOOMBERG COMMODITY INDEX	4.7	1.7	1.7	-5.0	-8.5	-6.8
WILSHIRE GLOBAL RESI INDEX	3.2	10.0	10.0	5.8	8.0	5.4
NCREIF ODCE FUND INDEX	2.1	7.6	7.6	10.4	11.5	5.0
NCREIF TIMBERLAND INDEX	1.5	3.6	3.6	3.7	6.2	4.4
ALERIAN MLP INDEX (OIL & GAS)	-1.0	-6.5	-6.5	-9.3	-0.1	6.0





Data sources: Wilshire Compass, National Council of Real Estate Investment Fiduciaries

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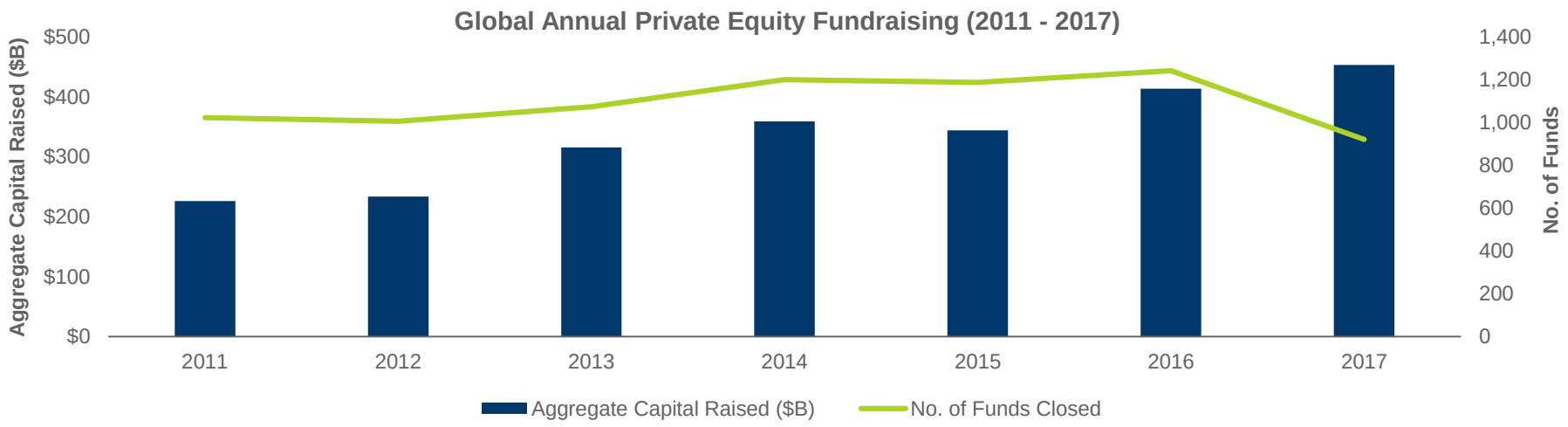
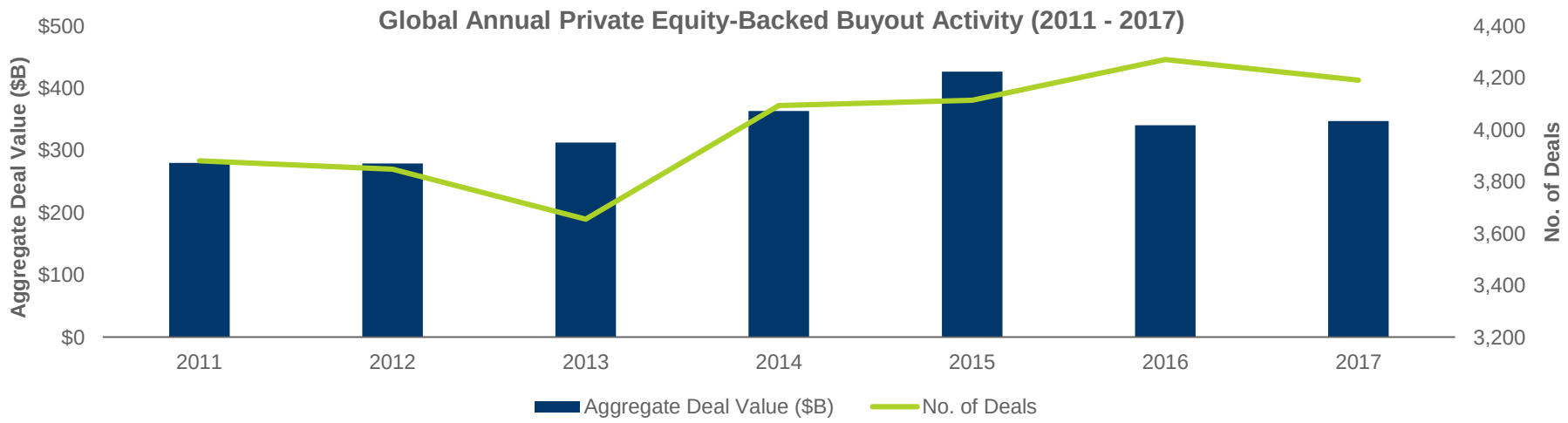
APPENDIX: PRIVATE MARKETS UPDATE

PRIVATE EQUITY – FUNDRAISING & INVESTMENT ACTIVITY





Source: Preqin, as of December 31, 2017.

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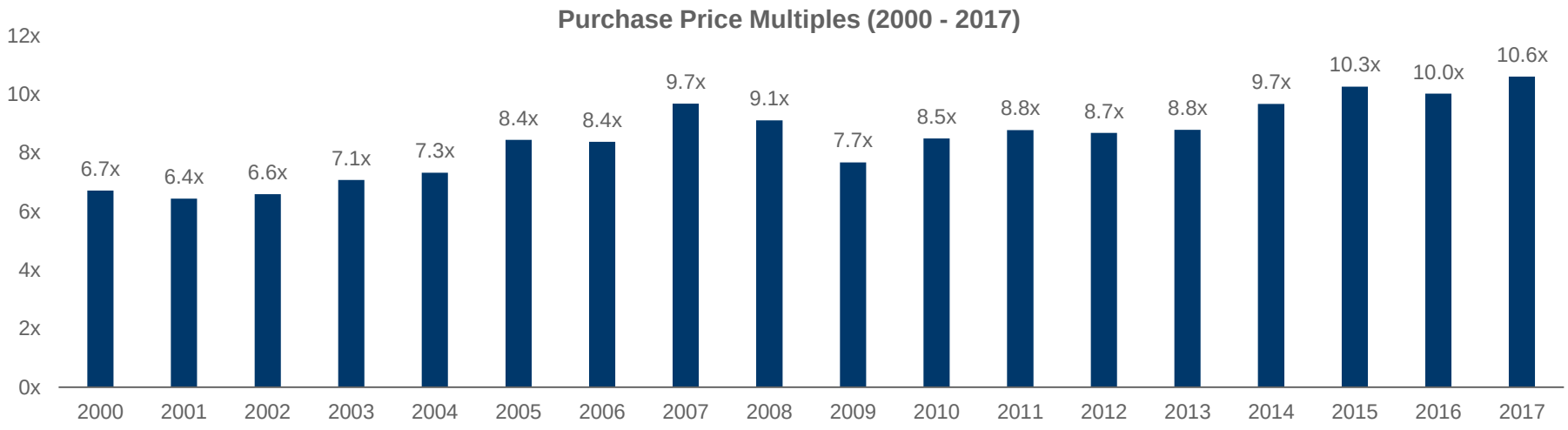
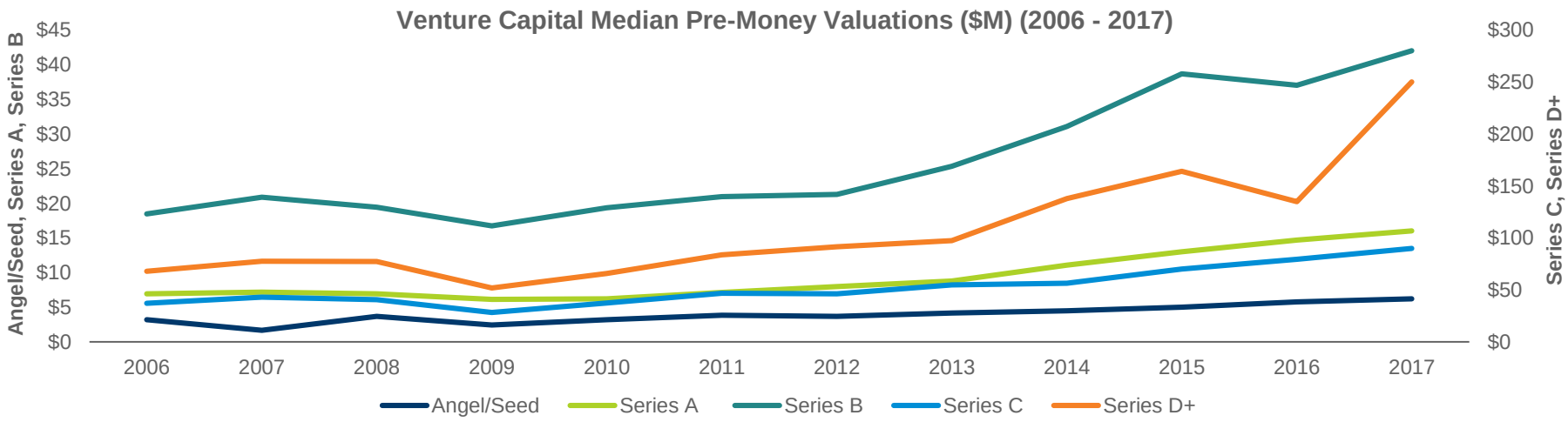
PRIVATE EQUITY – PRICING & VALUATIONS





Source: S&P LBO; Pitchbook, as of December 31, 2017

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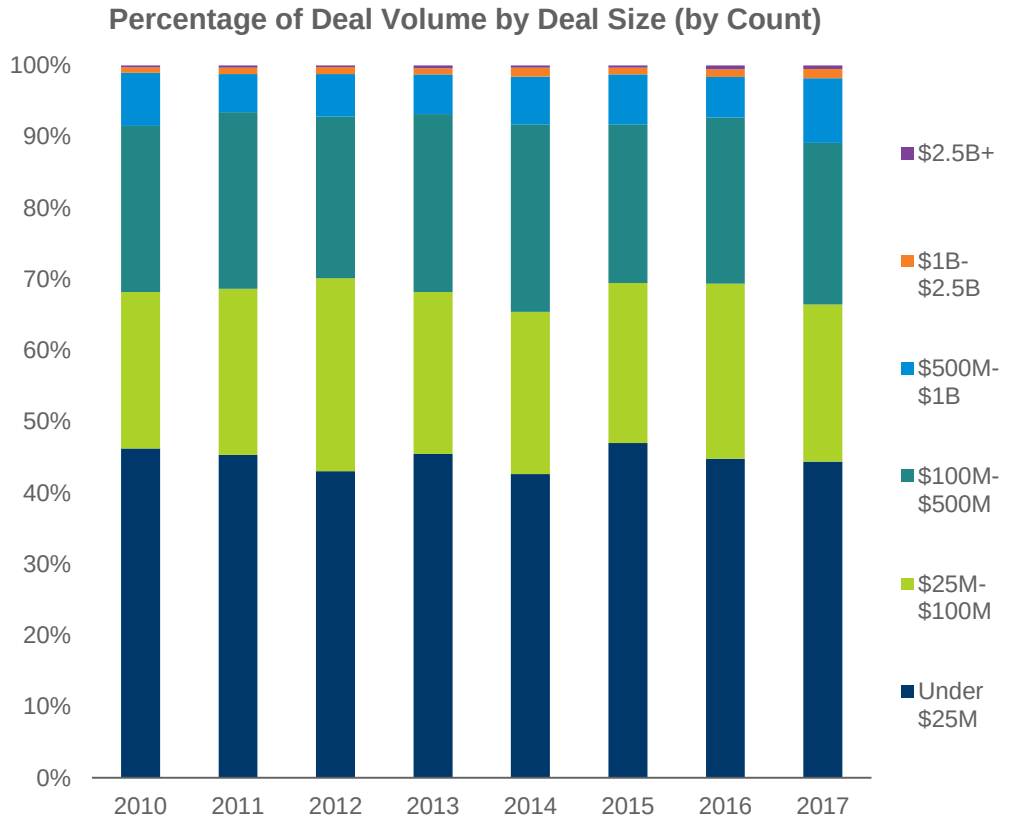
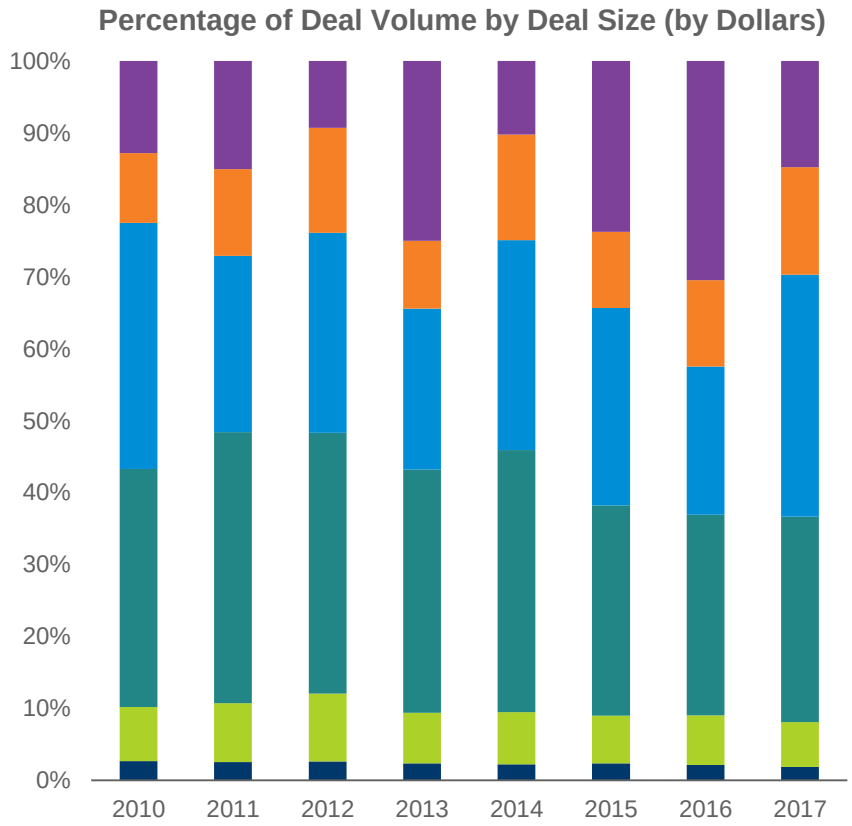
U.S. INVESTMENT ACTIVITY BY DEAL SIZE





- Smaller investments again comprised a majority of deal volume in 2017 while there continues to be a limited number of deals over $2.5 billion
- More capital was invested into deals in the $500 million to $1 billion range in 2017 than in prior years

Source: PitchBook, as of December 31, 2017

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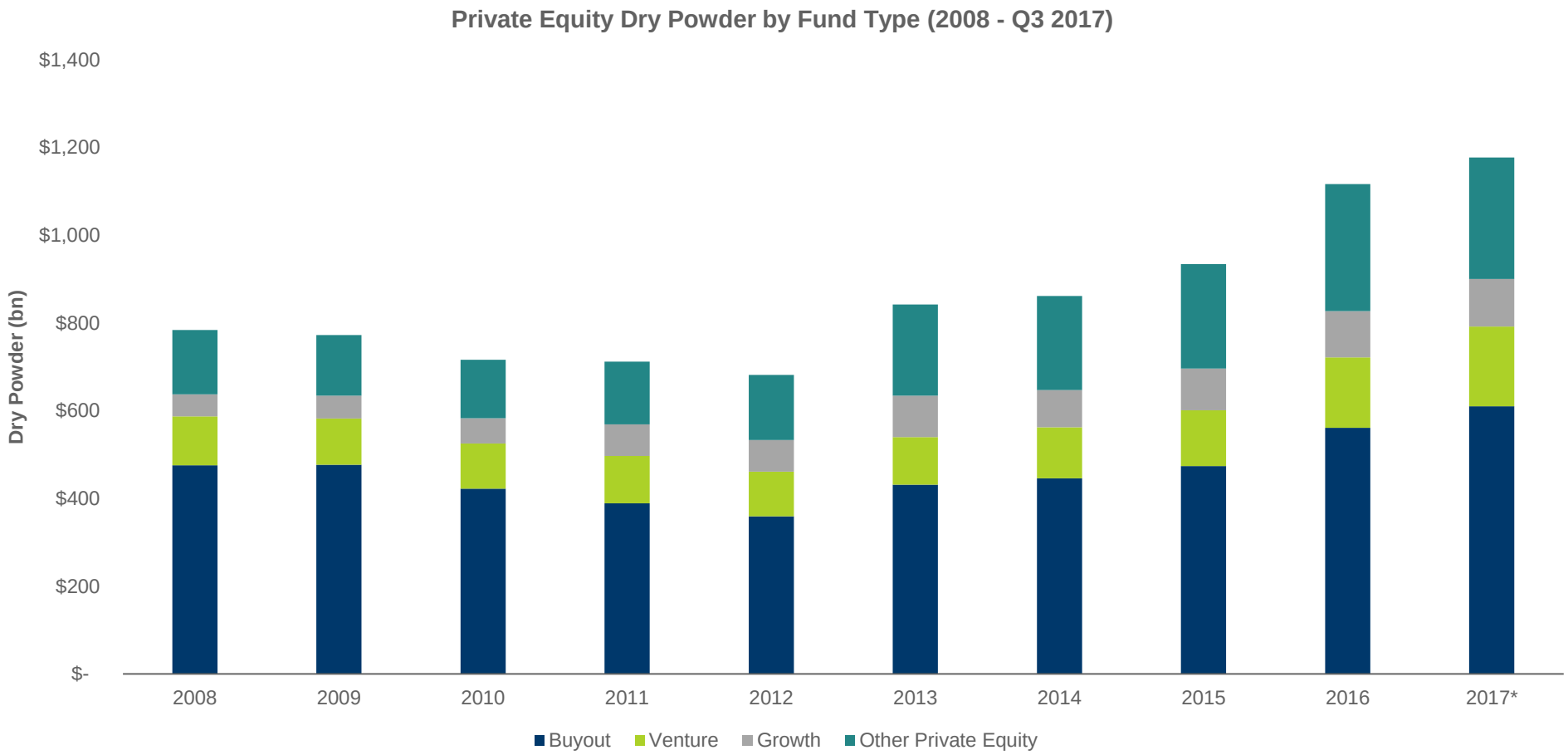
PRIVATE EQUITY DRY POWDER



- Global private equity dry powder continues to increase, topping $1.1 trillion across all fund types
- This abundant capital should continue to fuel private equity deal flow over the next few years

*Source: Preqin, as of September 30, 2017

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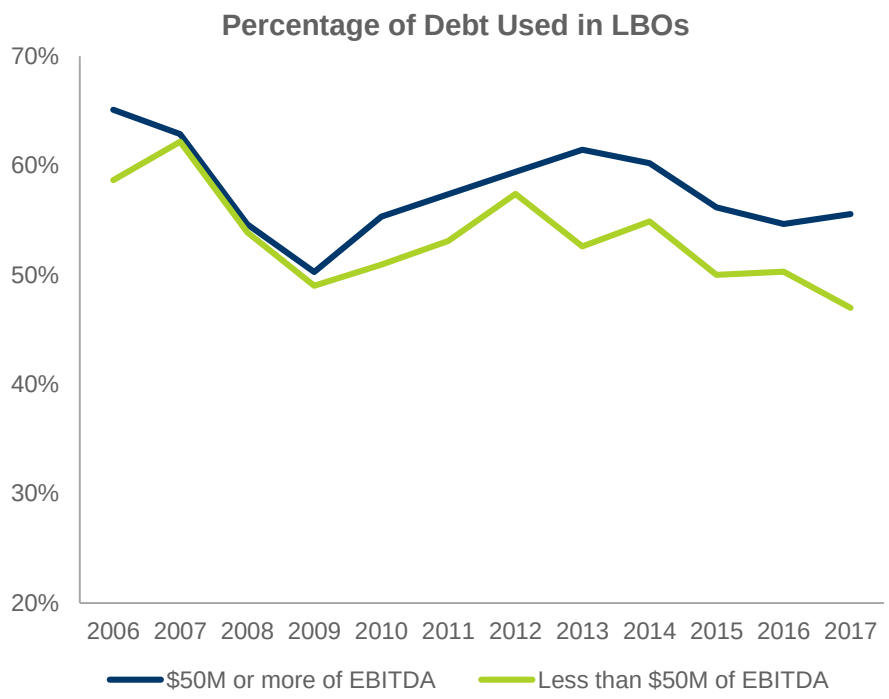
PRIVATE EQUITY - U.S. DEBT MARKETS



- The amount of capital available for leverage in LBOs has decreased considerably since its peak volume in 2007; however, loan volume in 2017 increased by approximately $27 billion from 2016
- LBOs of companies with under $50 million of EBITDA were financed with less debt than in prior years

Source: S&P LBO, as of December 31, 2017

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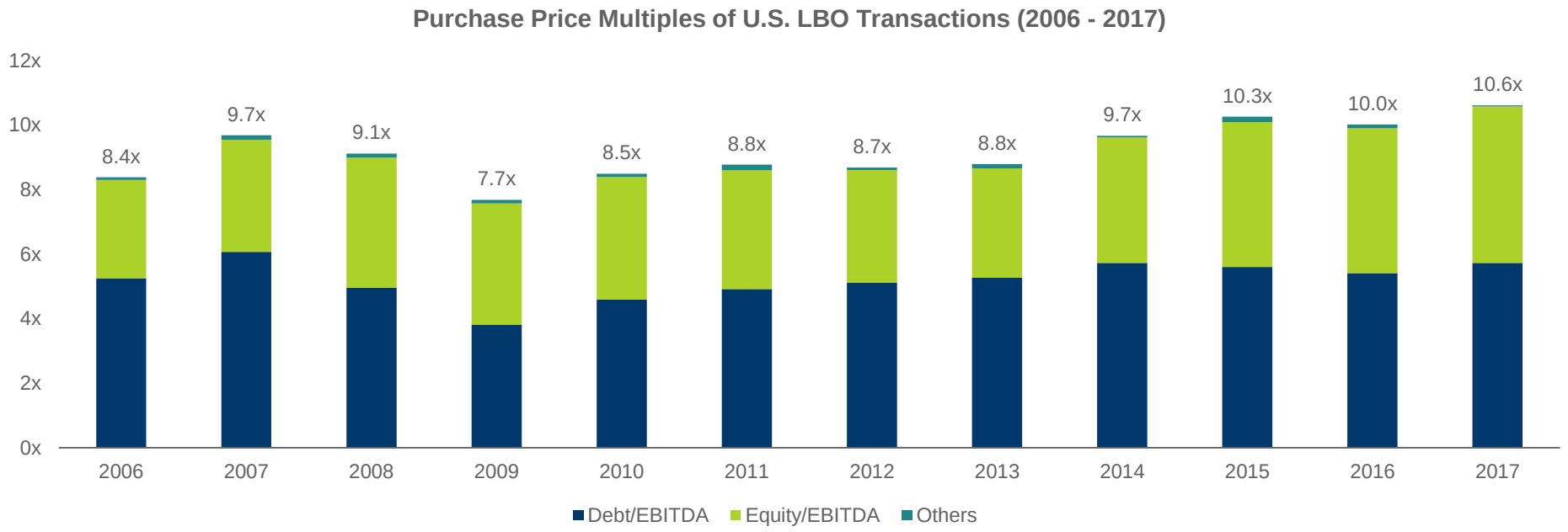
PRIVATE EQUITY- U.S. LBO PURCHASE PRICE MULTIPLES



- As debt remains readily available, purchase price multiples for U.S. LBOs continue to increase and remain high relative to 2009's low

Source: S&P LBO, as of December 31, 2017

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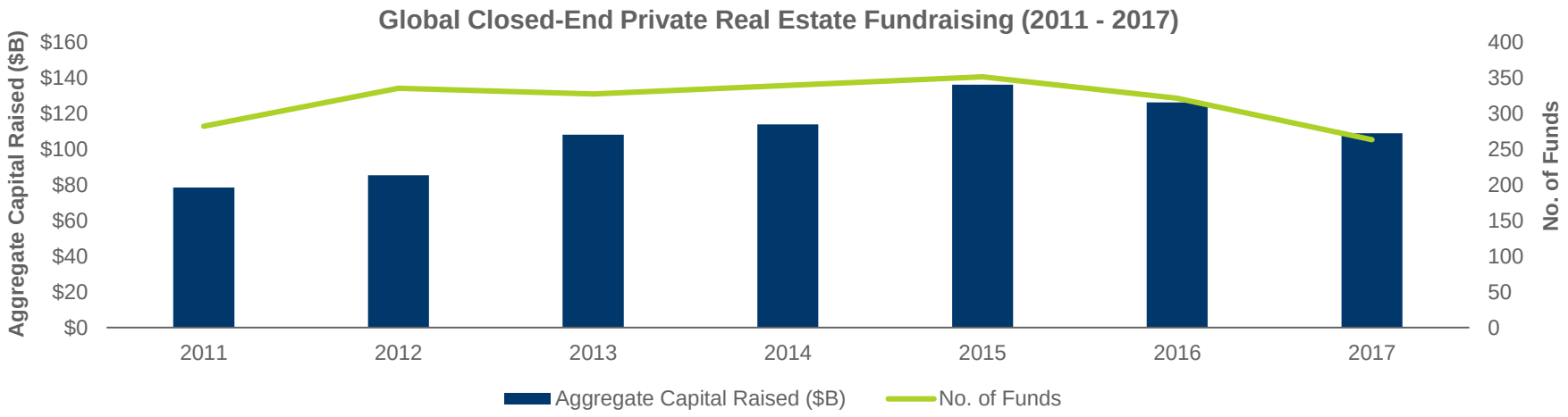
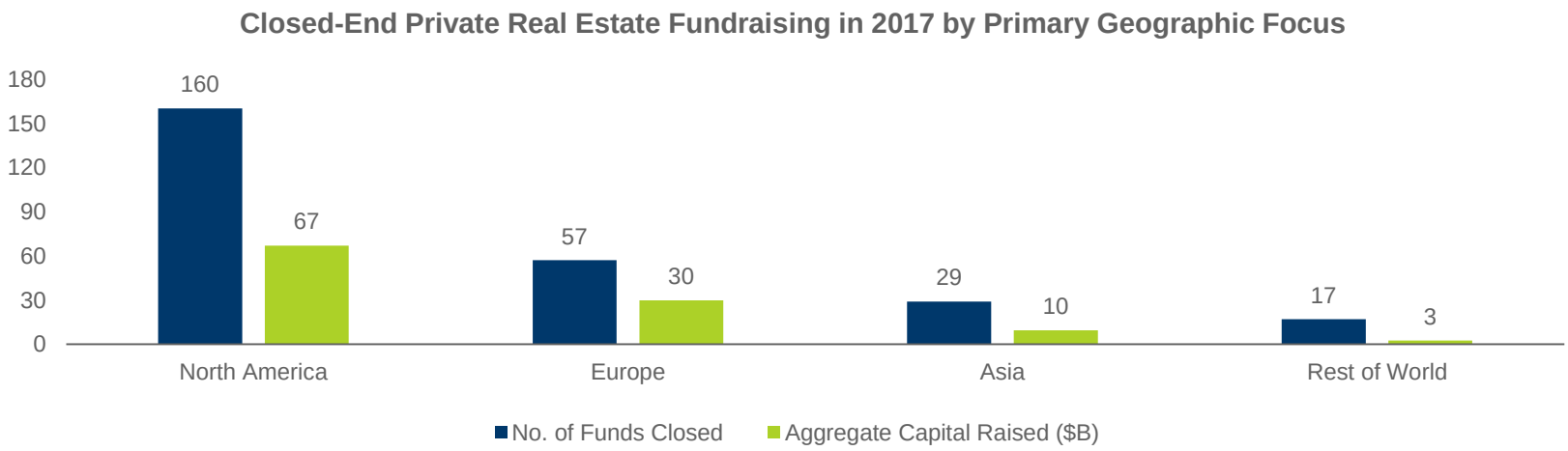
PRIVATE REAL ESTATE – FUNDRAISING ACTIVITY





Source: Preqin, as of December 31, 2017

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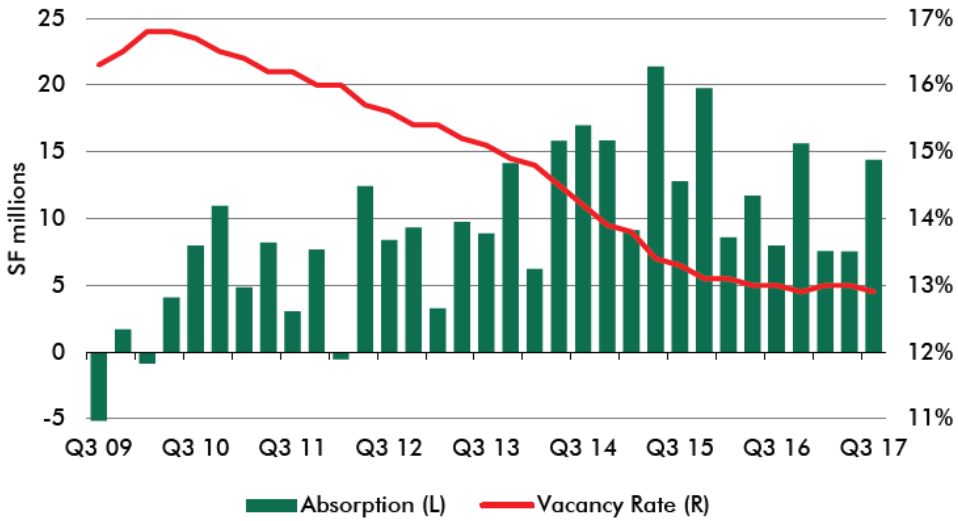
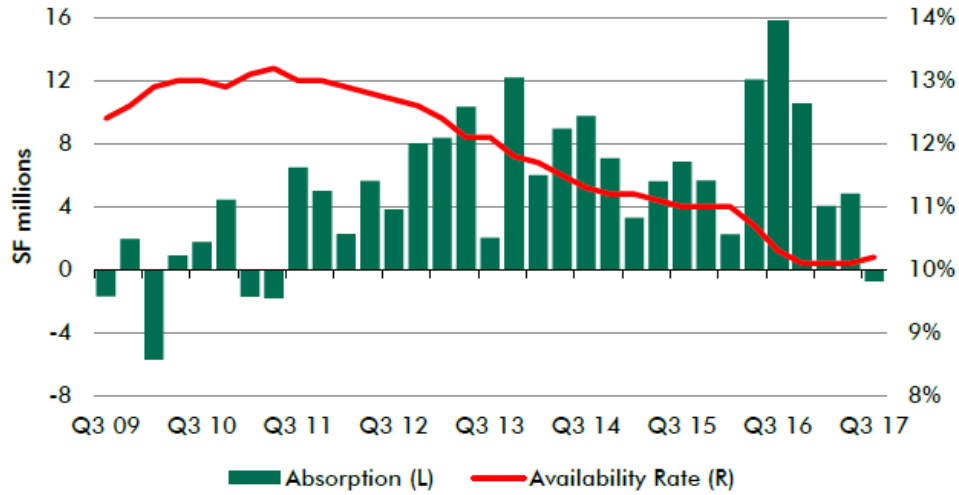
COMMERCIAL PROPERTY

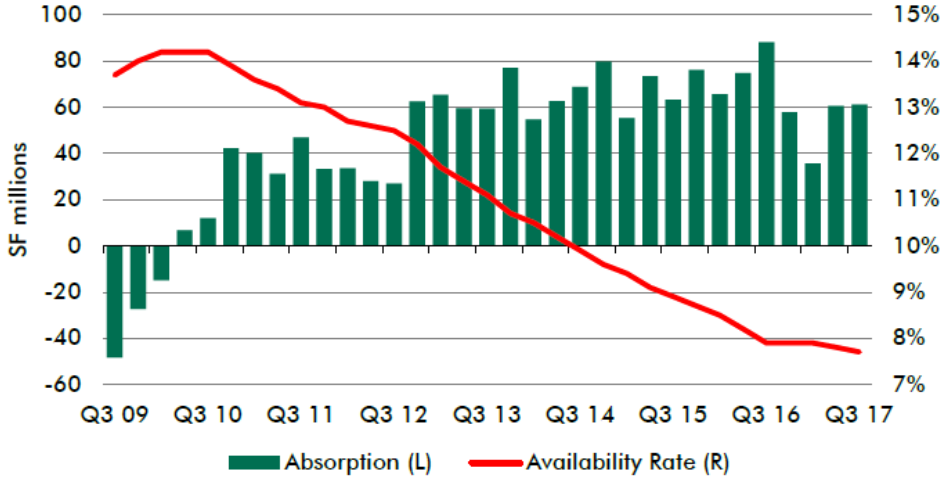
OFFICE



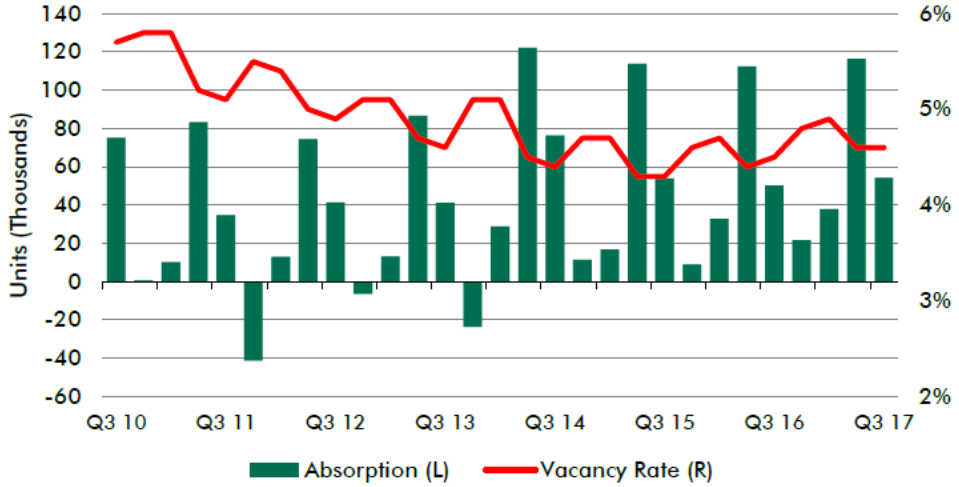
RETAIL



INDUSTRIAL



APARTMENTS



Data sources: CB Richard Ellis

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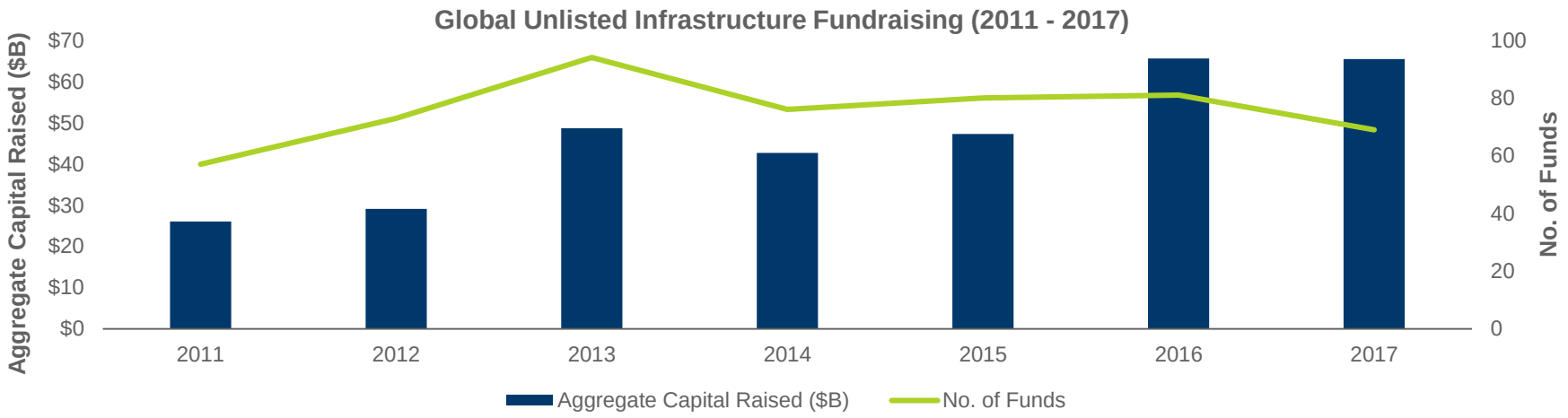
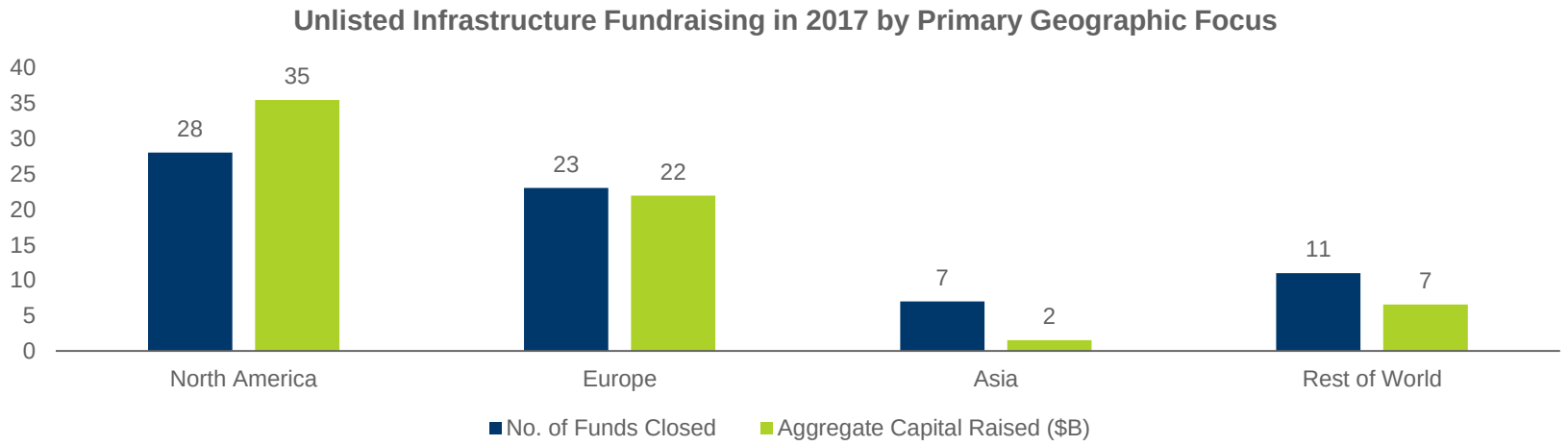
UNLISTED INFRASTRUCTURE – FUNDRAISING & INVESTMENT ACTIVITY





Source: Preqin, as of December 31, 2017

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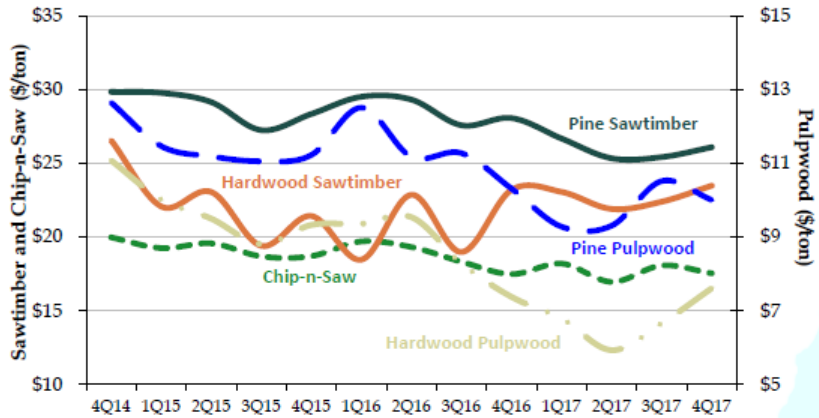
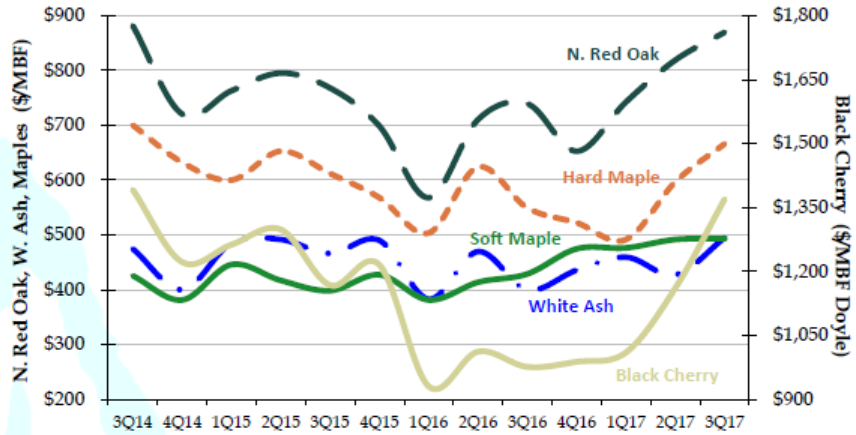
TIMBER

Southeastern Timber Prices



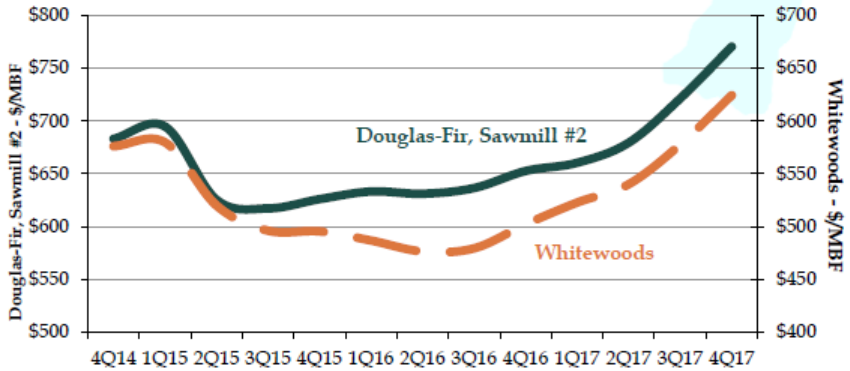
Source: Forest2Market®

Northeastern Hardwood Timber Prices



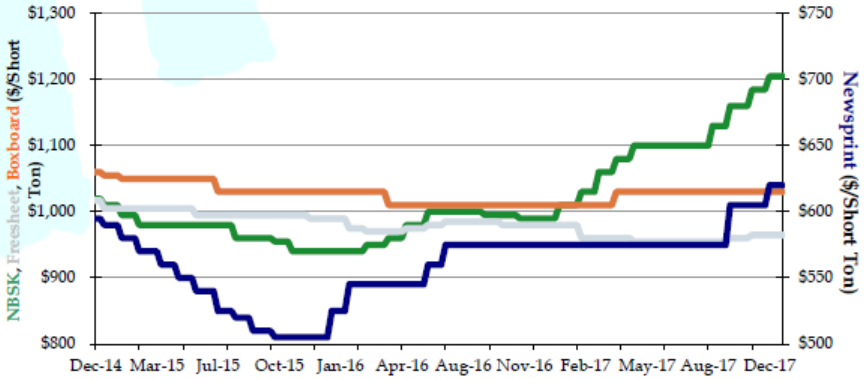
Source: Pennsylvania Woodlands Timber Market Report - Northwest Region

Pacific Northwest Timber Prices



Source: Log Lines®

Pulp and Paper



Source: FOEX Indexes, Ltd., RISI Pulp & Paper Week

Data sources: Forest Investment Associates

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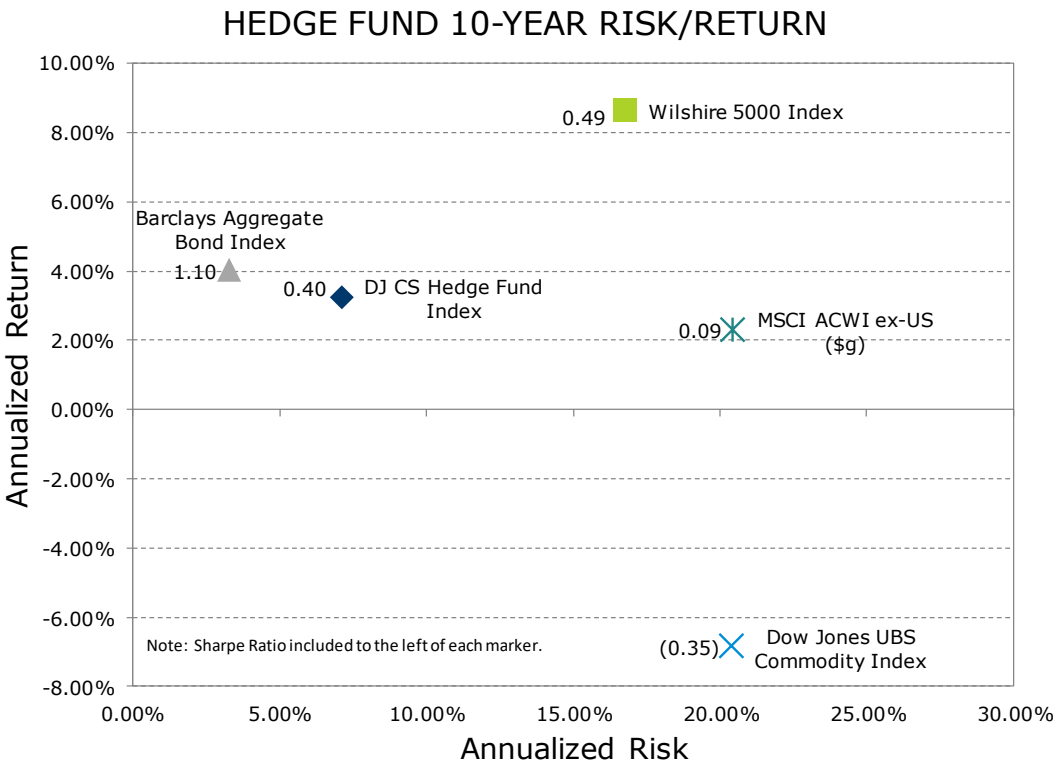
HEDGE FUND PERFORMANCE

AS OF DECEMBER 31, 2017	QTR	YTD	1 YR	3 YR	5 YR	10 YR
DJ CS HEDGE FUND INDEX	2.3	7.1	7.1	2.5	4.2	3.2
EVENT DRIVEN	1.5	6.3	6.3	0.8	3.7	3.0
GLOBAL MACRO	1.9	2.2	2.2	2.0	2.7	4.4
LONG/SHORT EQUITY	3.3	13.4	13.4	4.3	7.1	4.0
MULTI-STRATEGY	0.3	6.8	6.8	5.0	6.4	4.9
WILSHIRE 5000	6.4	21.0	21.0	11.4	15.7	8.6
MSCI ACWI EX-US ($G)	5.1	27.8	27.8	8.3	7.3	2.3
BLOOMBERG BARCLAYS AGGREGATE	0.4	3.6	3.6	2.2	2.1	4.0
DOW JONES UBS COMMODITY	4.7	1.7	1.7	-5.0	-8.5	-6.8



Data sources: Wilshire Compass

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