Wilshire

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Numbers in Context

Fourth Quarter 2018

Wilshire Consulting

ASSET CLASS PERFORMANCE

Wilshire

Annual Asset Class Returns - Best to Worst										Annualized 5-Year
2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	as of Dec 18'
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%	T-Bills 1.9%	U.S. Equity 8.1%
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%	Core Bond 0.0%	REITs 7.9%
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 -1.3%	High Yield 3.8%
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%	High Yield -2.1%	Core Bond 2.5%
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%	REITs -4.9%	Emrg Mrkts 2.0%
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 -5.3%	U.S. TIPS 1.7%
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%	Commodities -11.25%	Developed 1.0%
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%	MLPs -12.4%	T-Bills 0.6%
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%	Developed -13.4%	MLPs -7.3%
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%	Emrg Mrkts -14.3%	Commodities -8.8%

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 down -14.3% for the fourth quarter of 2018. This marks the worst quarter for U.S. equities since 2011 and the first down year since the credit crisis sell-off of 2008. Concerns of an economic slowdown weighed on stock prices as did fears that additional rate increases by the Federal Reserve could weaken future prospects for economic growth.

The yield curve ended 2018 with a very unusual shape – which will likely be a source of debate if it persists, largely focusing on the Fed's December rate hike. Some fear that it could be enough to slow the economy and are therefore selling shorter-term bonds, pushing rates higher. Others highlight the fact that the Fed's mandate focuses on both growth and inflation and that a 0.25% increase is not likely to stop the U.S. economy cold. Ultimately, the Fed makes their final decisions based on all available data and can decide to adjust their course of action.

Non-U.S. Equity

Equity markets outside of the U.S. suffered during the quarter, although they generally outperformed U.S. equity. While the EU began the year in sound economic condition, growth declined steadily while gains in unemployment stalled and industrial production reversed course. While there were some positive signals on U.S.-China trade, investors will likely wait until a scheduled meeting in January before fully evaluating the current global trade environment.

Fixed Income

The U.S. Treasury yield curve fell across most maturities with the 10-year Treasury yield at 2.69%, down 37 basis points. The Federal Open Market Committee increased its overnight rate by 25 basis points but adjusted downward their forecast for future rates. Credit spreads widened during the quarter within both the investment grade and high yield markets.

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DECEMBER 2018 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 (%)	7.00	7.50	7.50	7.75	7.45	10.05	2.65	3.85	4.25	3.00	5.90	1.25	5.65	5.85	6.65	4.35	6.40	1.70
EXPECTED ARITHMETIC RETURN (%)	8.30	8.95	10.45	9.35	8.75	13.35	2.65	4.00	4.70	3.15	6.35	1.30	7.00	7.00	7.55	5.40	6.75	1.70
EXPECTED RISK (%)	17.00	18.00	26.00	18.80	17.05	28.00	1.25	5.15	9.85	6.00	10.00	3.50	17.00	15.80	14.00	15.00	8.75	1.75
CASH YIELD (%)	2.15	3.50	2.50	3.25	2.65	0.00	2.65	4.05	5.00	3.55	8.95	1.80	4.40	4.40	2.70	2.65	3.00	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	0.66	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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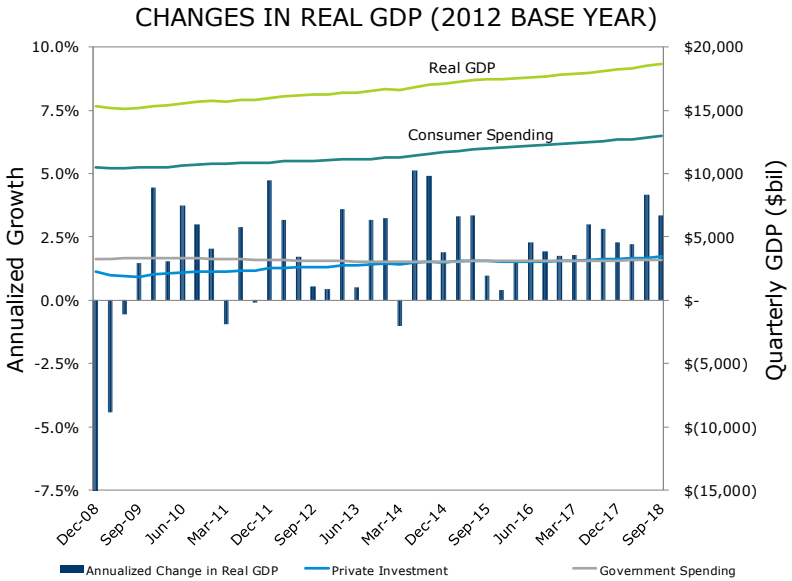
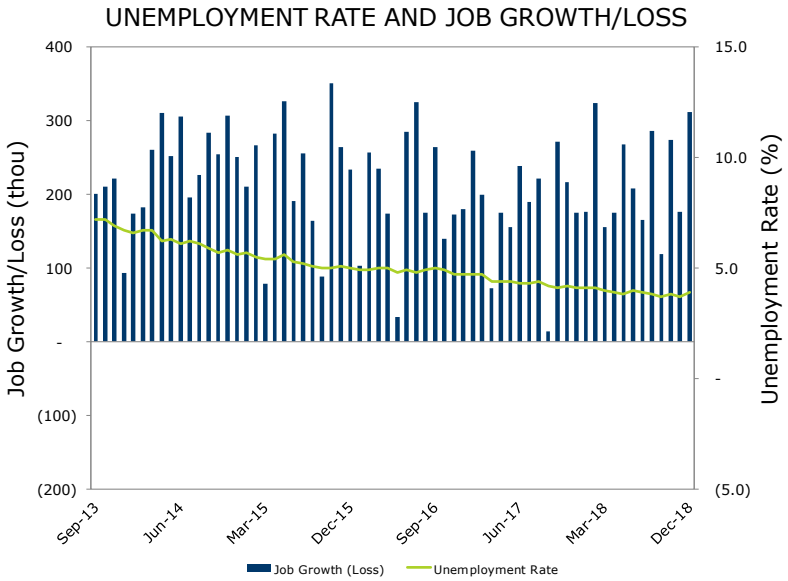
ECONOMIC REVIEW

AS OF DEC. 31, 2018	KEY ECONOMIC INDICATORS			
CPI (ALL ITEMS)	MONTHLY CHANGE		CUMULATIVE CHANGE	
SEASONALLY ADJUSTED	Dec-18	-0.1	3-Mo.	0.3
	Nov-18	0.0	12-Mo.	1.9
	Oct-18	0.3	10-Yr. (Annual)	1.8
BREAKEVEN INFLATION	10-Yr.	1.7		
CONSUMER SENTIMENT	Dec-18	98.3		
U. OF MICHIGAN SURVEY	Nov-18	97.5		
	1-Yr. Ago	95.9	10-Yr. Avg	82.5
MANUFACTURING	Dec-18	54.1	CHANGE IN SECTOR	
INST. FOR SUPPLY MGMT	Nov-18	59.3	>50	Expansion
PURCHASING MNGRS' IDX	1-Yr. Avg.	58.8	<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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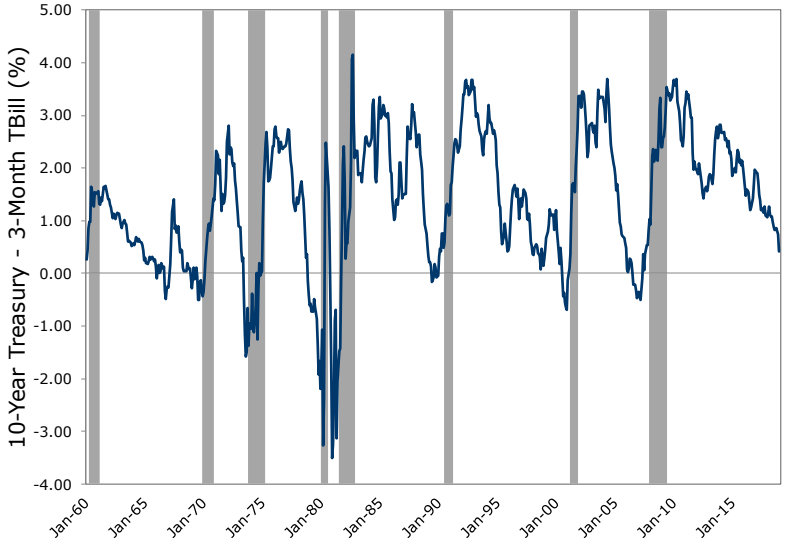
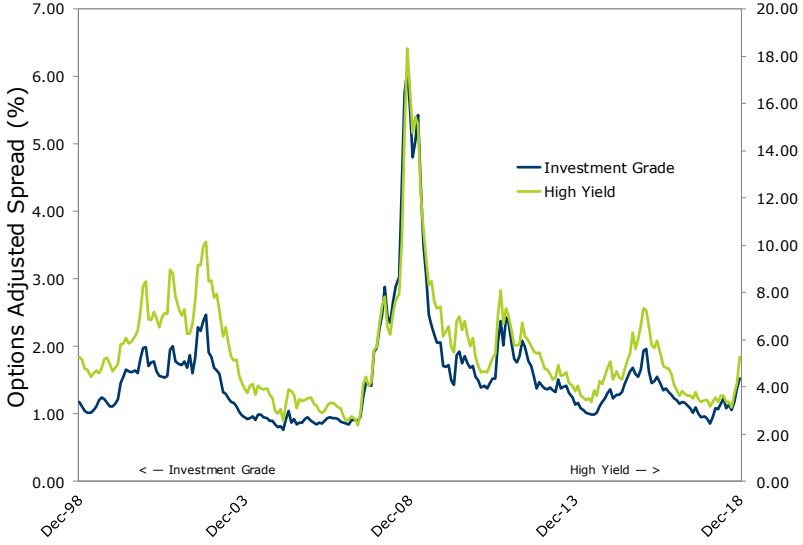
RISK MONITOR

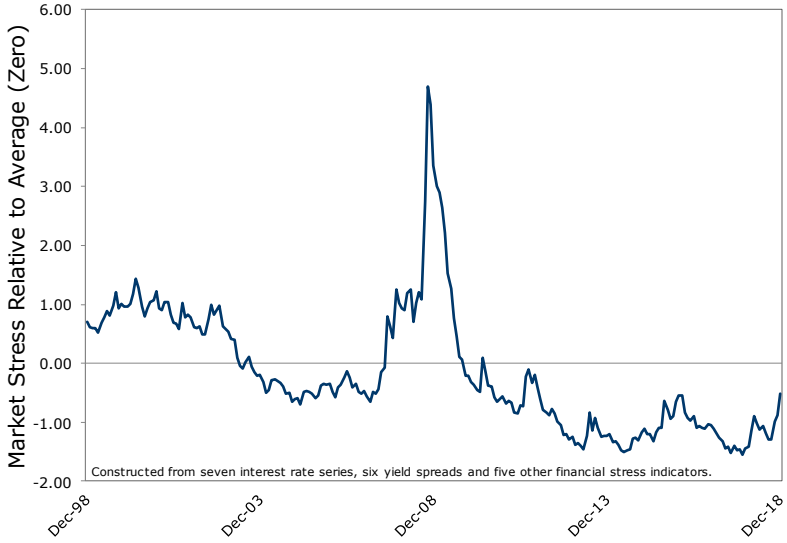
YIELD CURVE SLOPE VS RECESSIONS (IN GRAY)



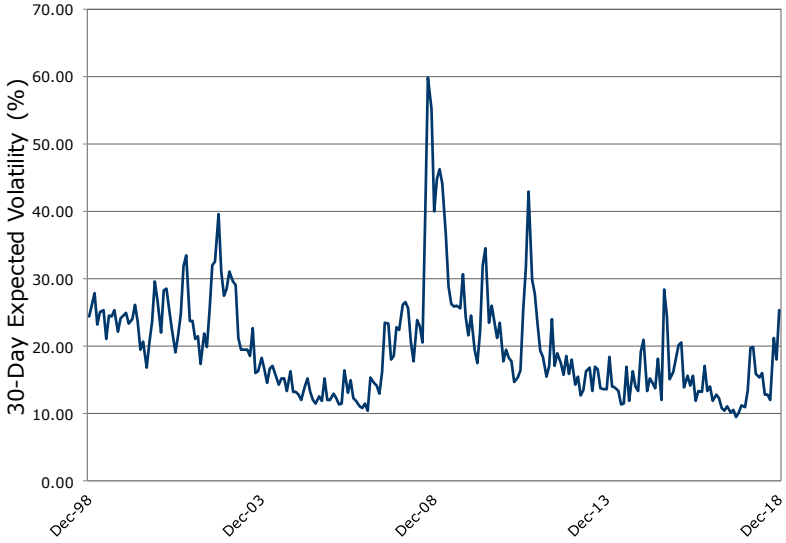
BLOOMBERG BARCLAYS CREDIT INDEXES



ST. LOUIS FED FINANCIAL STRESS INDEX



CBOE VOLATILITY INDEX



Data sources: Federal Reserve, Bloomberg Barclays

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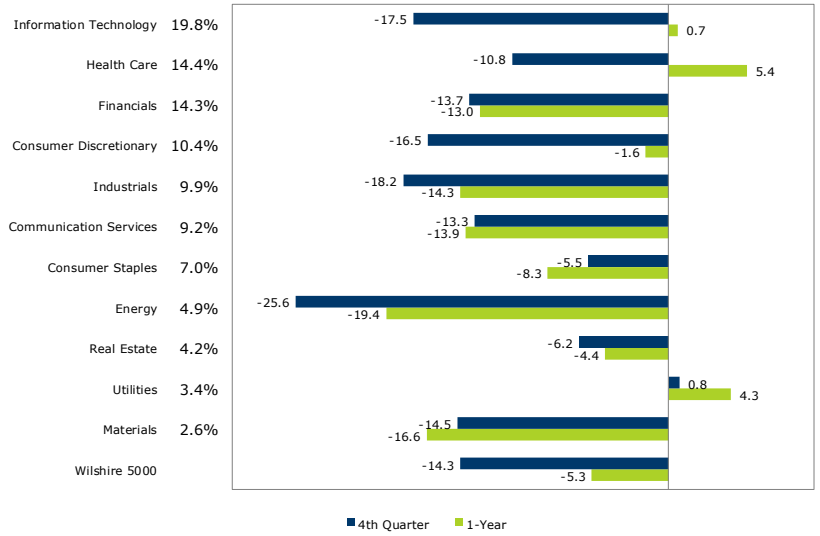
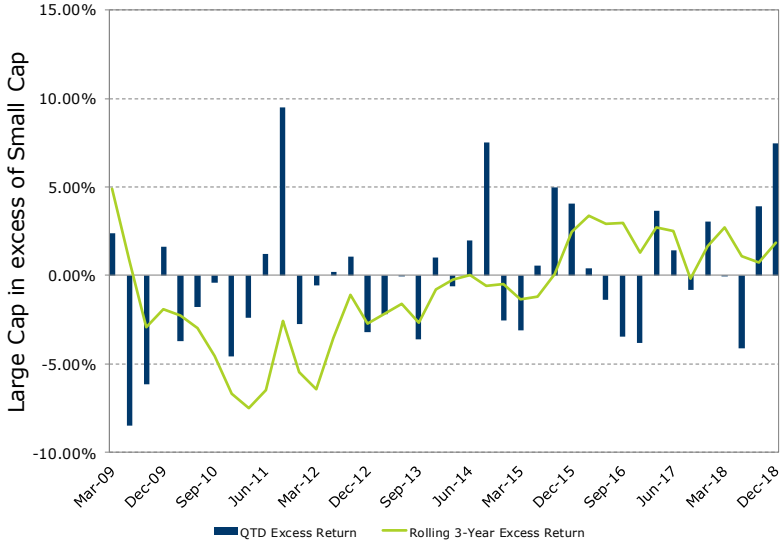
U.S. EQUITY MARKET

AS OF DECEMBER 31, 2018	QTR	YTD	1 YR	3 YR	5 YR	10 YR
WILSHIRE 5000 INDEX	-14.3	-5.3	-5.3	9.1	8.1	13.2
WILSHIRE U.S. LARGE CAP	-13.7	-4.6	-4.6	9.3	8.5	13.1
WILSHIRE U.S. SMALL CAP	-19.7	-10.8	-10.8	7.4	4.7	13.9
WILSHIRE U.S. LARGE GROWTH	-16.8	-3.6	-3.6	10.3	9.6	14.6
WILSHIRE U.S. LARGE VALUE	-10.8	-5.9	-5.9	8.1	7.2	11.6
WILSHIRE U.S. SMALL GROWTH	-20.6	-9.7	-9.7	8.1	4.5	14.7
WILSHIRE U.S. SMALL VALUE	-18.7	-12.0	-12.0	6.5	4.7	12.9
WILSHIRE REIT INDEX	-6.9	-4.8	-4.8	2.1	7.9	12.2
MSCI USA MIN. VOL. INDEX	-7.7	0.9	0.9	9.5	9.8	12.6
FTSE RAFI U.S. 1000 INDEX	-13.8	-8.3	-8.3	7.9	6.6	14.1

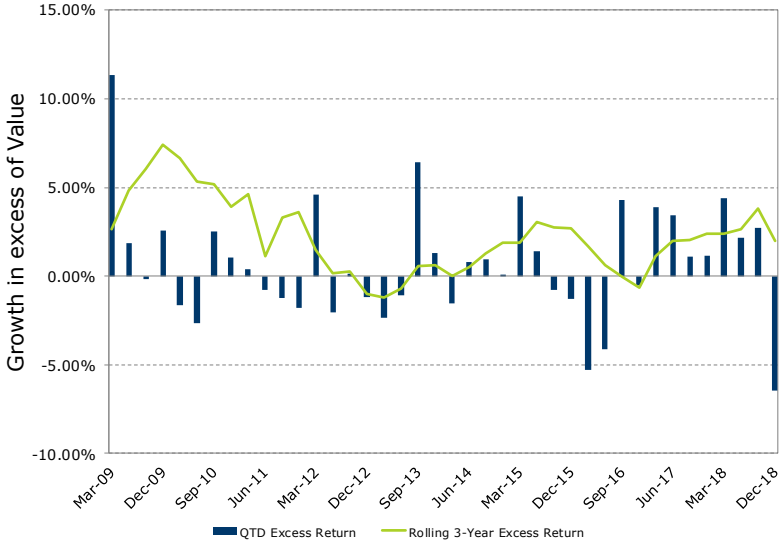
WILSHIRE 5000 SECTOR WEIGHT & RETURN (%)



LARGE CAP VS SMALL CAP



GROWTH VS VALUE



Data sources: Wilshire Compass, Wilshire Atlas

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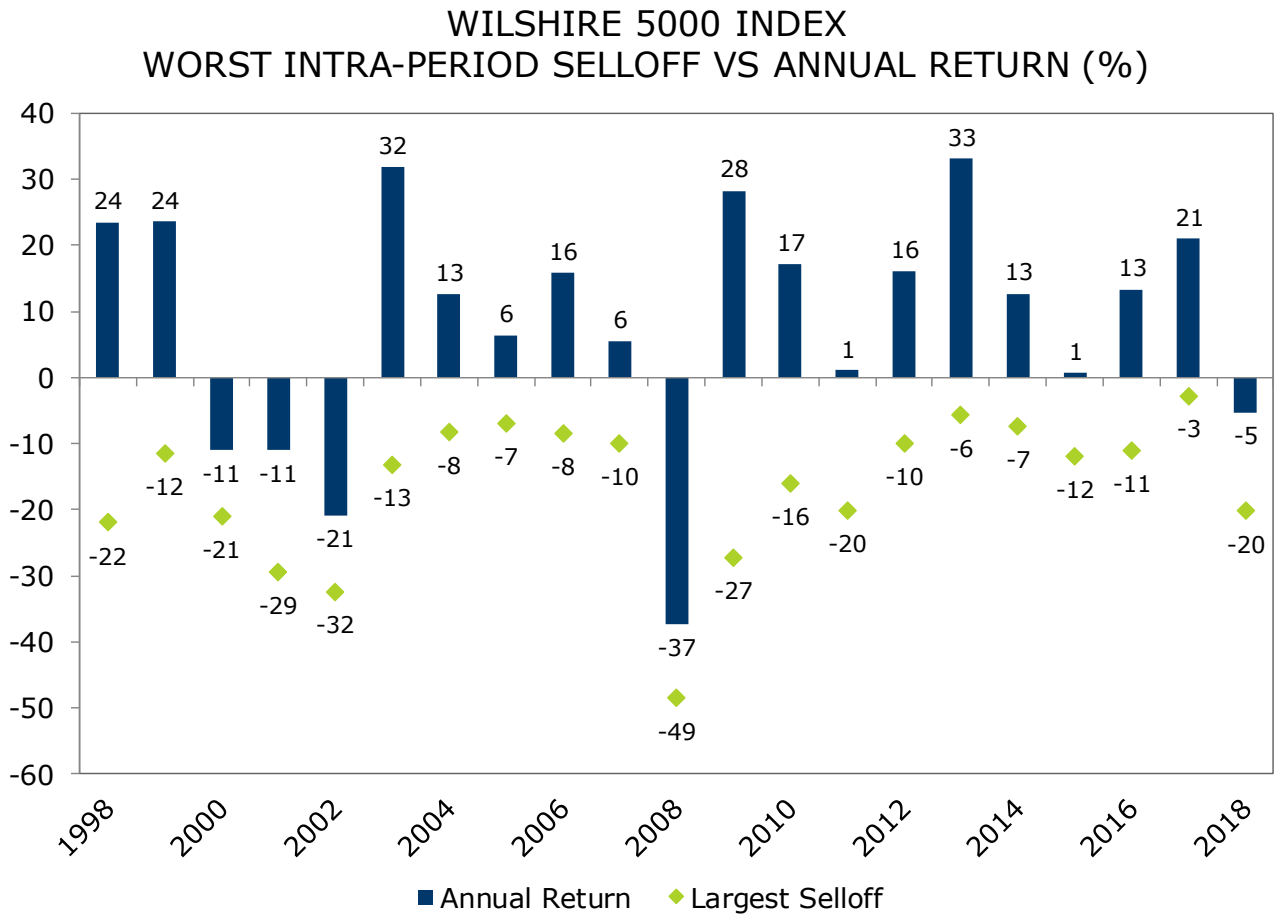
ANNUAL EQUITY RETURNS

- 2018 was the first down year for the Wilshire 5000 Index since the global financial crisis
- While it was the mildest negative return in two decades, the market briefly entered a technical bear market (-20%) in late December



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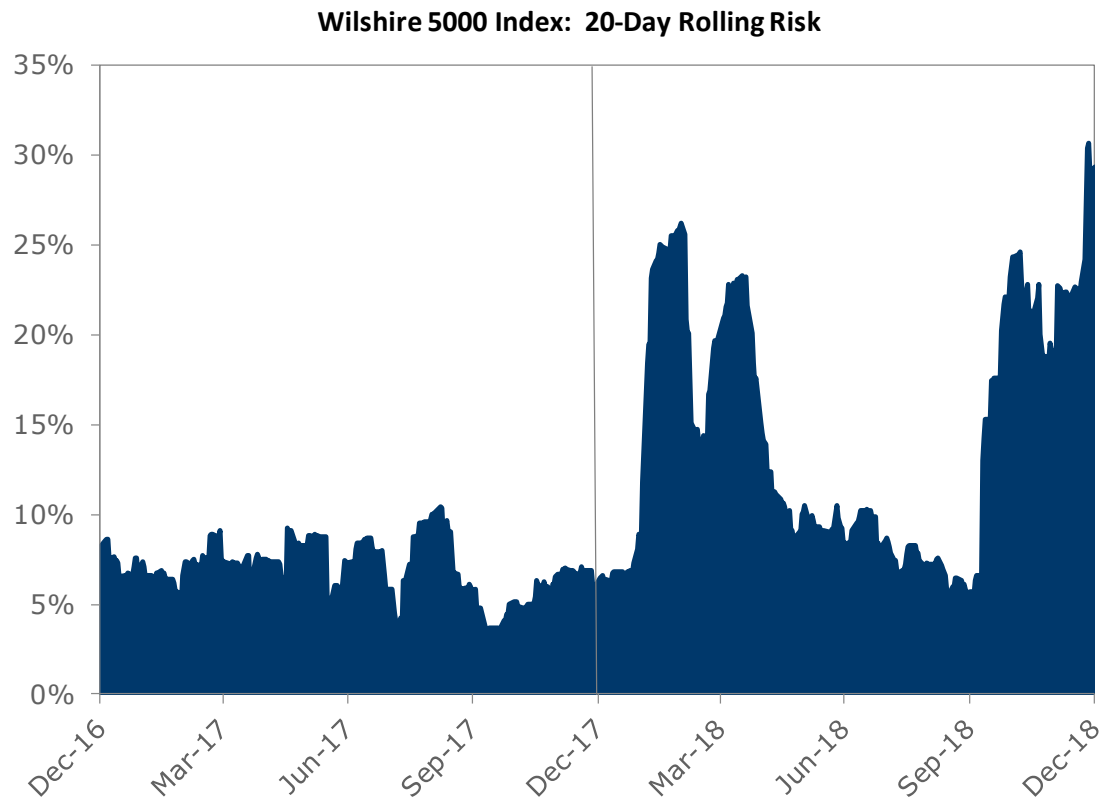
EQUITY VOLATILITY

- Volatility returned to the equity markets after a tranquil 2017
- Investor concerns included monetary tightening, global trade and future economic growth

Since 1980	Year	Annual Volatility	Largest Drawdown	Number of Days Down: 1%	2%	3%	4%	Worst Down Day
Universe Statistics	Max Risk	40.56%	-48.54%	71	42	24	17	-17.23%
	Avg	15.48%	-13.97%	28.2	7.7	2.3	1.0	-4.00%
	Med	13.33%	-9.95%	23.0	4.0	1.0	0.0	-3.34%
	Min Risk	6.96%	-2.74%	3	0	0	0	-1.36%
2017	**Level**	**6.96%**	**-2.75%**	**4**	**0**	**0**	**0**	**-1.85%**
	Rank	**1**	**2**	**2**	**1**	**1**	**1**	**7**
2018	**Level**	**16.86%**	**-20.18%**	**32**	**15**	**5**	**1**	**-4.02%**
	Rank	**29**	**31**	**25**	**33**	**32**	**27**	**27**

The "Rank" statistics reflect ordinal rankings among 39 annual observations (i.e. ranks shown are X of 39)



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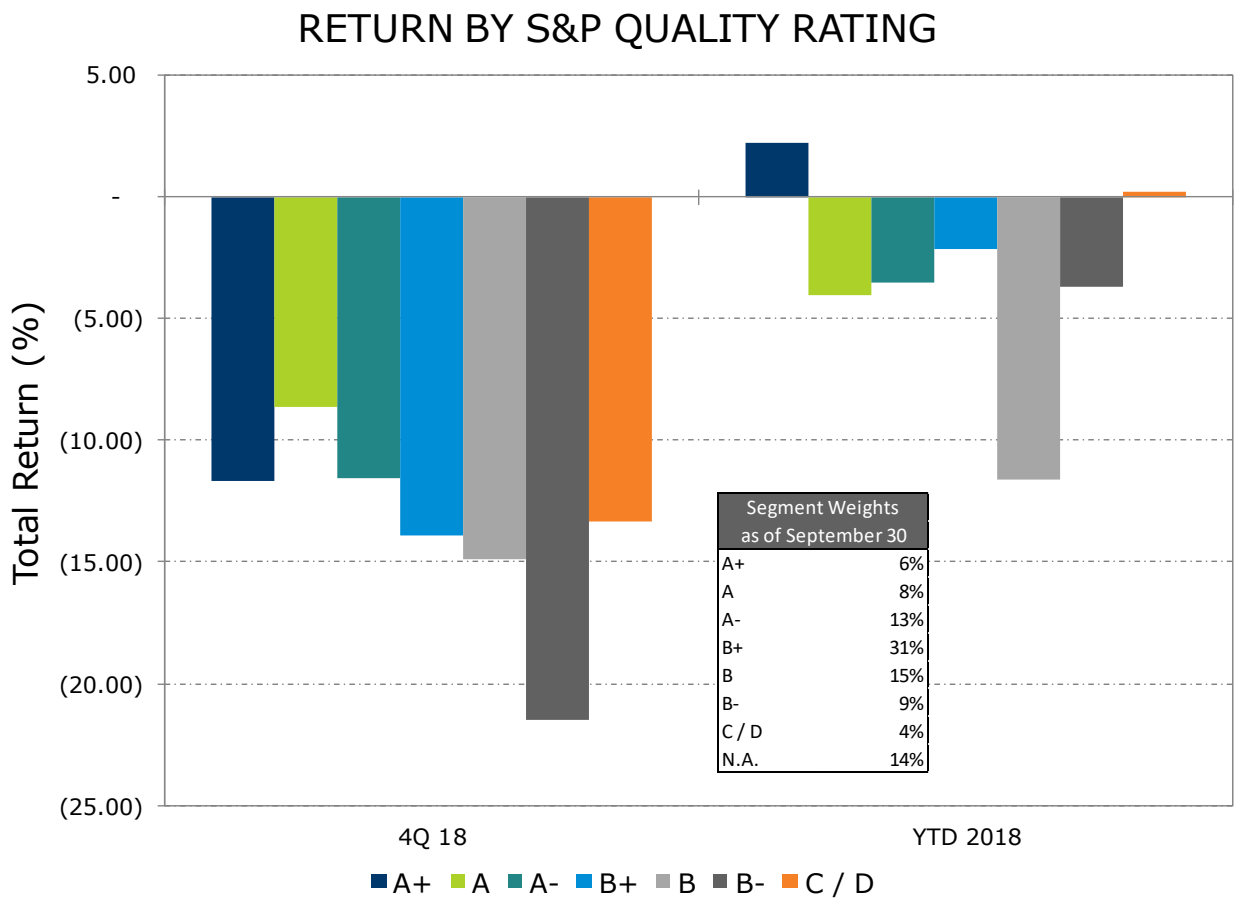
RETURNS BY QUALITY SEGMENT

Highest quality names produced a positive return for the year but are among the lowest weight within the broad market



Data sources: Wilshire Atlas

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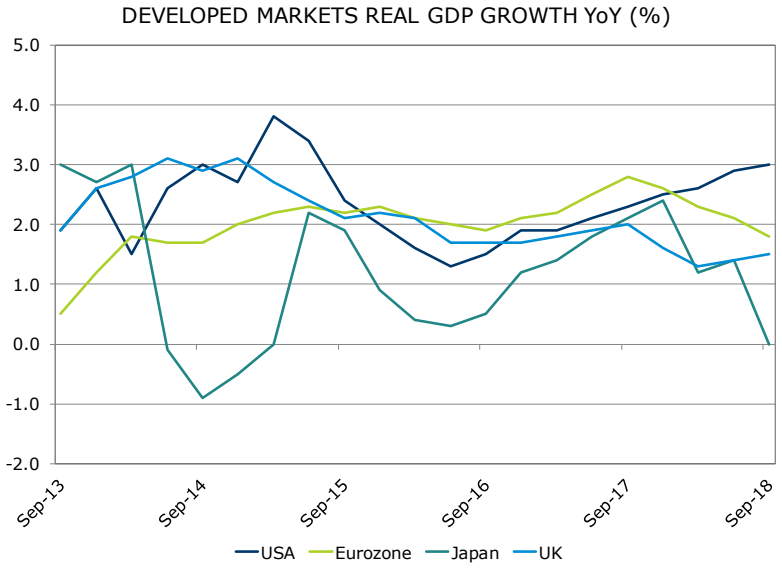
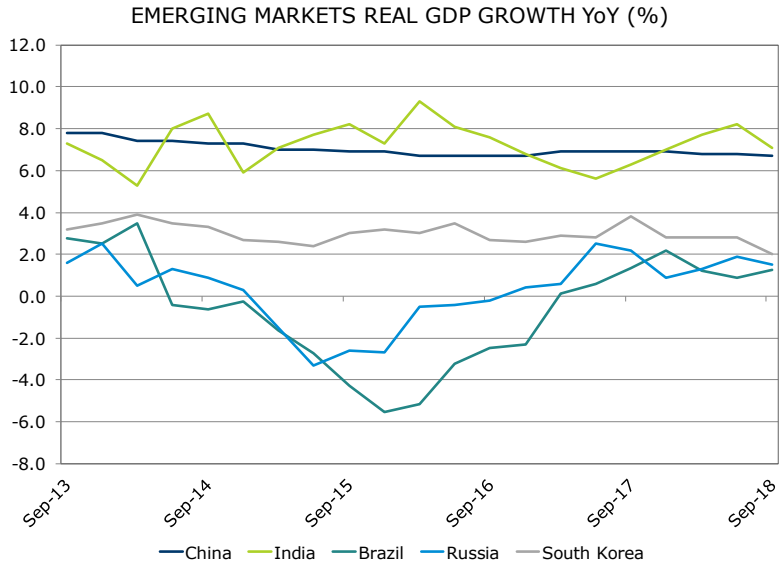
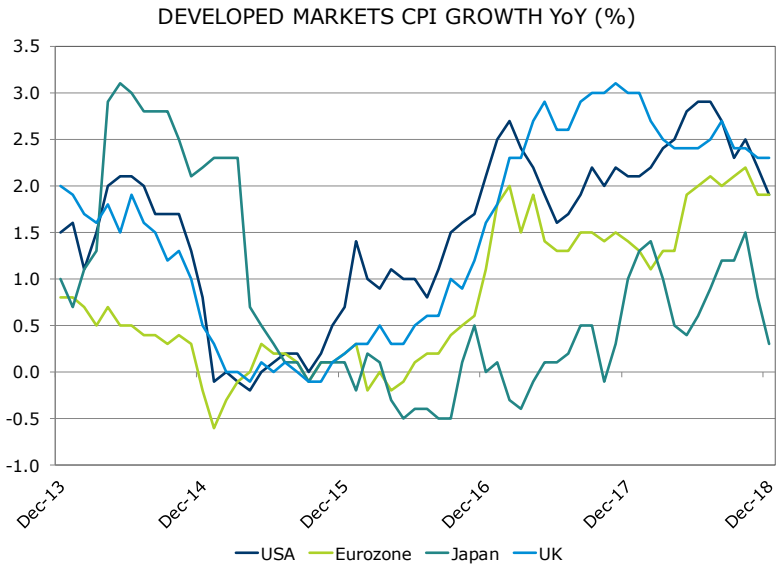
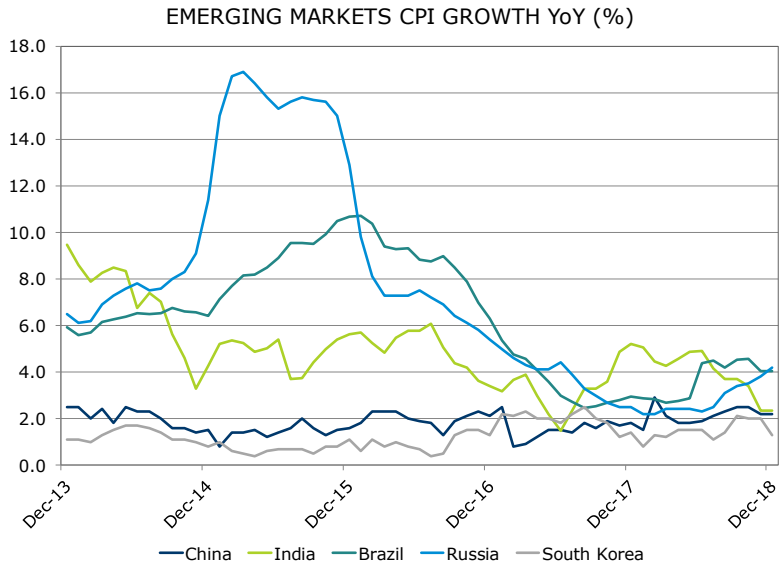
NON-U.S. GROWTH AND INFLATION









Data sources: Bloomberg

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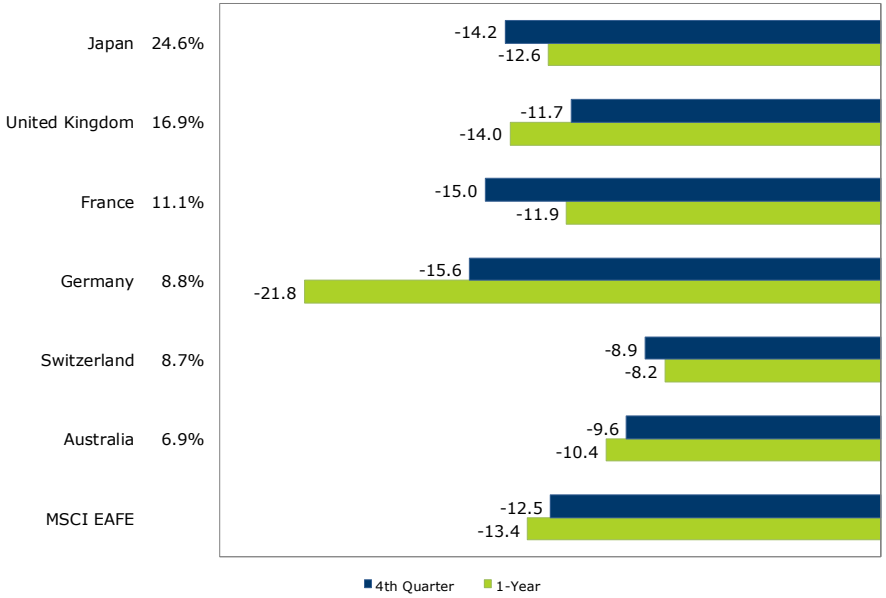
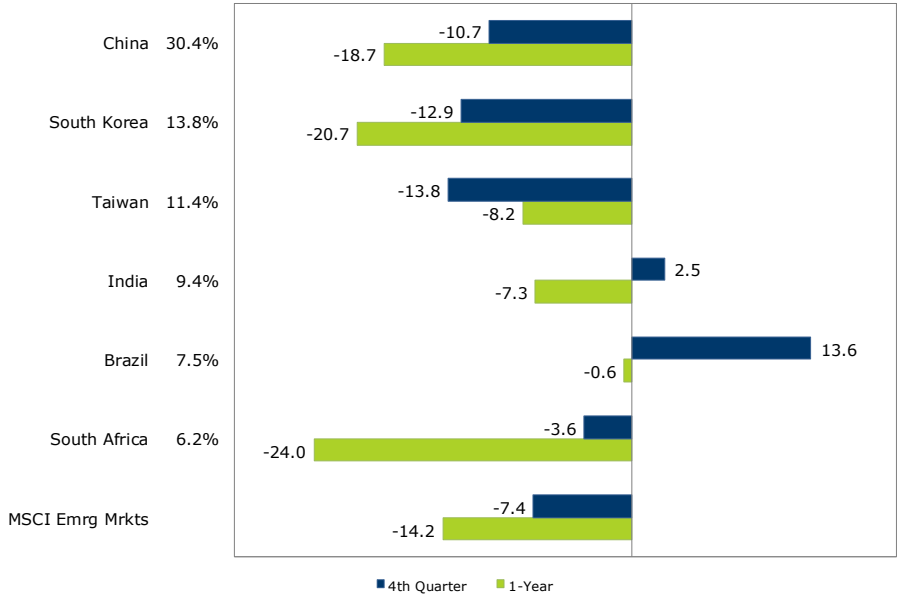
NON-U.S. EQUITY MARKET

AS OF DECEMBER 31, 2018	QTR	YTD	1 YR	3 YR	5 YR	10 YR
MSCI ACWI EX-US ($G)	-11.4	-13.8	-13.8	5.0	1.1	7.1
MSCI EAFE ($G)	-12.5	-13.4	-13.4	3.4	1.0	6.8
MSCI EMERGING MARKETS ($G)	-7.4	-14.2	-14.2	9.6	2.0	8.4
MSCI FRONTIER MARKETS ($G)	-4.3	-16.2	-16.2	4.6	1.1	5.4
MSCI ACWI EX-US GROWTH ($G)	-12.2	-14.1	-14.1	4.6	2.1	7.5
MSCI ACWI EX-US VALUE ($G)	-10.6	-13.4	-13.4	5.4	0.2	6.6
MSCI ACWI EX-US SMALL ($G)	-14.4	-17.9	-17.9	4.4	2.4	10.5
MSCI ACWI MINIMUM VOLATILITY	-6.5	-1.0	-1.0	8.3	7.9	10.5
MSCI EAFE MINIMUM VOLATILITY	-7.3	-5.2	-5.2	4.5	5.4	8.1
FTSE RAFI DEVELOPED EX-US	-12.8	-14.5	-14.5	4.9	0.9	7.3
MSCI EAFE LC (G)	-12.2	-10.5	-10.5	3.1	4.3	8.0

MSCI EAFE: LARGEST COUNTRIES & RETURN (USD)



MSCI EM: LARGEST COUNTRIES & RETURN (USD)



Data sources: Wilshire Compass

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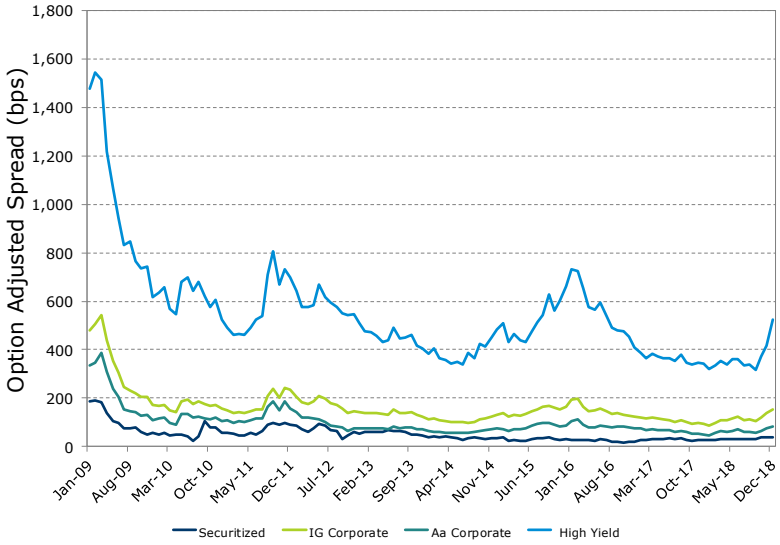
U.S. FIXED INCOME

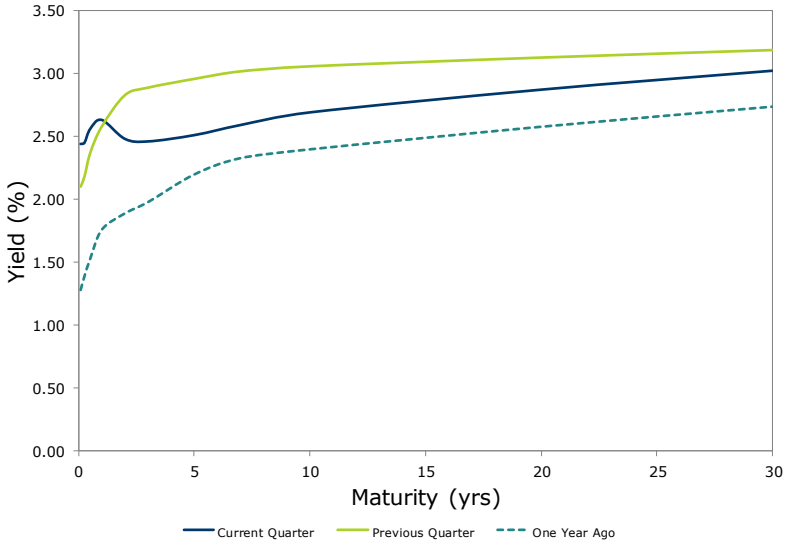
AS OF DECEMBER 31, 2018	YTM	DURATION	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS AGGREGATE	3.3	5.9	1.6	0.0	0.0	2.1	2.5	3.5
BLOOMBERG BARCLAYS TREASURY	2.6	6.1	2.6	0.9	0.9	1.4	2.0	2.1
BLOOMBERG BARCLAYS GOV'T-REL.	3.4	5.3	1.2	0.3	0.3	2.4	2.6	2.9
BLOOMBERG BARCLAYS SECURITIZED	3.4	4.7	2.0	1.0	1.0	1.8	2.5	3.4
BLOOMBERG BARCLAYS CORPORATE	4.2	7.1	-0.2	-2.5	-2.5	3.3	3.3	5.9
BLOOMBERG BARCLAYS LT G/C	4.1	15.0	0.8	-4.7	-4.7	4.0	5.4	5.9
BLOOMBERG BARCLAYS LT TREASURY	3.0	17.4	4.2	-1.8	-1.8	2.6	5.9	4.1
BLOOMBERG BARCLAYS LT GOV't-REL.	4.6	11.8	0.0	-3.2	-3.2	4.7	5.6	5.7
BLOOMBERG BARCLAYS LT CORP.	4.9	13.5	-1.8	-7.2	-7.2	4.9	5.0	7.6
BLOOMBERG BARCLAYS U.S. TIPS *	2.7	7.6	-0.4	-1.3	-1.3	2.1	1.7	3.6
BLOOMBERG BARCLAYS HIGH YIELD	8.0	4.0	-4.5	-2.1	-2.1	7.2	3.8	11.1
TREASURY BILLS	2.5	0.25	0.6	1.9	1.9	1.0	0.6	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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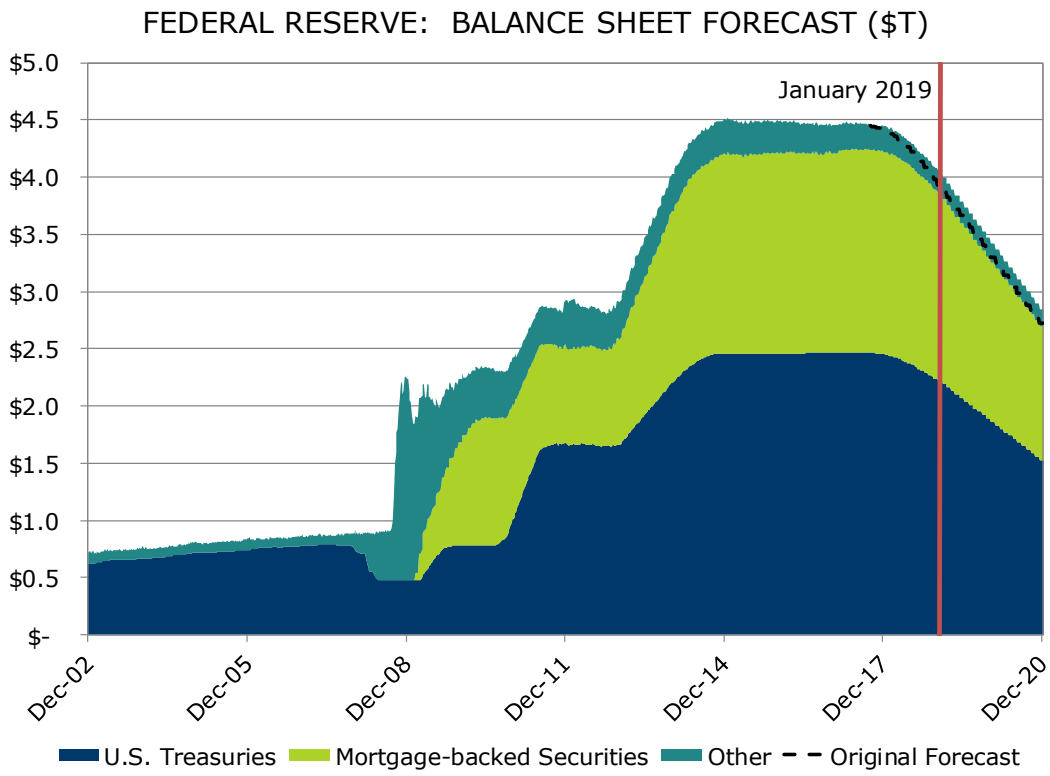
FEDERAL RESERVE

- Federal Reserve began their balance sheet normalization program during October 2017; targeting $10B in reductions per month while increasing to $50B per month in Q4 2018

- Generally on pace with their initial plan, the Federal Reserve has reduced their total assets by $406 billion through mid-January 2019



Data sources: Federal Reserve

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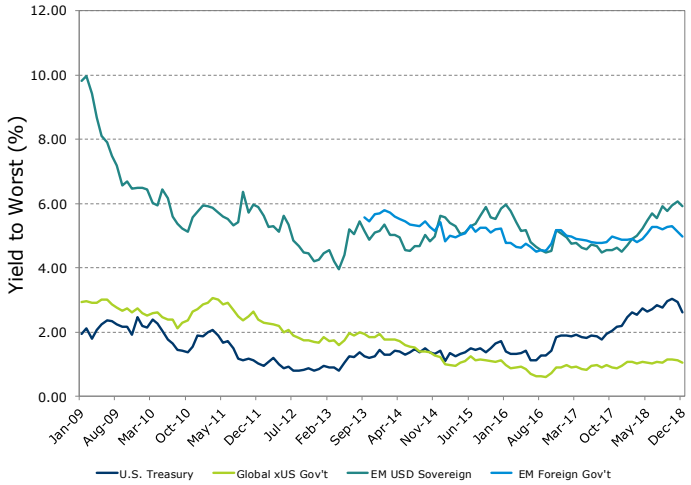
NON-U.S. FIXED INCOME

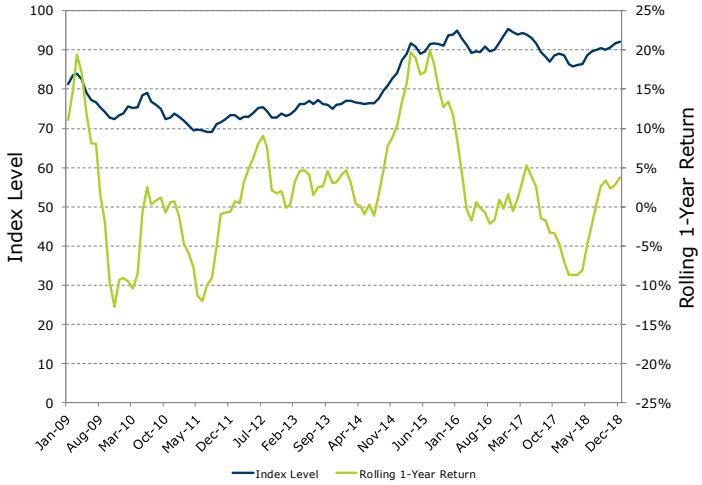
AS OF DECEMBER 31, 2018	QTR	YTD	1 YR	3 YR	5 YR	10 YR
DEVELOPED MARKETS						
BLMBRG BRCLYS GLBL AGGREGATE xUS	0.9	-2.1	-2.1	3.2	0.0	1.7
BLMBRG BRCLYS GLBL AGGREGATE xUS *	1.9	3.2	3.2	3.5	4.1	4.0
BLMBRG BRCLYS GLOBAL INF LNKD xUS	-1.1	-5.9	-5.9	3.1	1.0	3.8
BLMBRG BRCLYS GLOBAL INF LNKD xUS *	1.4	1.3	1.3	6.2	6.3	5.8
EMERGING MARKETS (HARD CURRENCY)						
BLMBRG BRCLYS EM USD AGGREGATE	-0.2	-2.5	-2.5	5.0	4.2	8.5
EMERGING MARKETS (FOREIGN CURRENCY)						
BLMBRG BRCLYS EM LOCAL CURR. GOV'T	2.5	-3.4	-3.4	5.3	0.5	4.1
BLMBRG BRCLYS EM LOCAL CURR. GOV'T *	2.6	2.7	2.7	3.2	2.9	3.2
EURO vs. DOLLAR	-1.6	-4.8	-4.8	1.7	-3.7	-2.0
YEN vs. DOLLAR	3.5	2.7	2.7	3.1	-0.9	-1.9
POUND vs. DOLLAR	-2.3	-5.9	-5.9	-4.7	-5.1	-1.2

* 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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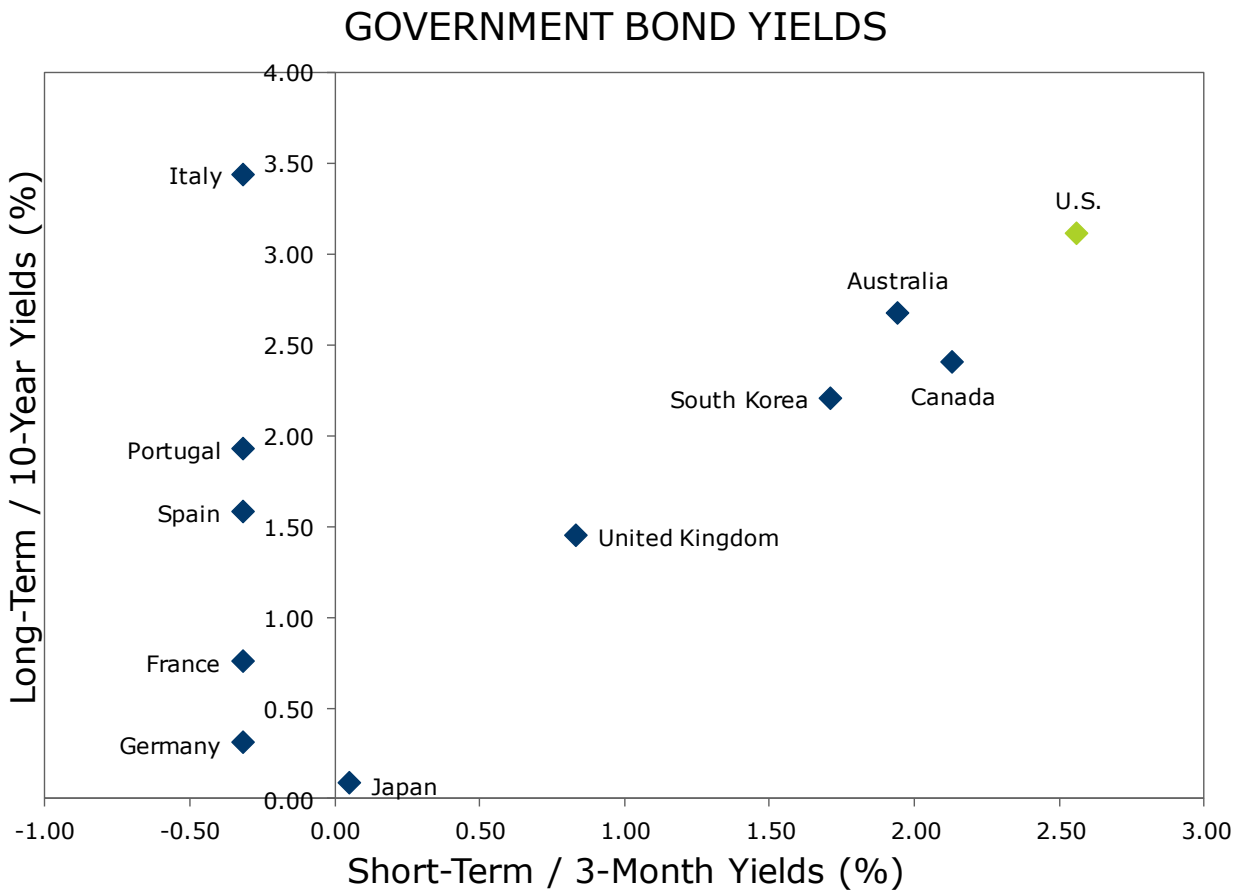
GLOBAL INTEREST RATES

Negative short-term rates remain in Europe; Long rates jumped in Italy during the quarter



Data sources: Organization for Economic Co-operation and Development

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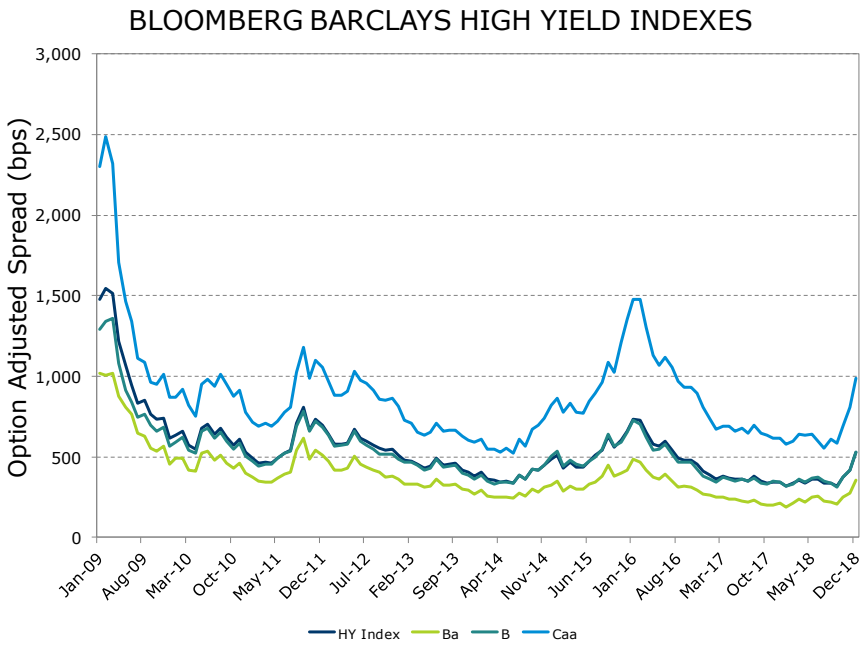
HIGH YIELD BOND MARKET

AS OF DECEMBER 31, 2018		QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS HIGH YIELD		-4.5	-2.1	-2.1	7.2	3.8	11.1
CREDIT SUISSE LEVERAGED LOAN		-3.1	1.1	1.1	5.0	3.3	8.3
HIGH YIELD QUALITY DISTRIBUTION	WEIGHT						
Ba U.S. HIGH YIELD	46.1%	-2.9	-2.4	-2.4	5.7	4.3	10.2
B U.S. HIGH YIELD	39.7%	-4.4	-1.3	-1.3	6.8	3.3	9.7
Caa U.S. HIGH YIELD	13.3%	-9.3	-3.8	-3.8	11.7	3.9	13.9
Ca to D U.S. HIGH YIELD	0.6%	-24.1	-1.3	-1.3	27.2	-11.2	7.4
Non-Rated U.S. HIGH YIELD	0.2%	-1.7	1.2	1.2	5.3	-0.5	6.9



Data sources: Wilshire Compass, Bloomberg Barclays

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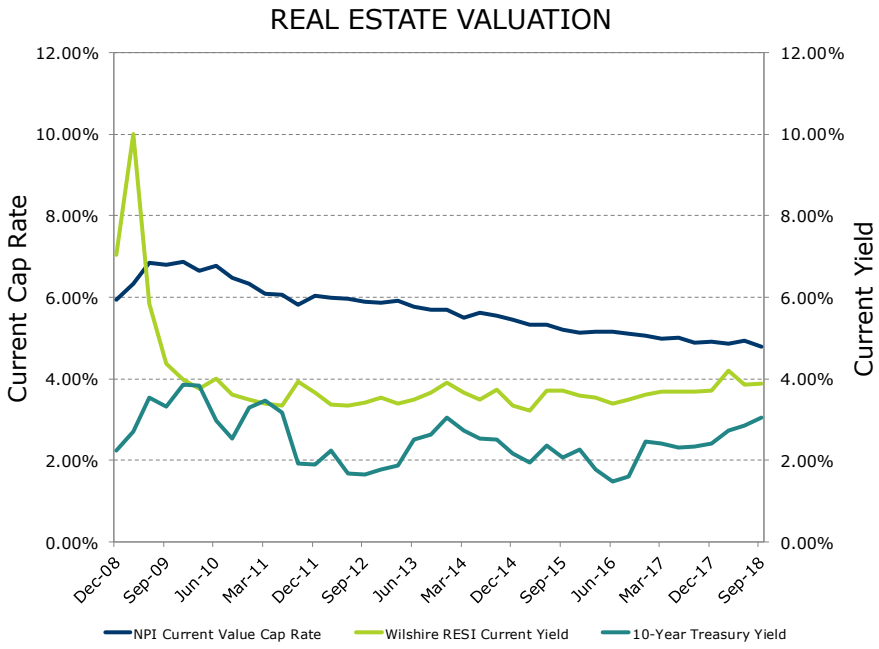
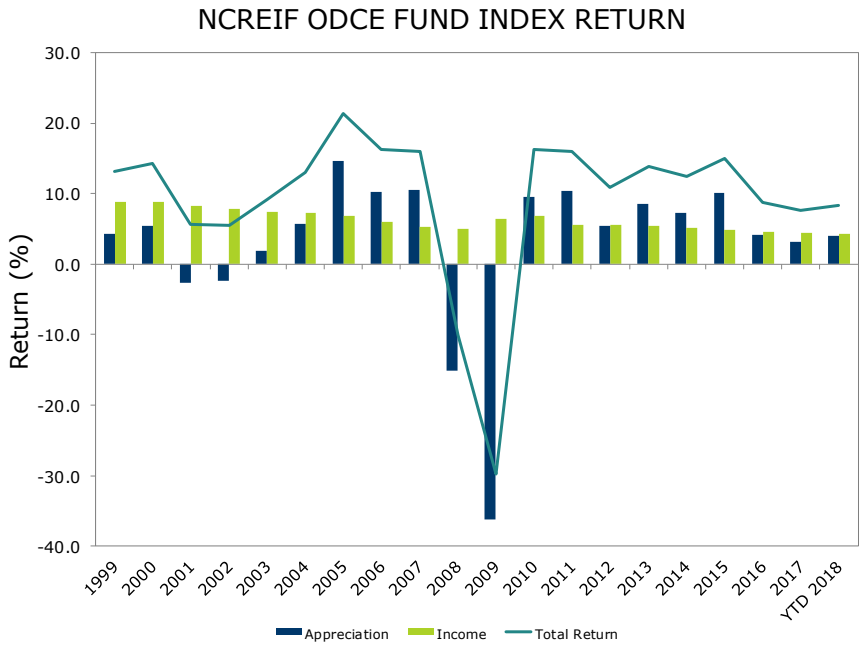
REAL ASSETS

AS OF DECEMBER 31, 2018	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS U.S. TIPS	-0.4	-1.3	-1.3	2.1	1.7	3.6
BLOOMBERG COMMODITY INDEX	-9.4	-11.2	-11.2	0.3	-8.8	-3.8
WILSHIRE GLOBAL RESI INDEX	-6.1	-5.4	-5.4	3.3	6.1	11.6
NCREIF ODCE FUND INDEX	1.8	8.3	8.3	8.2	10.4	7.0
NCREIF TIMBERLAND INDEX	1.0	3.4	3.4	3.2	5.0	3.8
ALERIAN MLP INDEX (OIL & GAS)	-17.3	-12.4	-12.4	-1.1	-7.3	9.6





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

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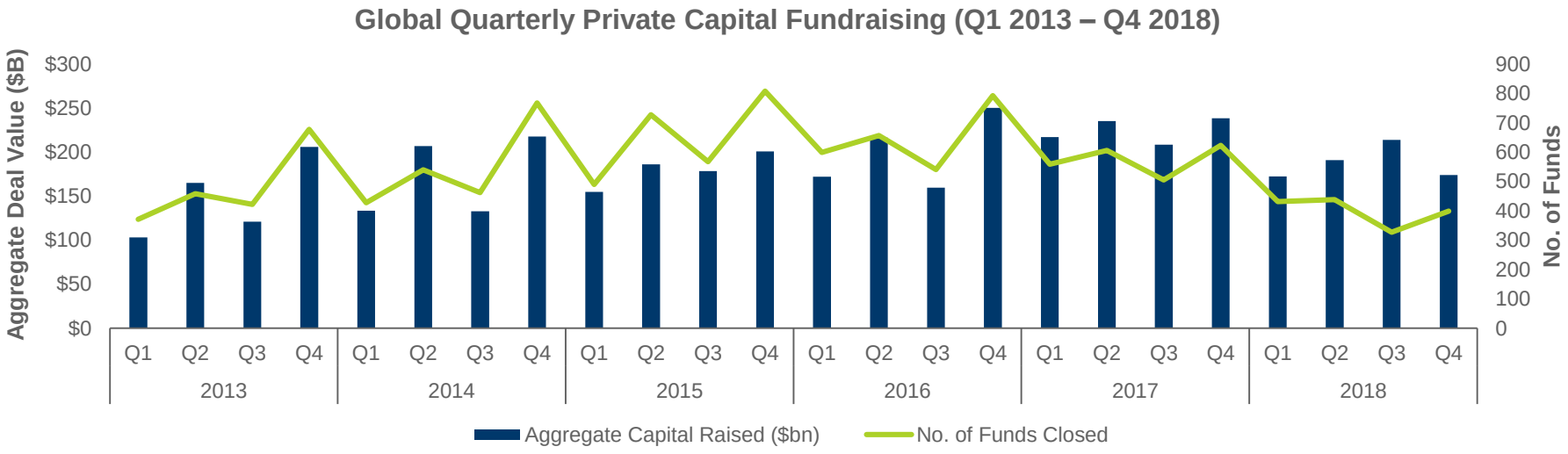
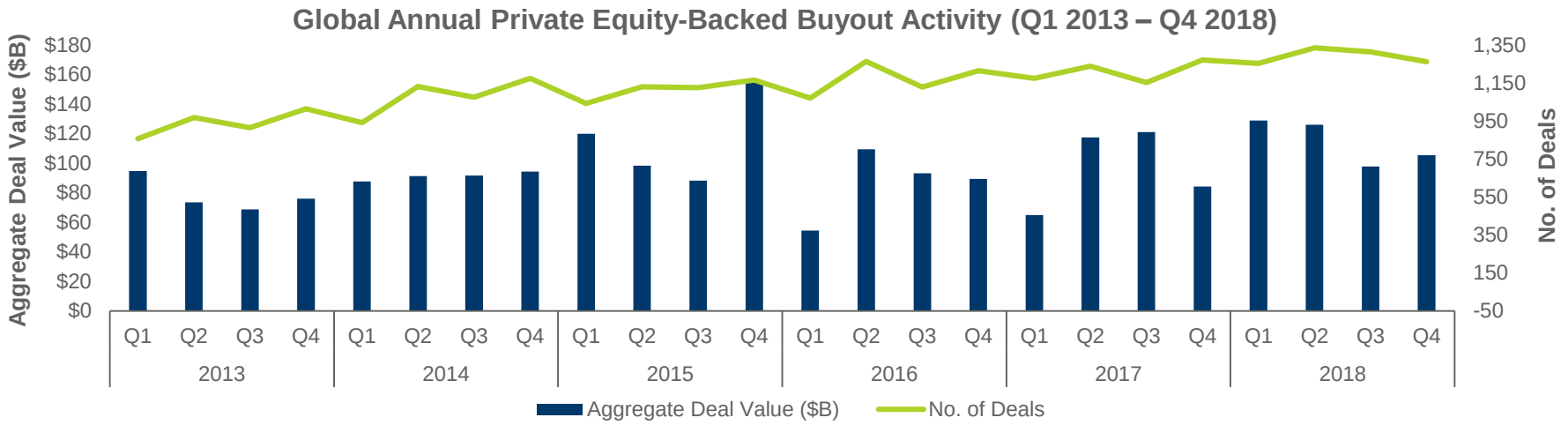
APPENDIX: PRIVATE MARKETS UPDATE

PRIVATE EQUITY – FUNDRAISING & INVESTMENT ACTIVITY





Source: Preqin, as of December 31, 2018.

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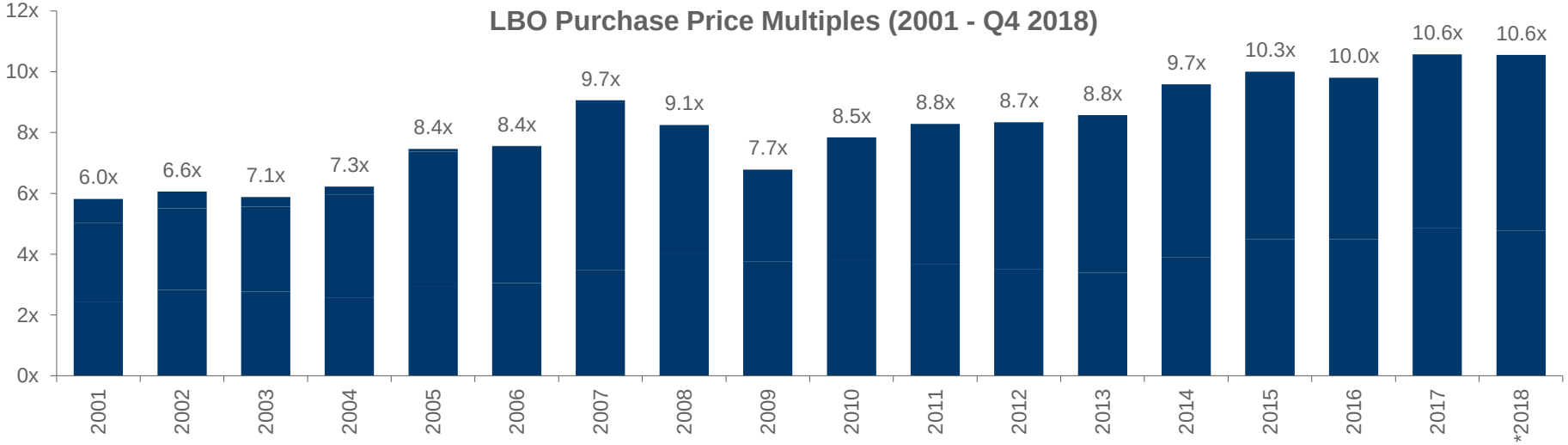
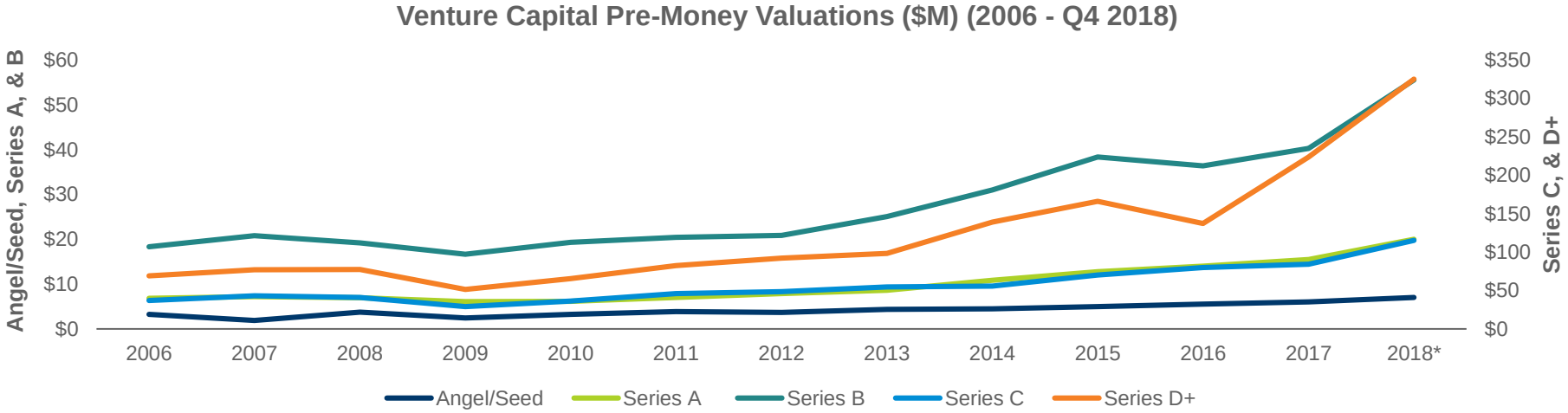
PRIVATE EQUITY – PRICING & VALUATIONS





Source: S&P LBO; PitchBook, *as of December 31, 2018.

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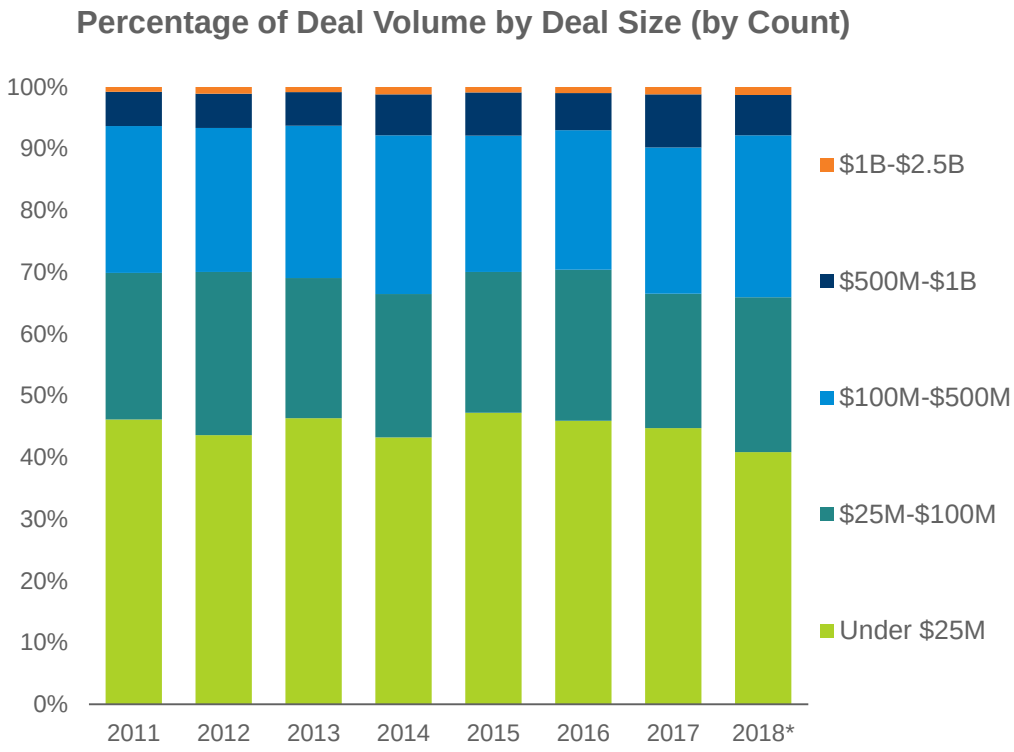
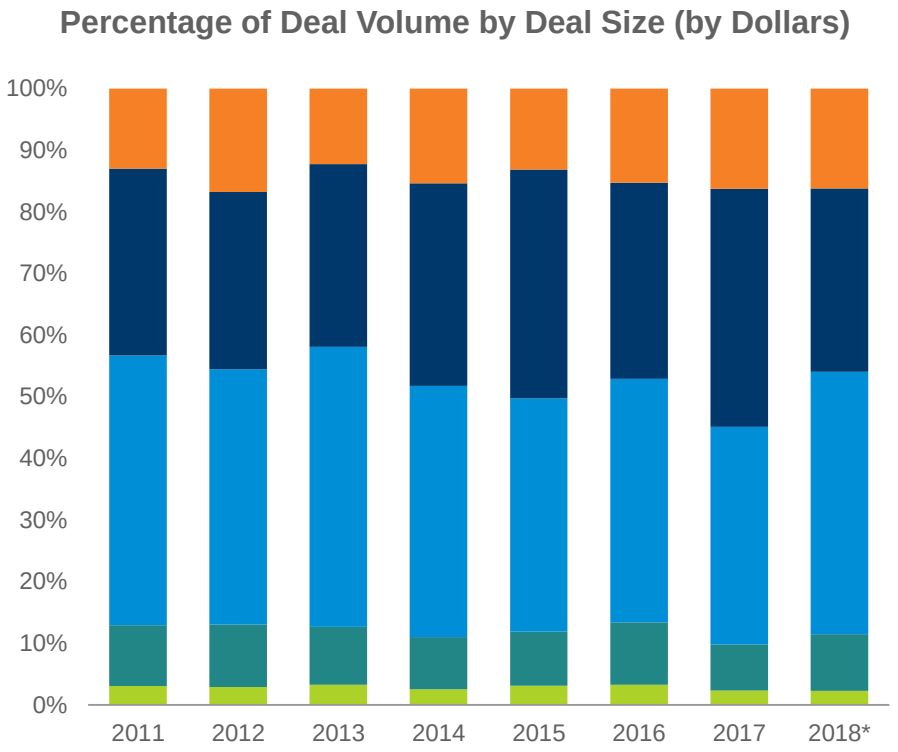
U.S. INVESTMENT ACTIVITY BY DEAL SIZE





- Deal volume continues to be dominated by lower middle market deals with investment sizes below $100 million through the fourth quarter of 2018
- However, deals with below $100 million check sizes comprised only 7% of all deal volume by amount of capital invested in the fourth quarter of 2018

Source: PitchBook, *as of December 31, 2018.

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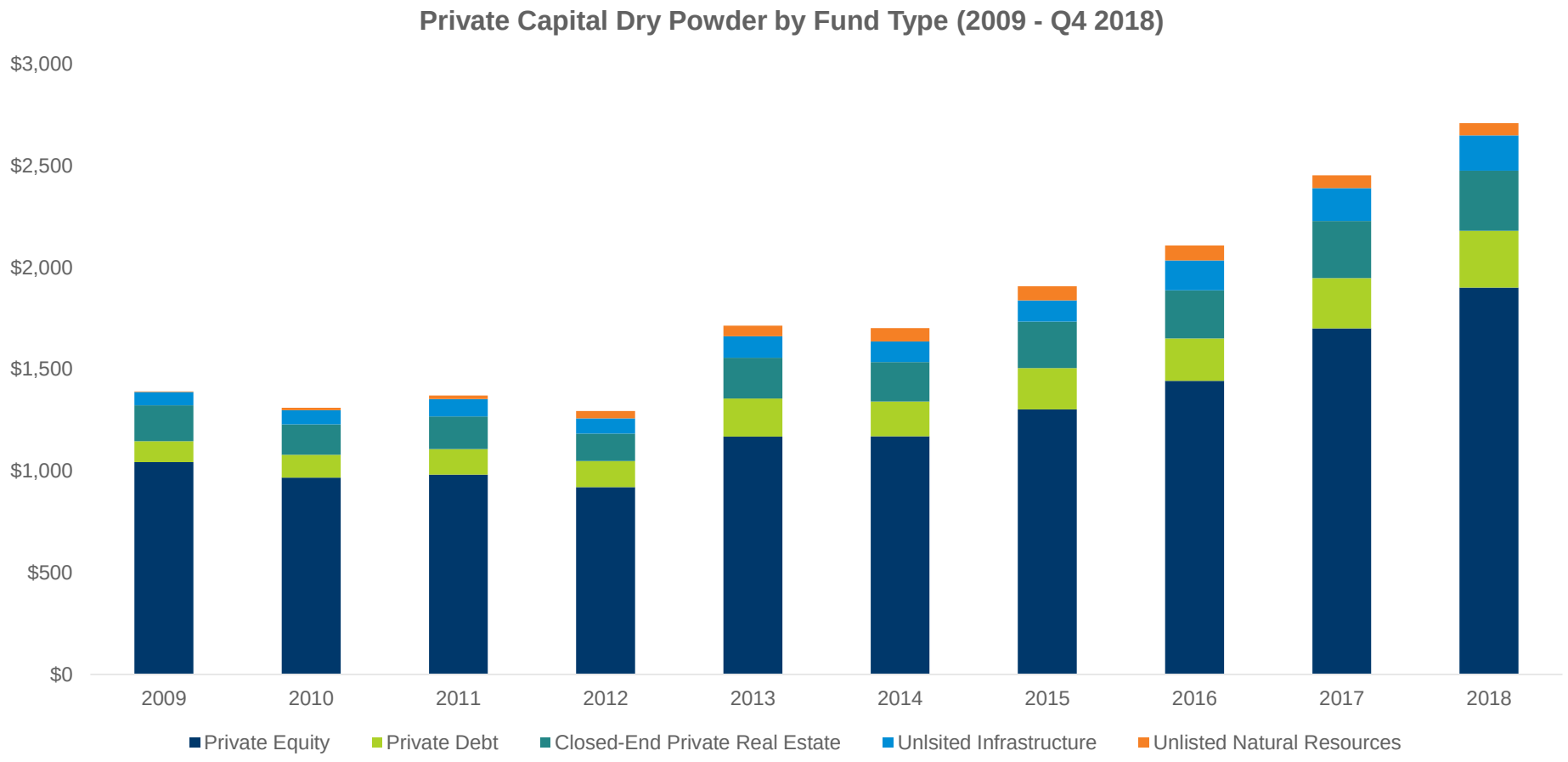
PRIVATE CAPITAL DRY POWDER



- Global private capital dry powder continues to increase, topping $2 trillion across all fund types
- Private equity comprises just under 70% of total dry powder in the market as of Q4 2018

Source: Preqin, as of December 31, 2018.

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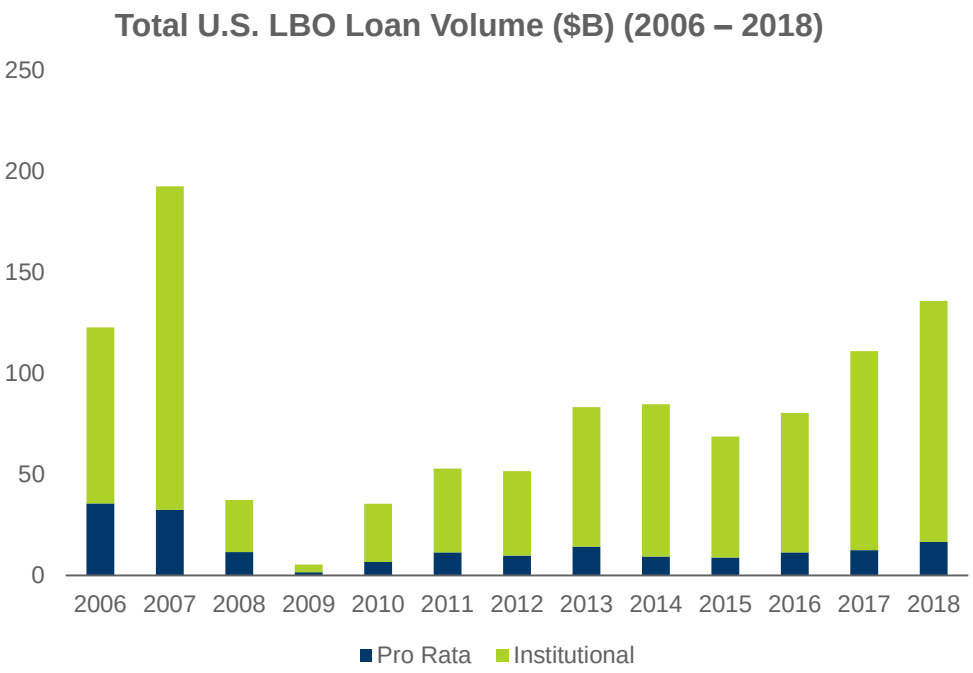
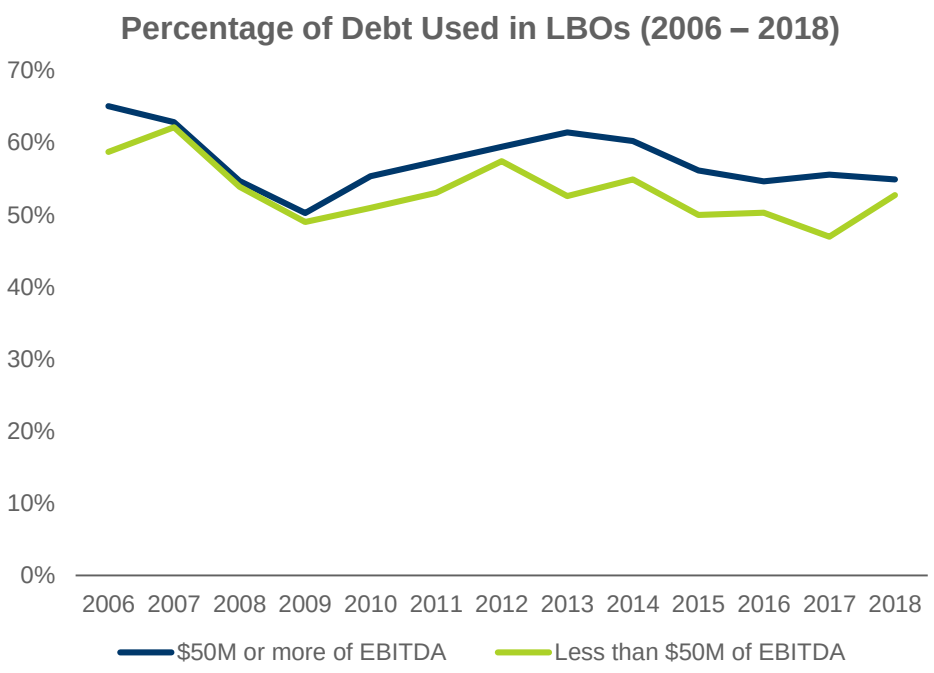
PRIVATE EQUITY - U.S. DEBT MARKETS





- Loan volume in 2018 increased by approximately $25 billion from the prior year and is on pace to once again increase year-over-year through the fourth quarter of 2018
- Availability of debt capital has driven up the percentage of debt used to finance leveraged buyouts of less than $50 million of EBITDA through the fourth quarter of 2018

Source: S&P LBO, as of December 31, 2018.

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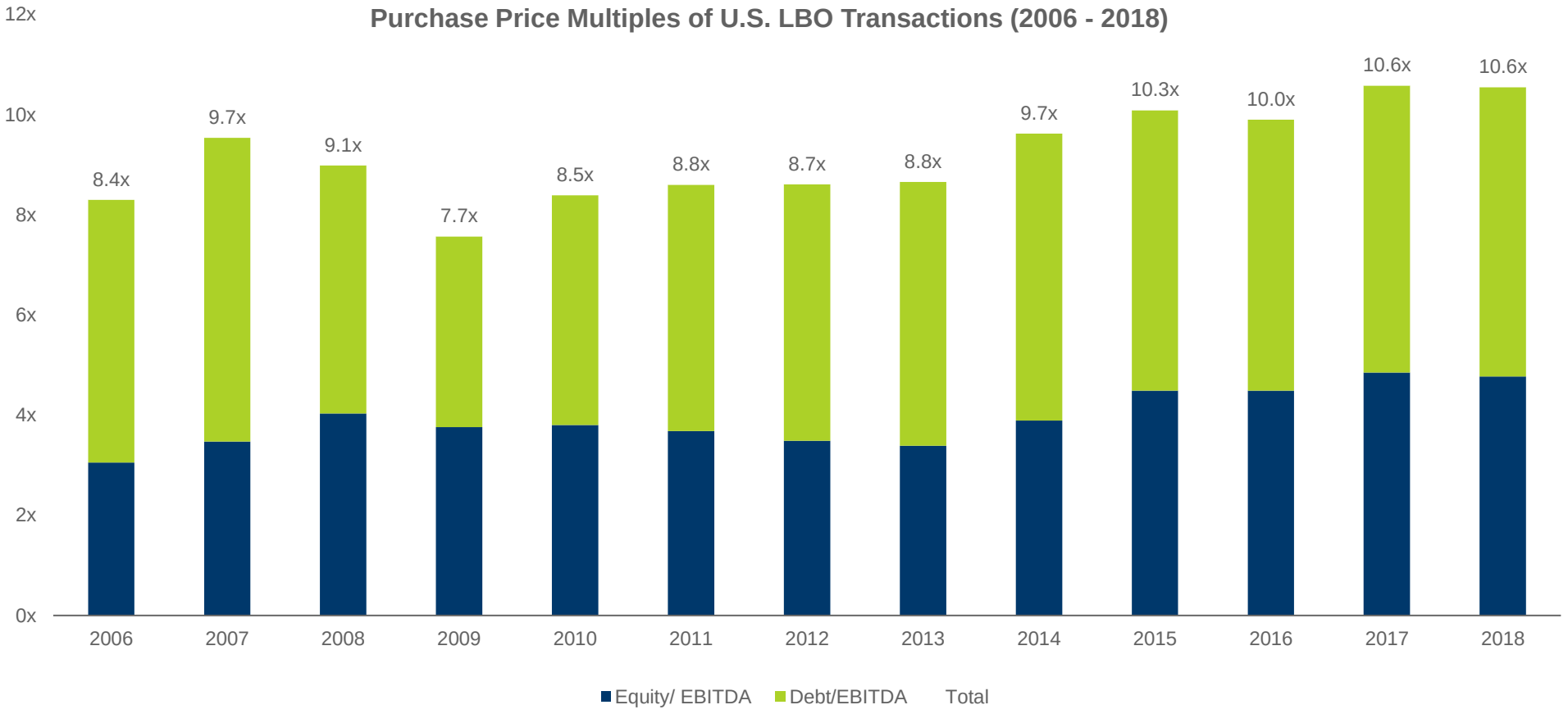
PRIVATE EQUITY - U.S. LBO PURCHASE PRICE MULTIPLES



- Due to the amount of debt that is readily available, purchase price multiples for U.S. LBOs have remained consistent through Q4 2018 relative to 2017 levels

Source: S&P LBO, as of December 31, 2018.

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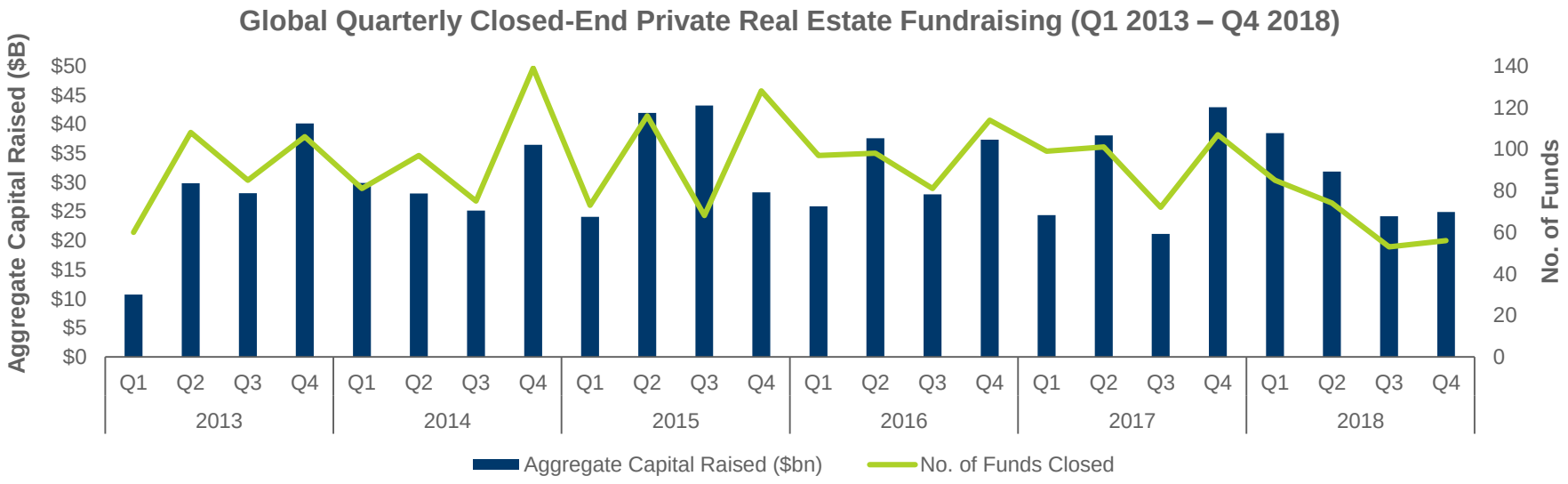
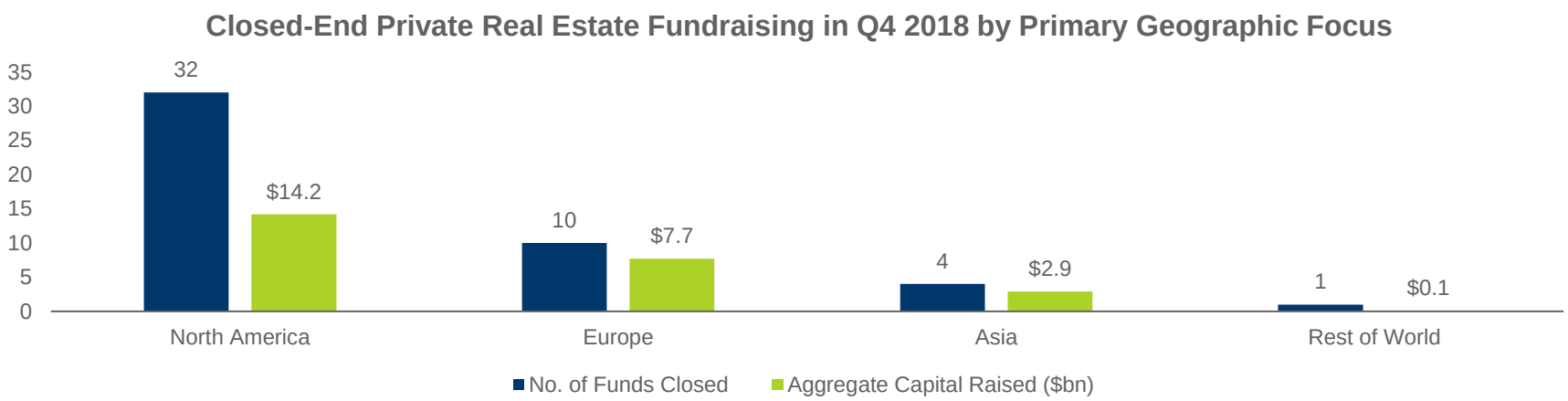
PRIVATE REAL ESTATE – FUNDRAISING ACTIVITY





Source: Preqin, as of December 31, 2018.

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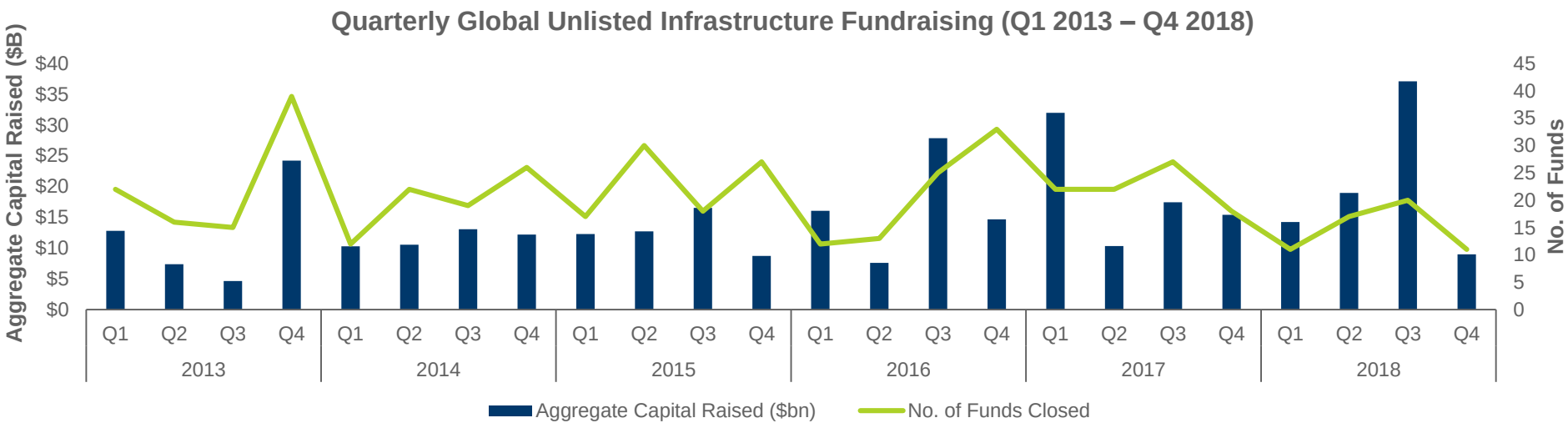
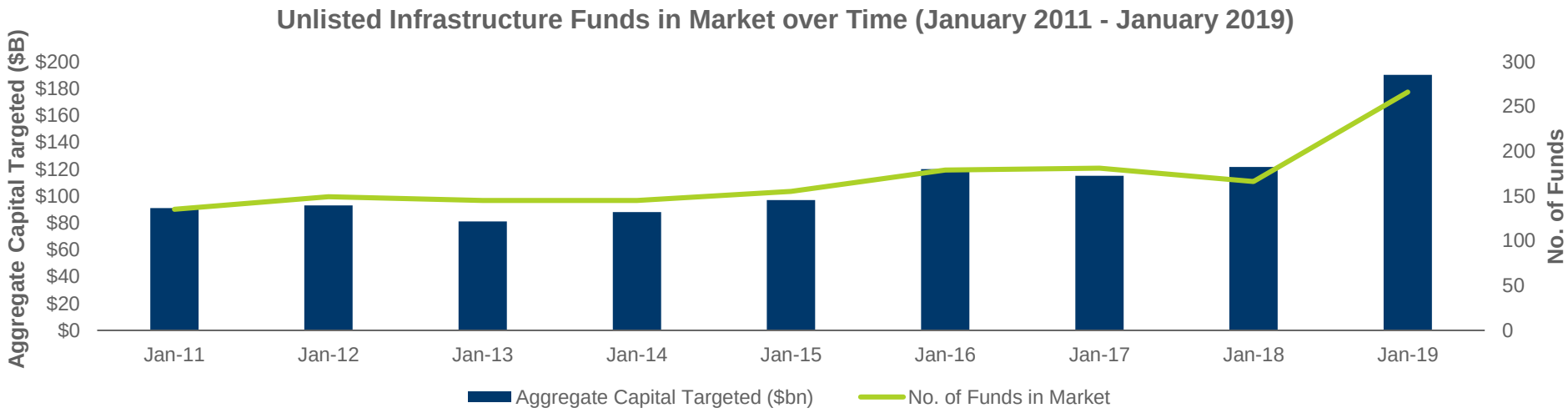
UNLISTED INFRASTRUCTURE – FUNDRAISING & INVESTMENT ACTIVITY





Source: Preqin, as of January 16, 2019.

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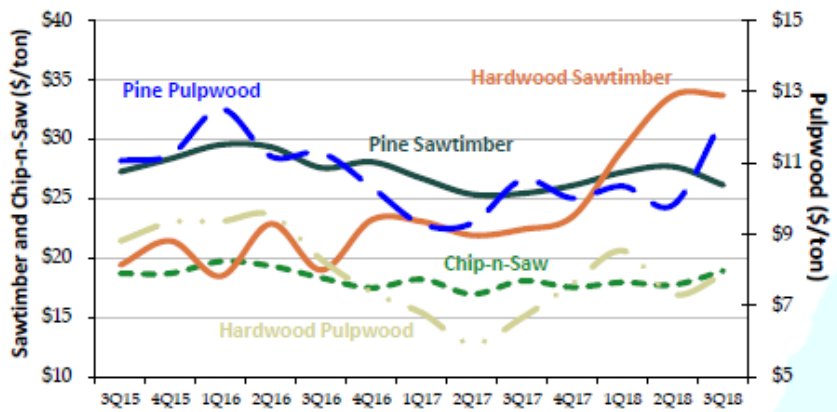
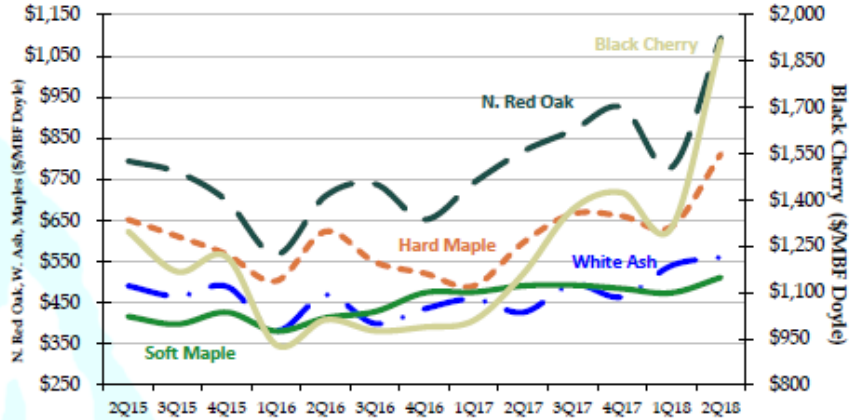
TIMBER

Southeastern Timber Prices



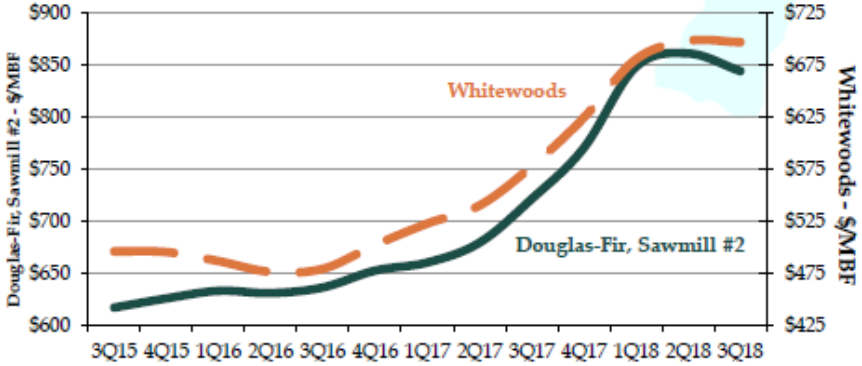
Source: Forest2Market®

Northeastern Hardwood Timber Prices



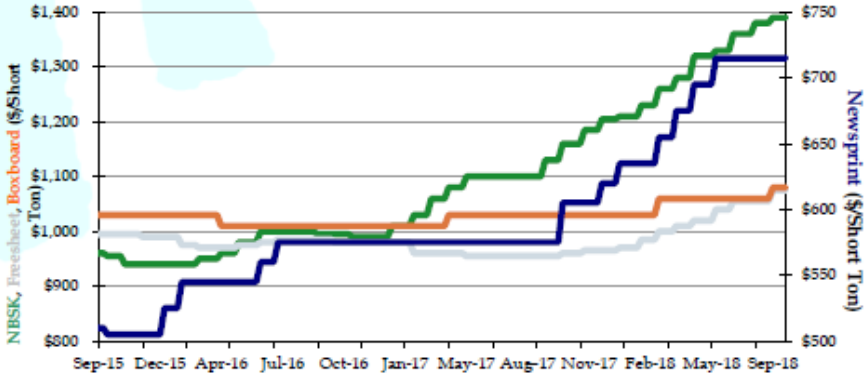
Source: Pennsylvania Woodlands Timber Market Report - Northwest Region

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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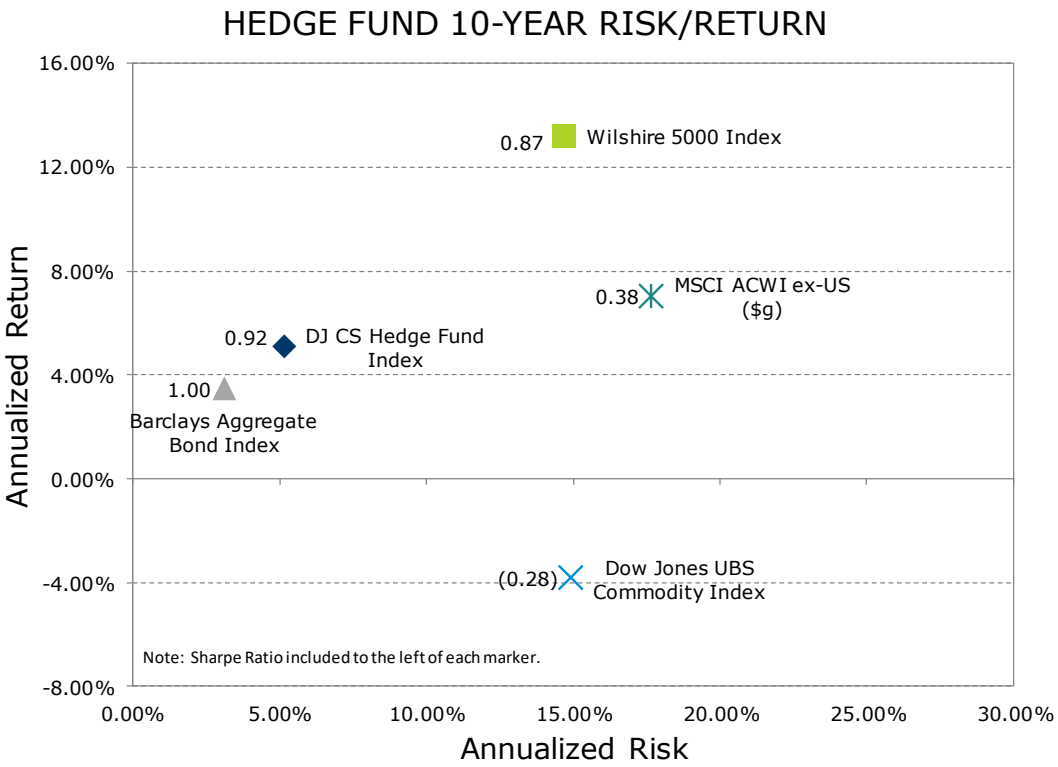
HEDGE FUND PERFORMANCE

AS OF DECEMBER 31, 2018	QTR	YTD	1 YR	3 YR	5 YR	10 YR
DJ CS HEDGE FUND INDEX	-4.3	-3.2	-3.2	1.6	1.7	5.1
EVENT DRIVEN	-6.2	-3.9	-3.9	1.6	0.0	4.6
GLOBAL MACRO	-1.7	-0.1	-0.1	1.9	1.8	4.8
LONG/SHORT EQUITY	-6.7	-4.6	-4.6	1.5	2.7	5.8
MULTI-STRATEGY	-3.7	-1.0	-1.0	3.3	4.0	7.6
WILSHIRE 5000	-14.3	-5.3	-5.3	9.1	8.1	13.2
MSCI ACWI EX-US ($G)	-11.4	-13.8	-13.8	5.0	1.1	7.1
BLOOMBERG BARCLAYS AGGREGATE	1.6	0.0	0.0	2.1	2.5	3.5
DOW JONES UBS COMMODITY	-9.4	-11.2	-11.2	0.3	-8.8	-3.8



Data sources: Wilshire Compass

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