

Guide to Alternatives

1Q 2019

J.P. Morgan

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Prepared by:

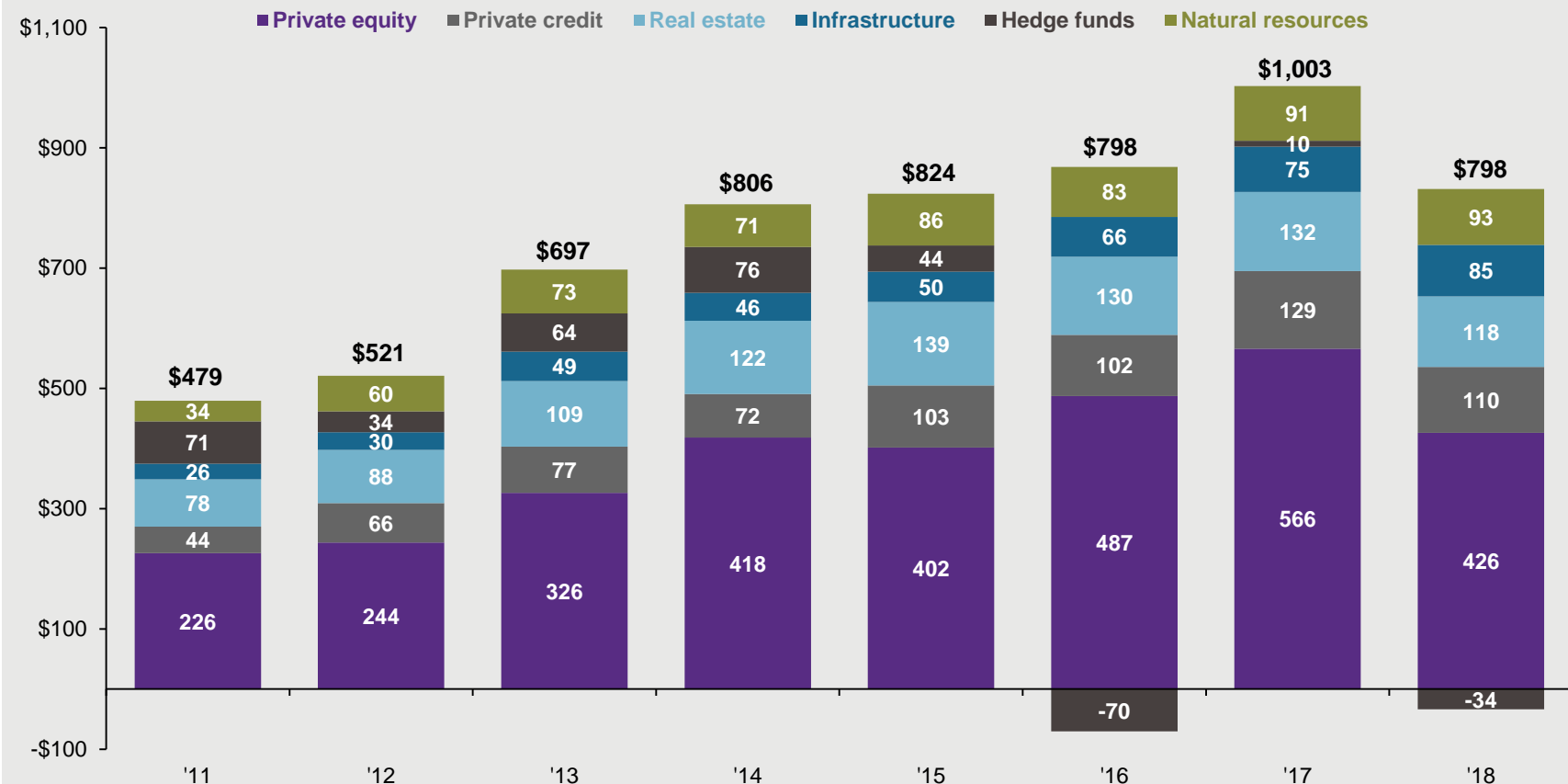
David Lebovitz, *Global Market Strategist*, Market Insights, J.P. Morgan Asset Management
Anita Sonawane, *Associate*, Alternatives Solutions Group, J.P. Morgan Asset Management

Alternatives fundraising

Alts in aggregate

Global private capital fundraising

Billions USD



Source: Preqin, HFRI, J.P. Morgan Asset Management.

Fundraising categories are provided by Preqin, and represent their estimate of annual capital raised in closed-end funds. Hedge fund fundraising numbers are represented by net flows and come from HFRI.

Data are as of December 31, 2018.

Public and private market correlations

Public and private market correlations

10-years, quarterly returns

		Global bonds	Global equities	U.S. core RE	Europe core RE	APAC core RE	Global infra.	U.S. direct lending	U.S. venture capital	U.S. private equity	Equity long/short	Relative value	Global macro
Financial assets	Global bonds	1.0											
	Global equities	0.3	1.0										
Global real estate	U.S. core RE	-0.1	0.1	1.0									
	Europe core RE	0.0	0.3	0.6	1.0								
	APAC core RE	0.1	0.4	0.8	0.8	1.0							
Other real assets	Global infrastructure	-0.1	0.0	0.5	0.4	0.5	1.0						
Private markets	U.S. direct lending	-0.1	0.7	0.4	0.4	0.4	0.3	1.0					
	U.S. venture capital	-0.2	0.5	0.6	0.5	0.5	0.4	0.6	1.0				
	U.S. private equity	0.0	0.8	0.4	0.6	0.6	0.3	0.9	0.7	1.0			
Hedge funds	Equity long/short	0.2	1.0	0.0	0.4	0.3	0.0	0.7	0.5	0.8	1.0		
	Relative value	0.1	0.8	0.0	0.3	0.2	0.0	0.8	0.4	0.8	0.9	1.0	
	Global macro	0.4	0.4	-0.1	0.3	0.1	-0.1	0.0	0.0	0.1	0.4	0.2	1.0

Source: MSCI, Bloomberg Barclays, NCREIF, Cliffwater, Burgiss, HFRI, J.P. Morgan Asset Management. RE – real estate. Global equities: MSCI AC World Index. Global bonds: Bloomberg Barclays Global Aggregate Index. U.S. core real estate: NCREIF Property Index – Open End Diversified Core Equity component. Europe core real estate: IPD Global Property Fund Index – Continental Europe. Asia Pacific (APAC) core real estate: IPD Global Property Fund Index – Asia-Pacific. Global infrastructure (infra.): MSCI Global Quarterly Infrastructure Asset Index (equal-weighted blend). U.S. direct lending: Cliffwater Direct Lending Index. U.S. private equity: Cambridge Associates U.S. Private Equity Index. U.S. venture capital: Cambridge Associates U.S. Venture Capital Index. Hedge fund indices include equity long/short, relative value, and global macro and are all from HFRI. All correlation coefficients are calculated based on quarterly total return data for the period 9/30/08 –9/30/18. Returns are denominated in USD.

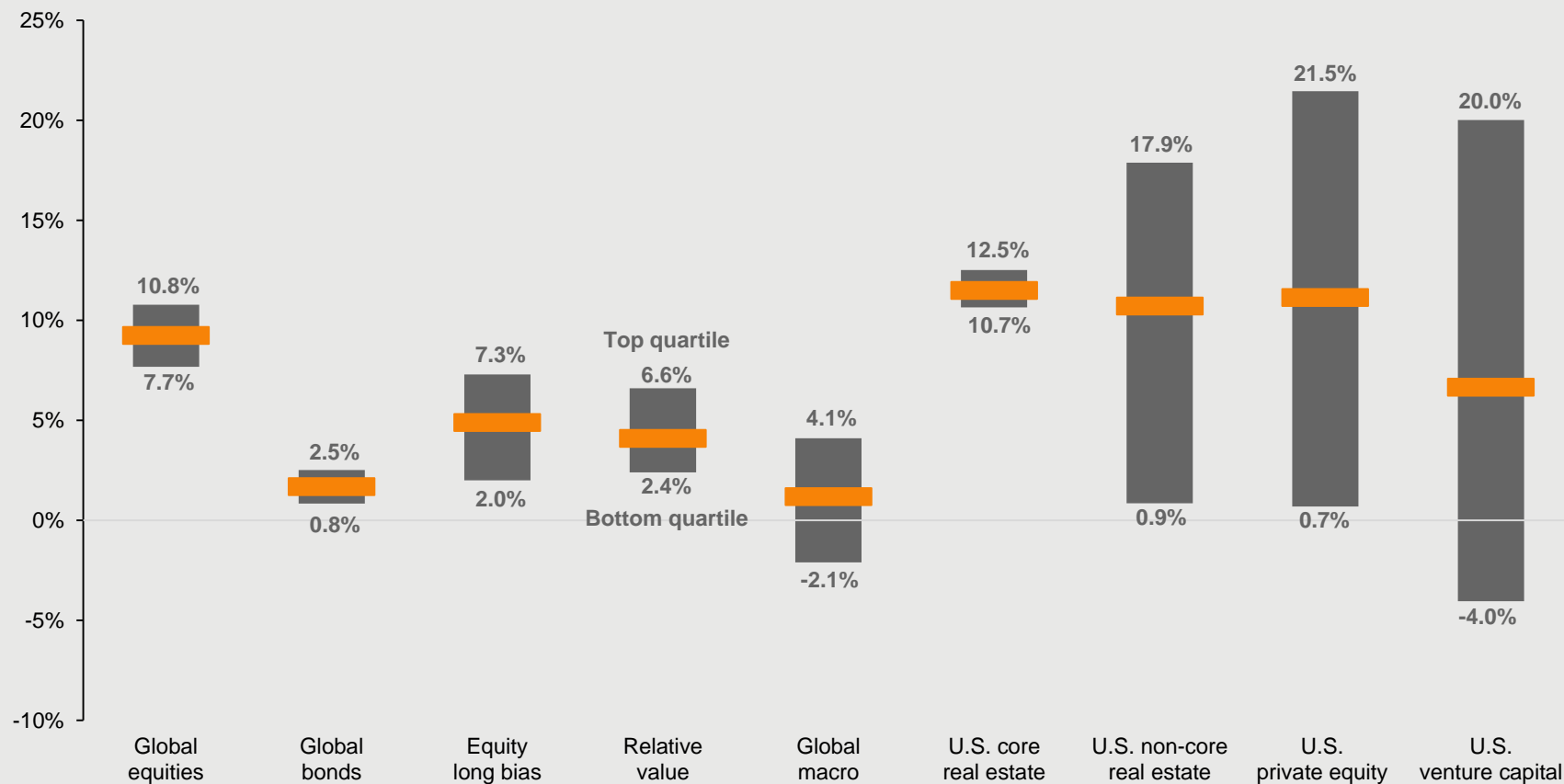
Data are as of December 31, 2018.

Alternatives and manager selection

Alts in aggregate

Private and public manager dispersion

Based on returns from 2013 – 2018



Sources: Lipper, NCREIF, Cambridge Associates, HFRI, J.P. Morgan Asset Management.

Global equities (large cap) and global bonds dispersion are based on the world large stock and world bond categories, respectively. Manager dispersion is based on: 2013 – 2018 annual returns for global equities, global bonds, U.S. core real estate and hedge funds. U.S. non-core real estate, U.S. private equity and U.S. venture capital are represented by the 5-year horizon internal rate of return (IRR).

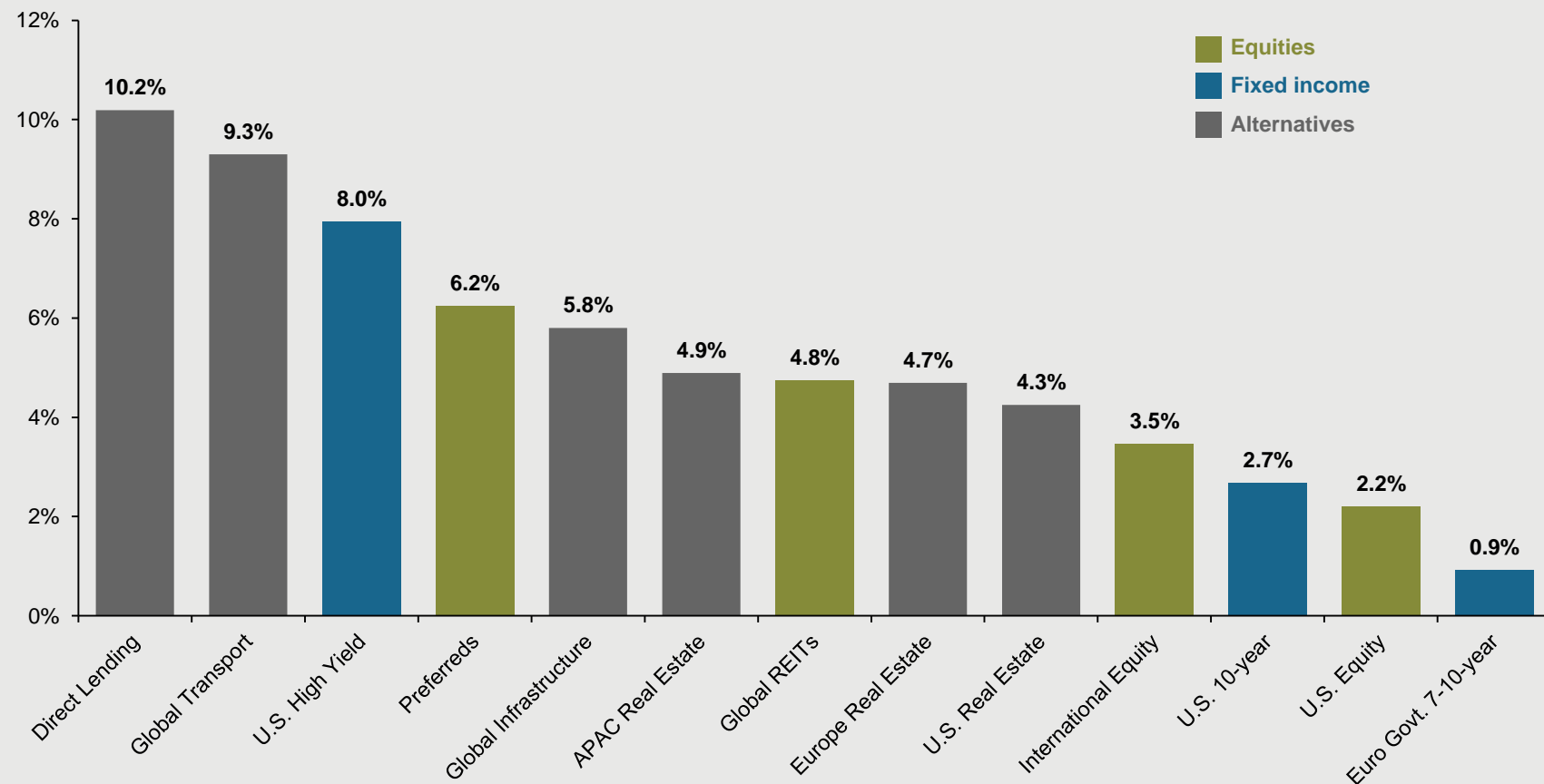
Data as of December 31, 2018.

Yield alternatives

Alts in aggregate

Asset class yields

Percent

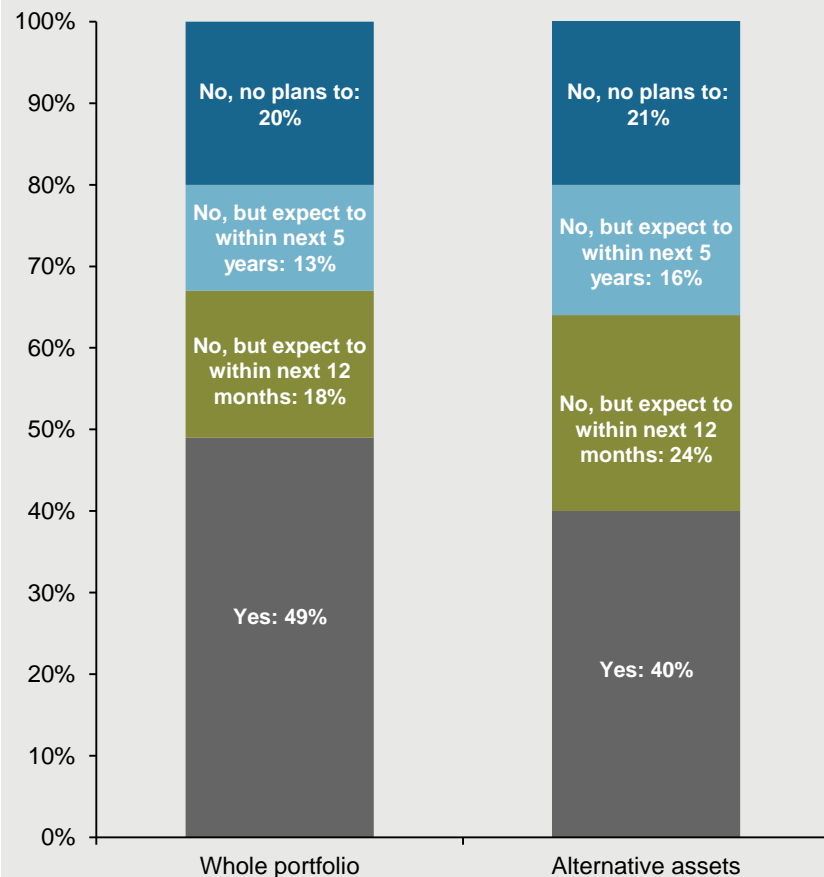


Source: BAML, Barclays, Bloomberg, Clarkson, Cliffwater, Drewry Maritime Consultants, Federal Reserve, FTSE, MSCI, NCREIF, FactSet, J.P. Morgan Asset Management. Yields are as of 12/31/18, except Global Transport, Global Infrastructure, EMEA, APAC and U.S. Real Estate (9/30/18). Global Transport: Levered yields for transport assets calculated as the difference between charter rates (rental income), operating expenses, debt amortization and interest expenses, as a percentage of equity value. Yields for each of the sub-vessel types above are calculated and respective weightings are applied to arrive at the current levered yields for Global Transport; Preferreds: BAML Hybrid Preferred Securities; U.S. High Yield: Bloomberg US Aggregate Corporate High Yield; Global Infrastructure: MSCI Global Infrastructure Asset Index-Low risk; U.S. Real Estate: NCREIF-ODCE Index; Global REITs: FTSE NAREIT Global REITs; International Equity: MSCI AC World ex-U.S.; U.S. 10-year: 10-year U.S. Treasury yield; U.S. Equity: MSCI USA, Europe core real estate: IPD Global Property Fund Index – Continental Europe. Asia Pacific (APAC) core real estate: IPD Global Property Fund Index – Asia-Pacific. Euro Govt. 7-10-year: Bloomberg Barclays Euro Aggregate Government – Treasury (7-10Y). Data are as of December 31, 2018.

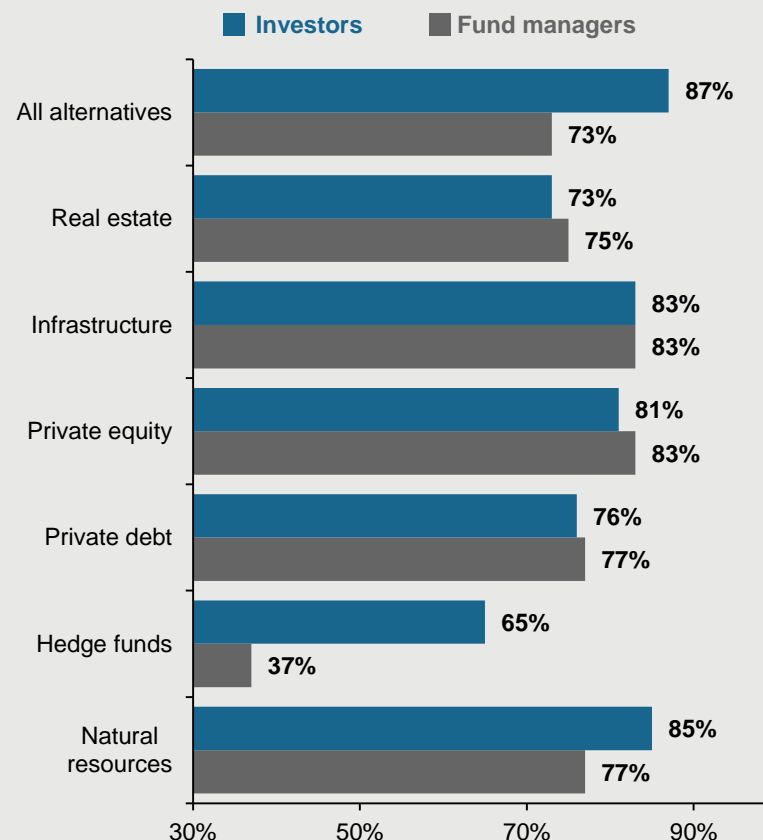
Alternatives and ESG

Alts in aggregate

Fund managers with ESG policy



Percent of managers who think ESG will become more important in the next 5 years



Source: Preqin Fund Manager Survey June 2018, J.P. Morgan Asset Management.

Fund survey covered managers across the globe. Environmental, social and governance (ESG). Forecasts, projections and other forward looking statements are based upon current beliefs and expectations. They are for illustrative purposes only and serve as an indication of what may occur. Given the inherent uncertainties and risks associated with forecasts, projections and other forward statements, actual events, results or performance may differ materially from those reflected or contemplated.

Data are as of December 31, 2018.

Global real estate fundraising

Real estate

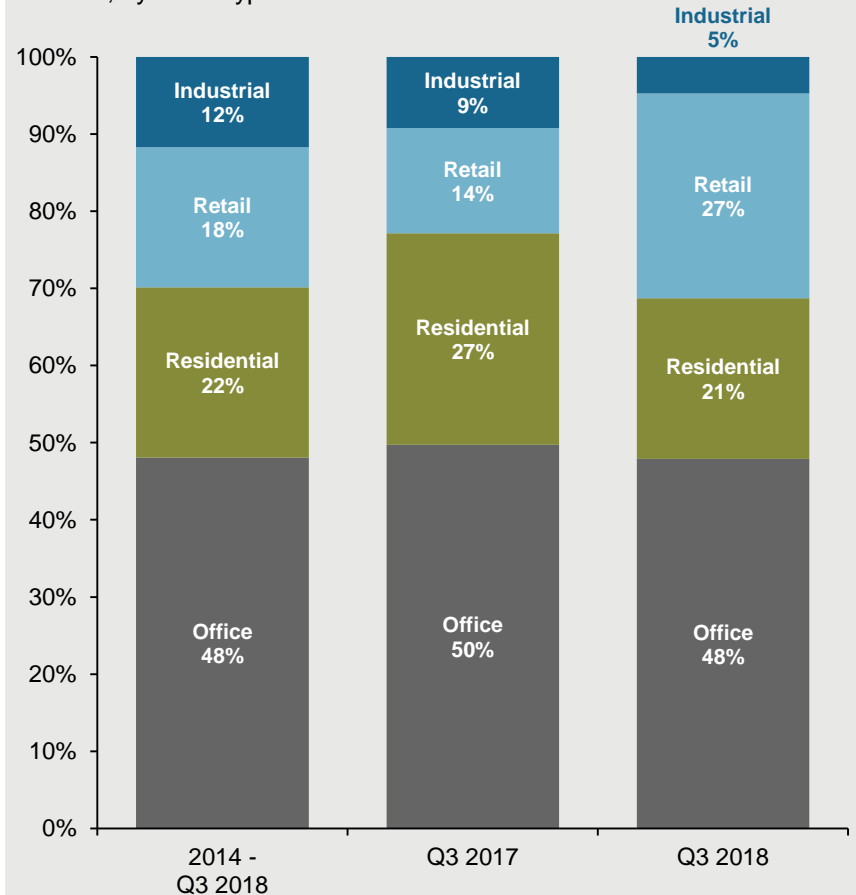
Global real estate fundraising

Aggregate capital raised, billions USD



Real estate acquisitions

Percent, by asset type



Source: Preqin, J.P. Morgan Asset Management.

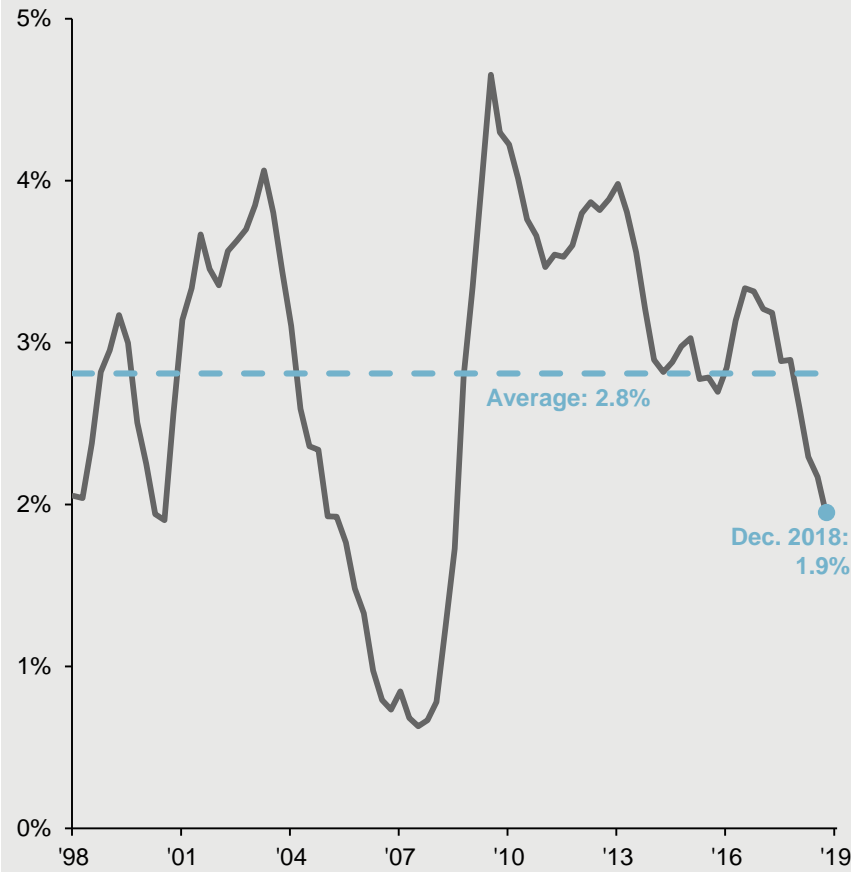
Fundraising and acquisition activity is that of closed-end real estate funds.

Data are as of December 31, 2018.

U.S. real estate dynamics

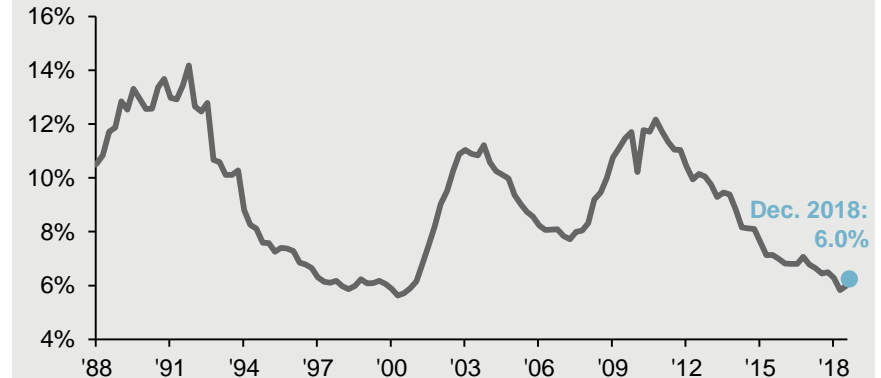
U.S. real estate cap rate spreads

Transactions based, spread to 10y UST, 4-quarter rolling average



U.S. vacancy rates

Percent



U.S. real estate construction costs

PPI construction materials, year-over-year % change



Source: NCREIF, Federal Reserve, BLS, J.P. Morgan Asset Management.

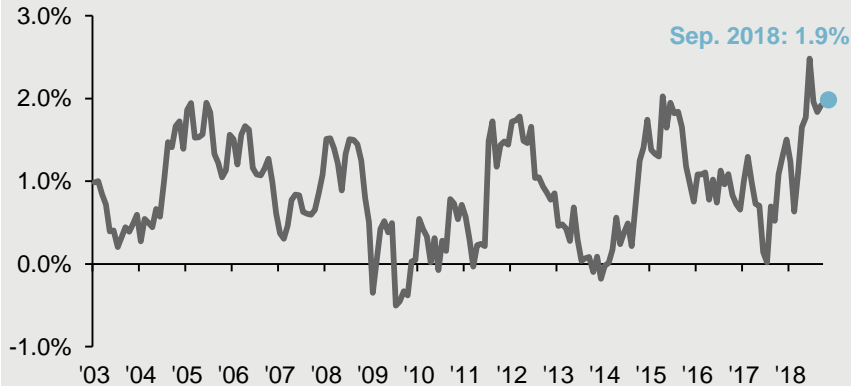
The cap rate, which is computed as the net operating income over sales price, is the rate of return on a real estate investment property.

Data are as of December 31, 2018.

U.S. real estate: Residential and retail

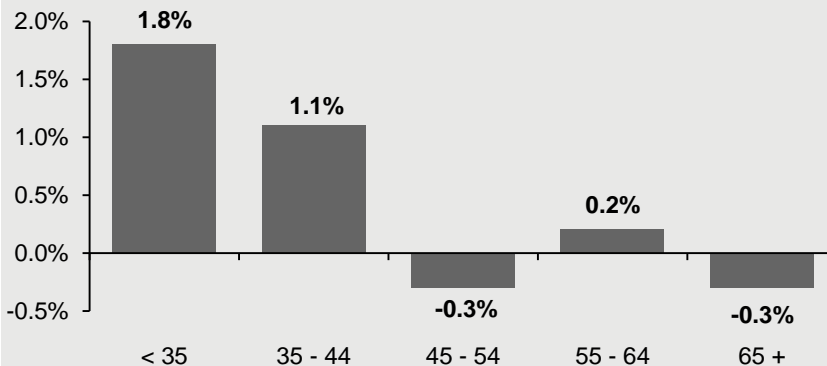
Household formation

Year-over-year % change



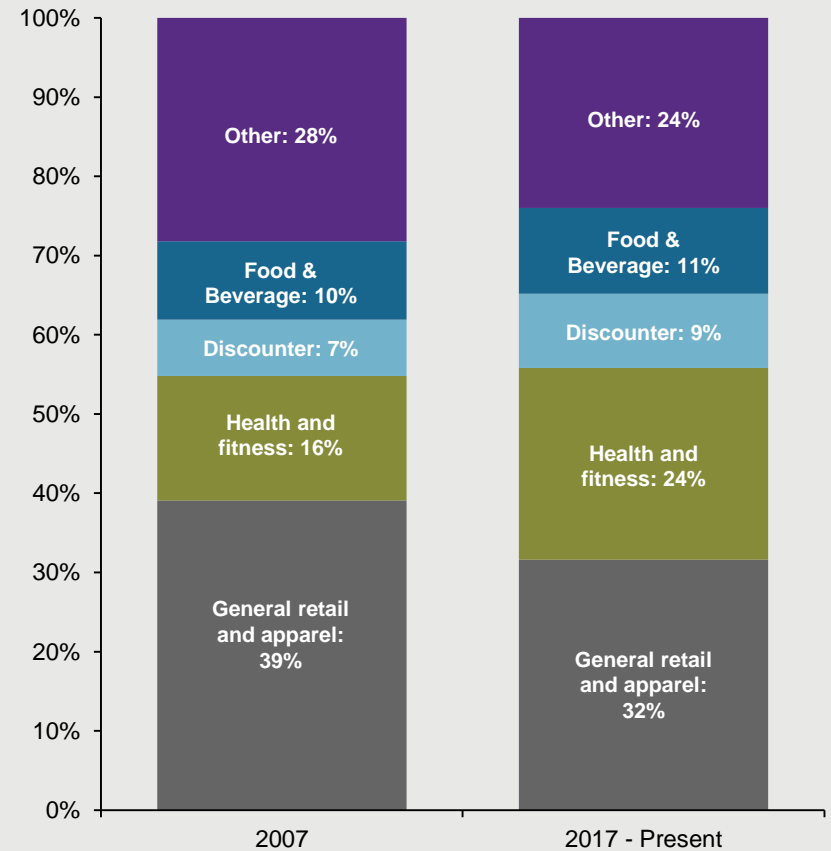
Homeownership rate by age of householder

Change since 2015



Retail leasing activity

Share of square footage leased by retailer type

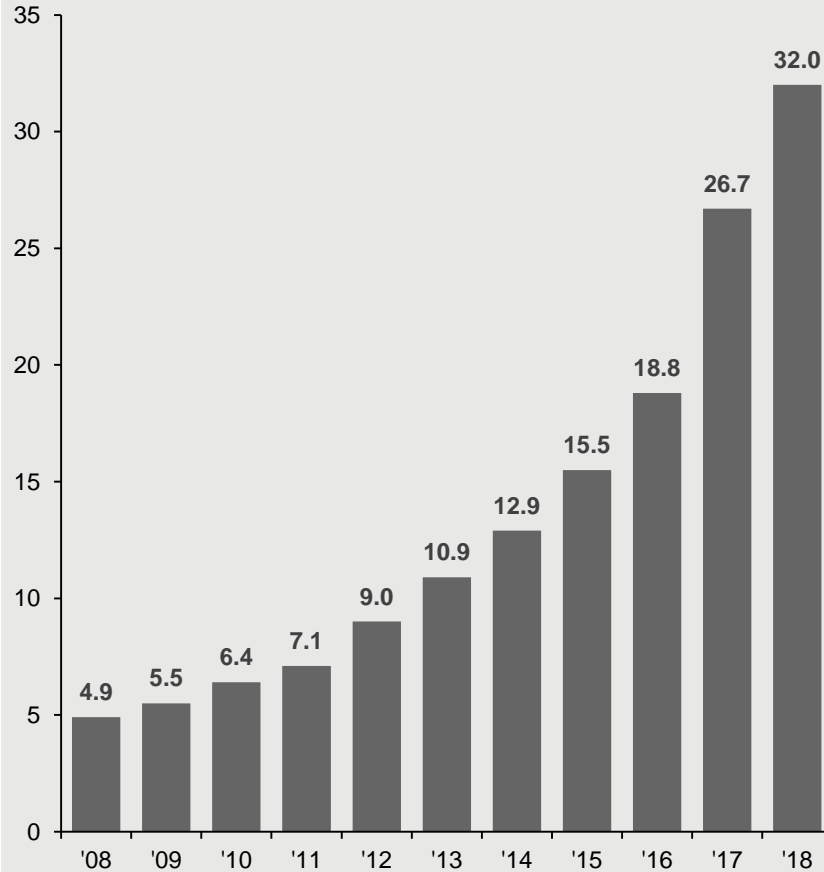


Source: Census Bureau, CoStar, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

U.S. real estate: Office

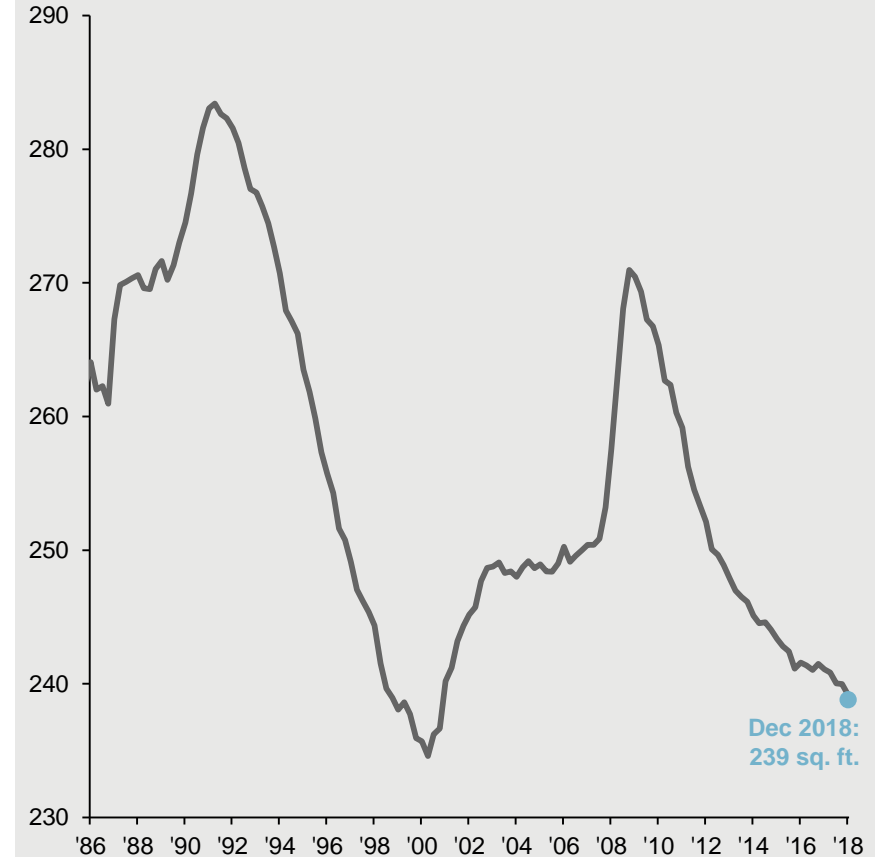
Coworking space

Millions of square feet



Total occupied office square feet per worker

Square feet



Source: CoStar, CBRE, J.P. Morgan Asset Management
Data are as of December 31, 2018.

REIT sector returns

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2009-2018	
											Ann.	Vol.
Regional Malls	63.0%	47.0%	35.2%	31.3%	10.5%	46.2%	40.6%	30.7%	24.9%	11.4%	Mfgd. Homes	Regional Malls
Mfgd. Homes	40.9%	34.6%	22.0%	28.2%	9.5%	39.6%	25.6%	14.2%	20.6%	7.6%	Self Storage	Industrial
Office	35.5%	30.8%	20.4%	25.0%	7.4%	33.3%	16.5%	13.2%	8.7%	3.7%	Regional Malls	Shopping Centers
Apartments	30.4%	29.3%	15.1%	20.4%	5.6%	32.6%	4.7%	8.6%	5.2%	2.9%	Apartments	Office
All Equity	28.0%	27.9%	13.6%	19.9%	5.0%	31.4%	4.2%	6.4%	3.7%	-2.5%	Industrial	All Equity
Health Care	24.6%	27.0%	8.3%	19.7%	2.9%	30.0%	2.8%	3.7%	3.7%	-4.0%	All Equity	Apartments
Industrial	12.2%	19.2%	-0.7%	14.2%	-1.0%	28.0%	2.6%	2.9%	0.9%	-7.0%	Health Care	Health Care
Self Storage	8.4%	18.9%	-0.8%	7.1%	-6.2%	25.9%	0.3%	-5.2%	-2.7%	-14.5%	Office	Self Storage
Shopping Centers	-1.7%	18.4%	-5.2%	6.9%	-7.1%	21.0%	-7.2%	-8.1%	-11.4%	-14.5%	Shopping Centers	Mfgd. Homes

Sources: FTSE NAREIT, FactSet, J.P. Morgan Asset Management.

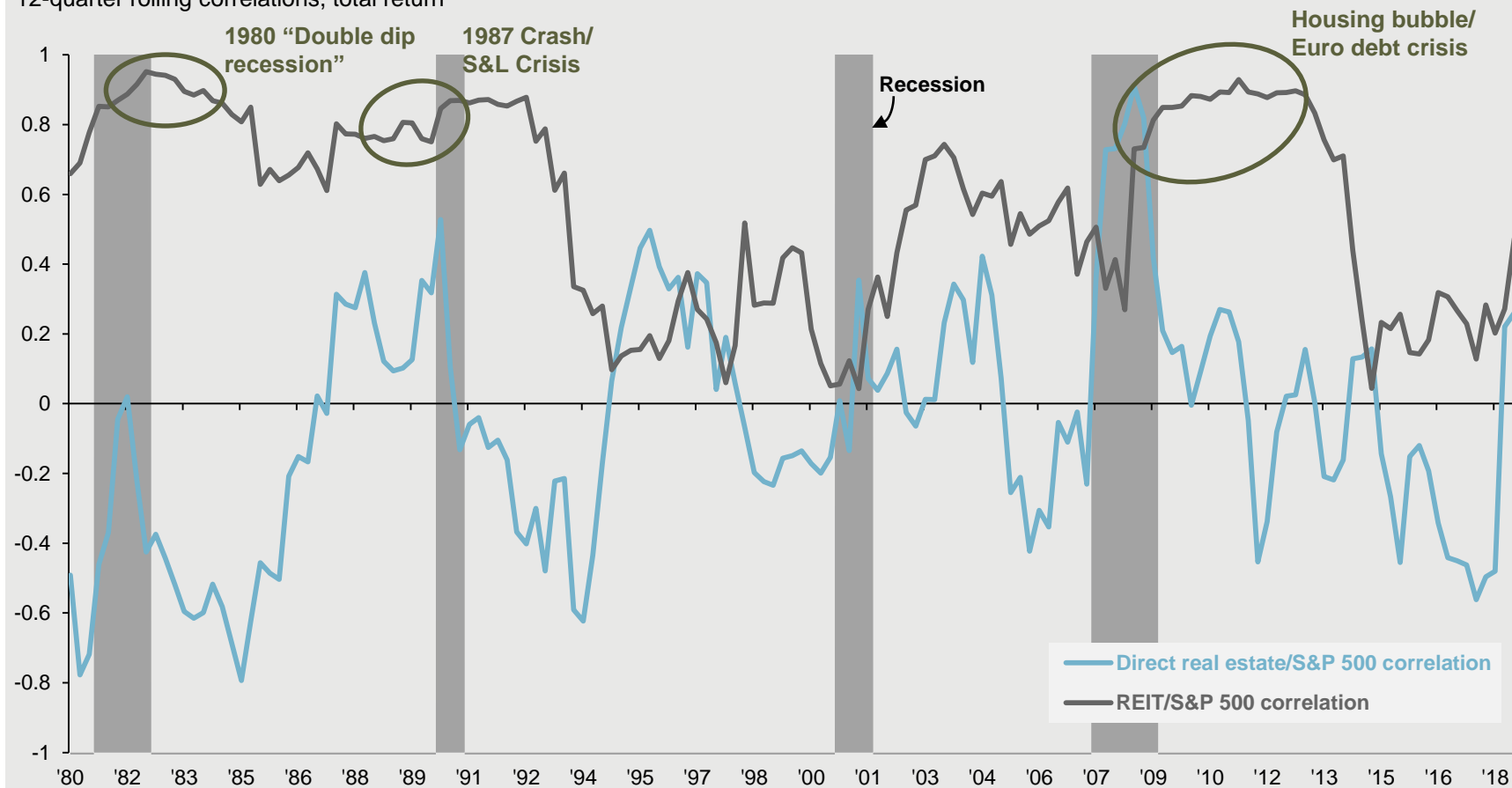
All indices are from FTSE NAREIT. Mfg. Homes represents manufactured homes.

Data are as of December 31, 2018.

U.S. REITs and real estate

U.S. REITs, real estate, and equities

12-quarter rolling correlations, total return



Source: NAREIT, NCREIF, Standard & Poor's, FactSet, J.P. Morgan Asset Management.

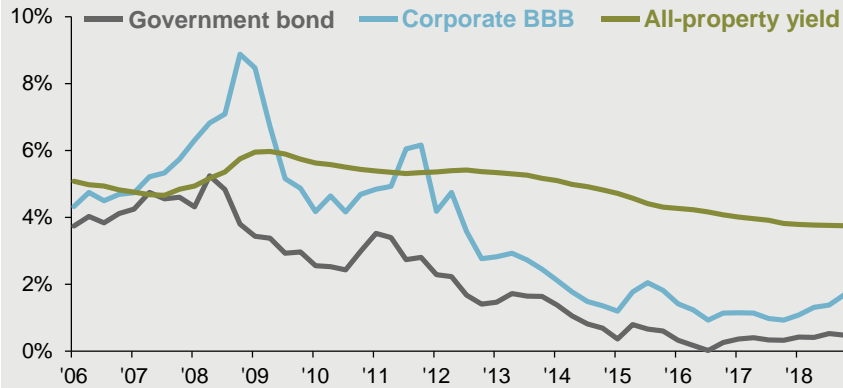
Real estate investment trusts (REITs). Indices do not include fees or operating expenses and are not available for actual investment. Past performance is not necessarily a reliable indicator for current and future performance.

Data are as of December 31, 2018.

Global real estate pricing

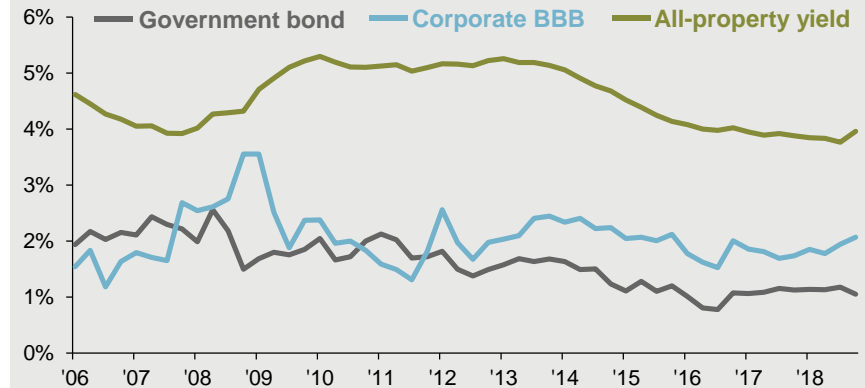
Europe real estate property yield spreads

Property yields vs. government bonds vs. BBB-rated bonds



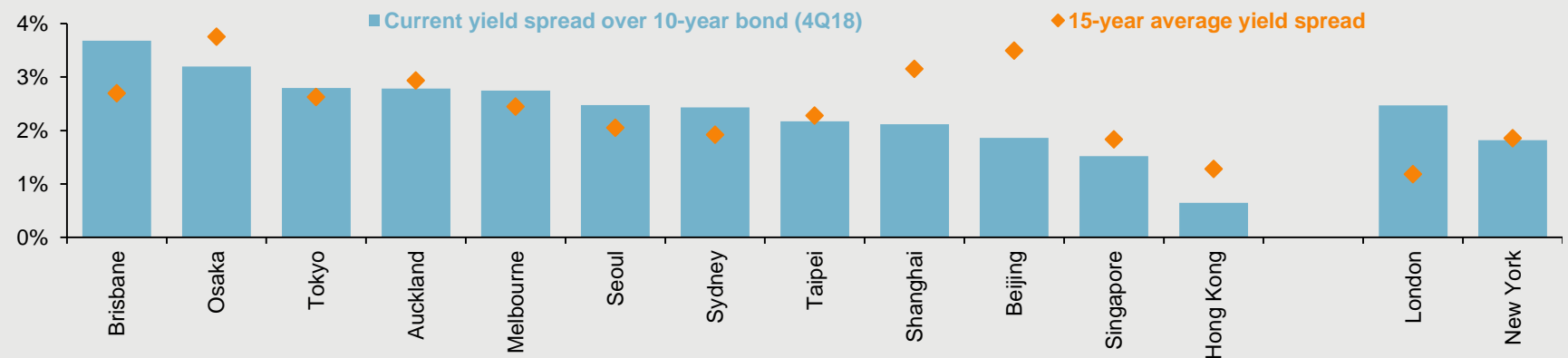
APAC real estate property yield spreads

Property yields vs. government bonds vs. BBB-rated bonds



Global cities yields

Grade A office yields, percent



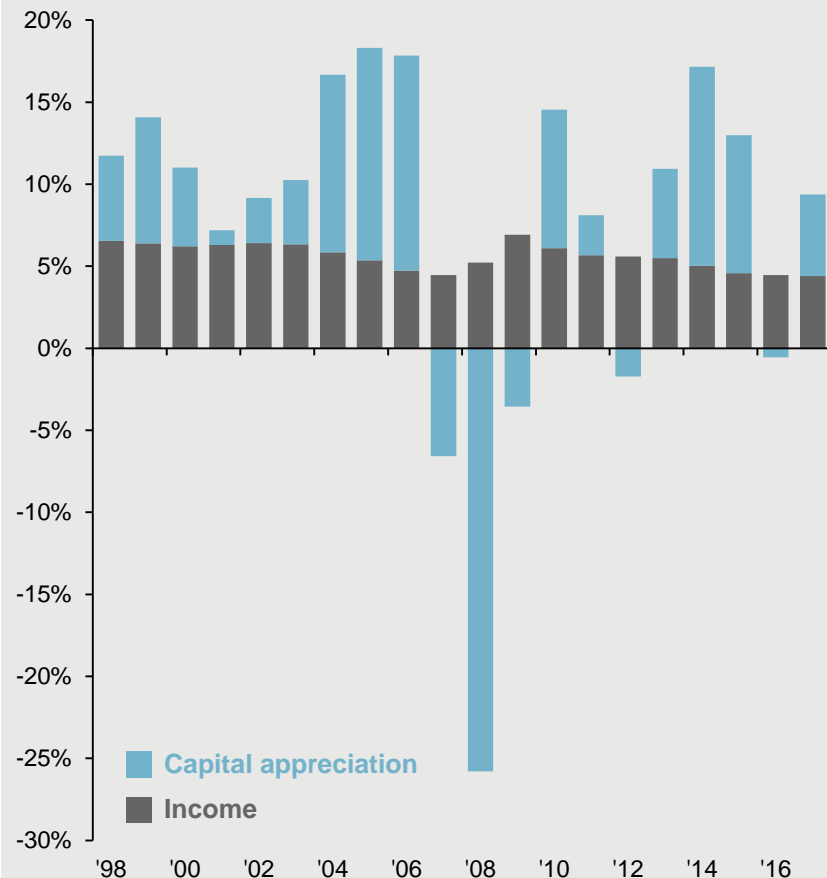
Sources: Bloomberg, NCREIF, CBRE, Jones Lang LaSalle, J.P. Morgan Asset Management. Bottom chart: Based on Grade A office yields, which are all broker-estimated with the exception of New York's office yield (derived from NCREIF). Grade A refers to the highest quality commercial real estate properties.

Data are as of December 31, 2018.

Sources of European property returns

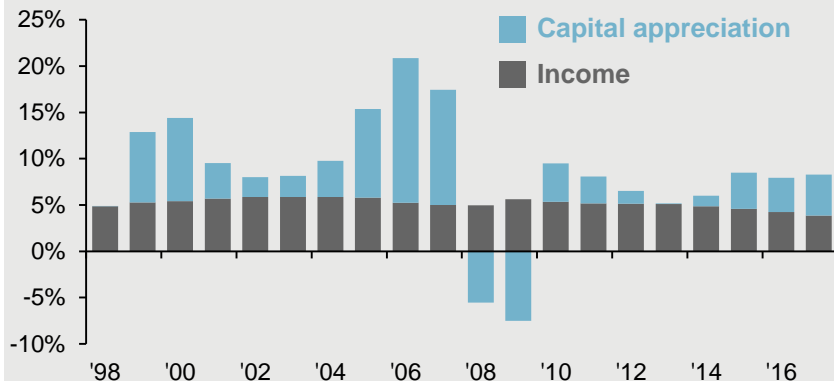
U.K. property returns

Annual returns from income and capital appreciation



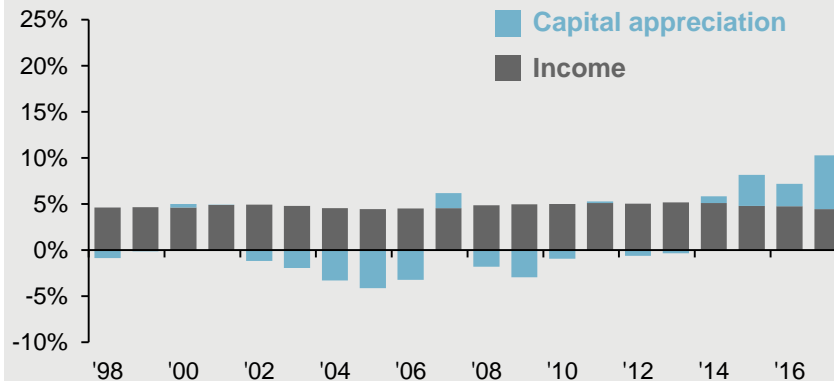
France property returns

Annual returns from income and capital appreciation



Germany property returns

Annual returns from income and capital appreciation



Sources: MSCI, J.P. Morgan Asset Management.

All returns are based on the respective MSCI IPD Global Property Index, and show one-year returns from income and capital appreciation.

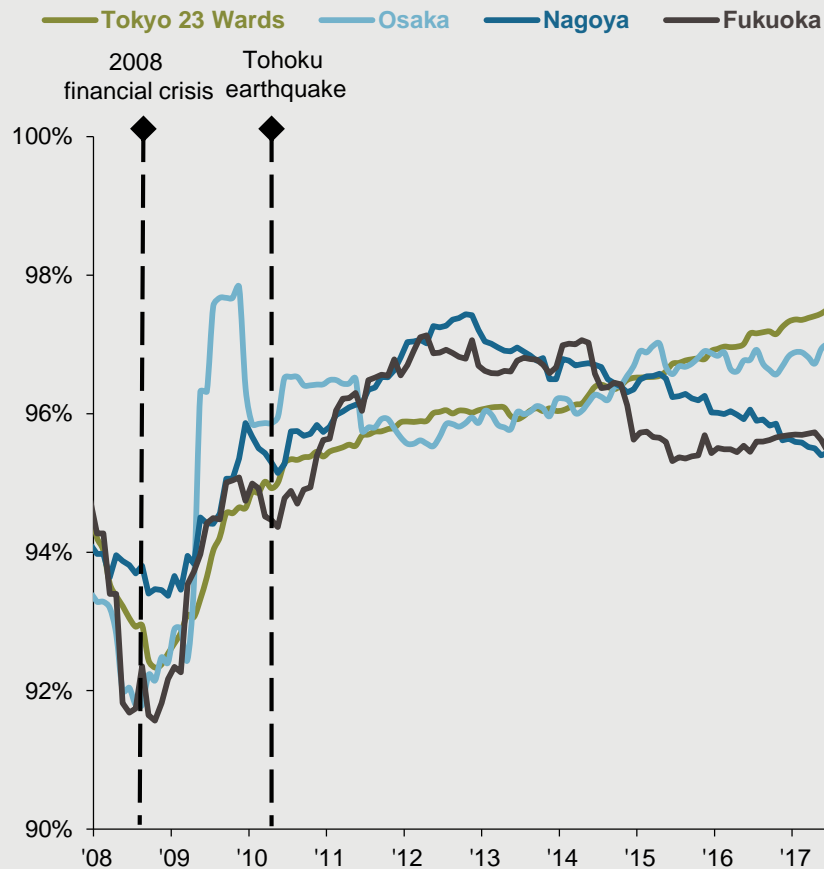
Past performance is not indicative of future results. Alternative investments carry more risk than traditional investments and are recommended only for long-term investment. Some alternative investments may be highly leveraged and rely on speculative investments that can magnify the potential for loss or gain. Diversification does not guarantee investment returns or eliminate the risk of loss.

Data are as of December 31, 2018.

APAC real estate: Japan residential and Australia office

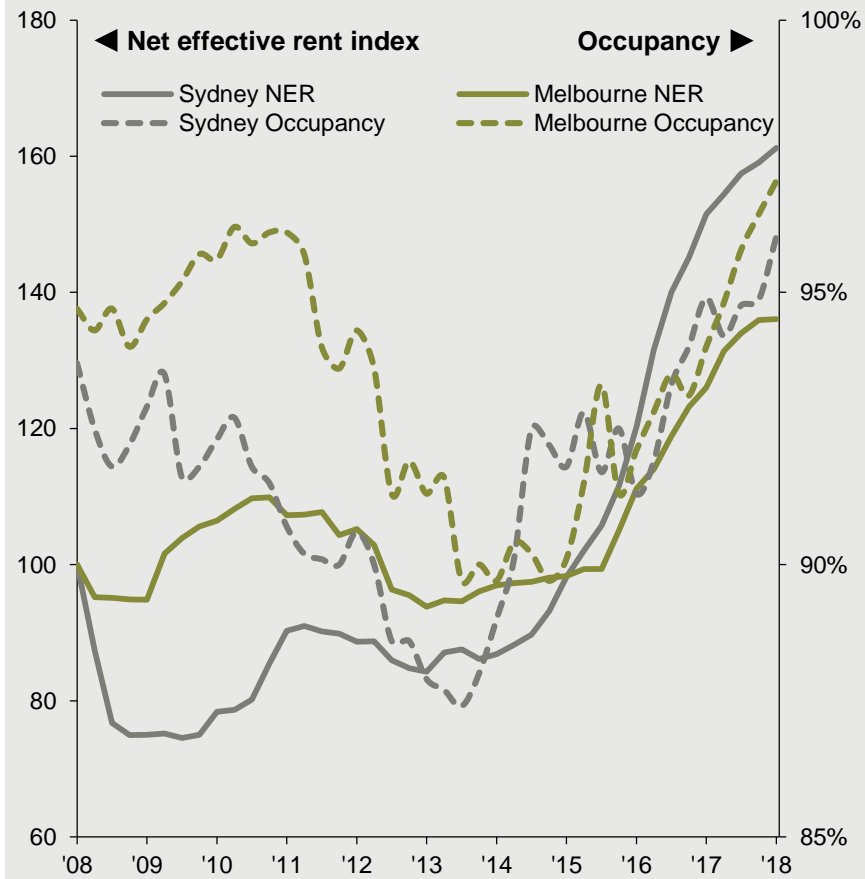
Japan multi-family

Occupancy, percent



Australia prime office

Net effective rent, index level; occupancy, percent

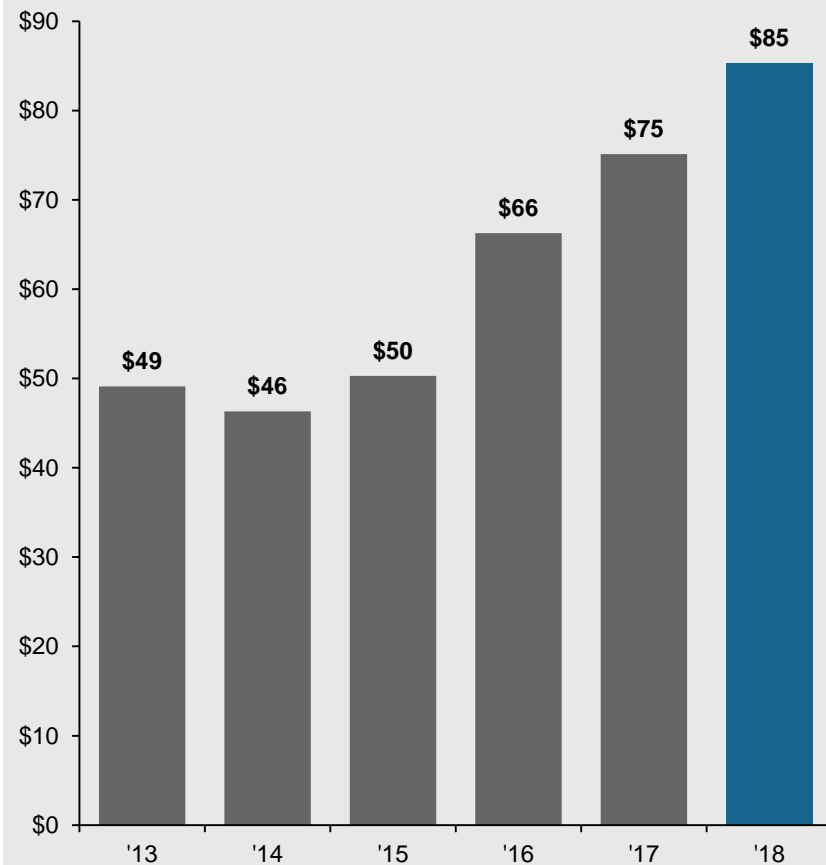


Sources: Association of Real Estate Securitization, Japan Property Index, Jones Lang LaSalle, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

Global infrastructure fundraising and dry powder

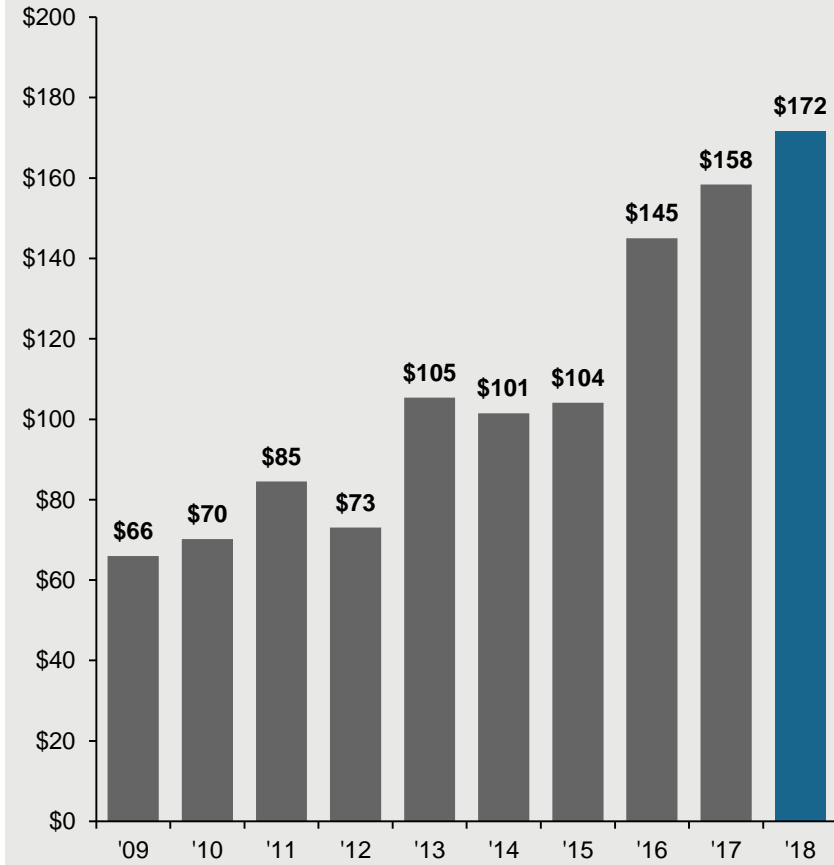
Global infrastructure fundraising

Aggregate capital raised, billions USD



Global infrastructure dry powder*

Billions USD



Source: Preqin, J.P. Morgan Asset Management.

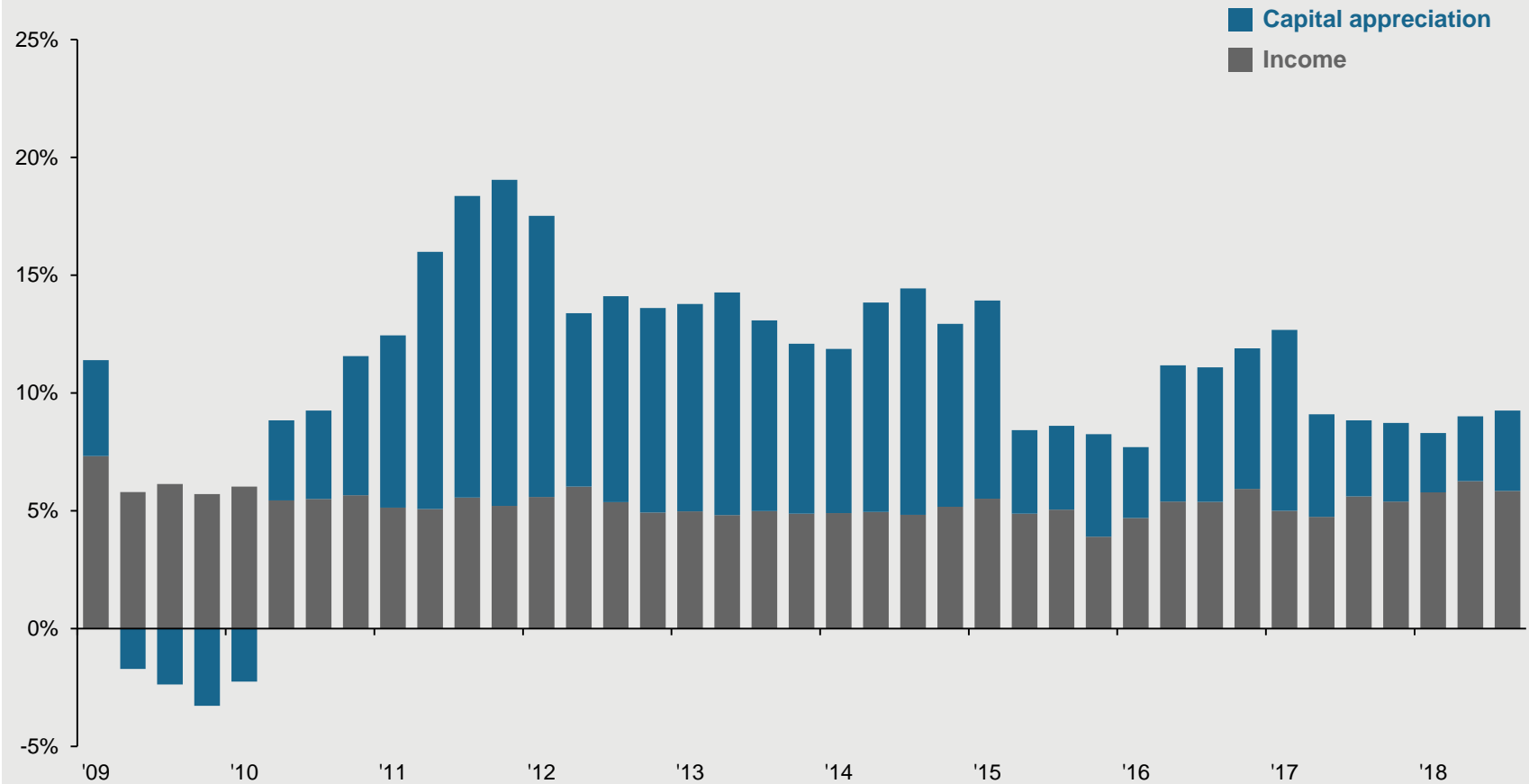
*Dry powder refers to the amount of cash reserves or liquid assets available for use.

Data are as of December 31, 2018.

Sources of global infrastructure returns

Global core infrastructure returns

Rolling 4-quarter returns from income and capital appreciation



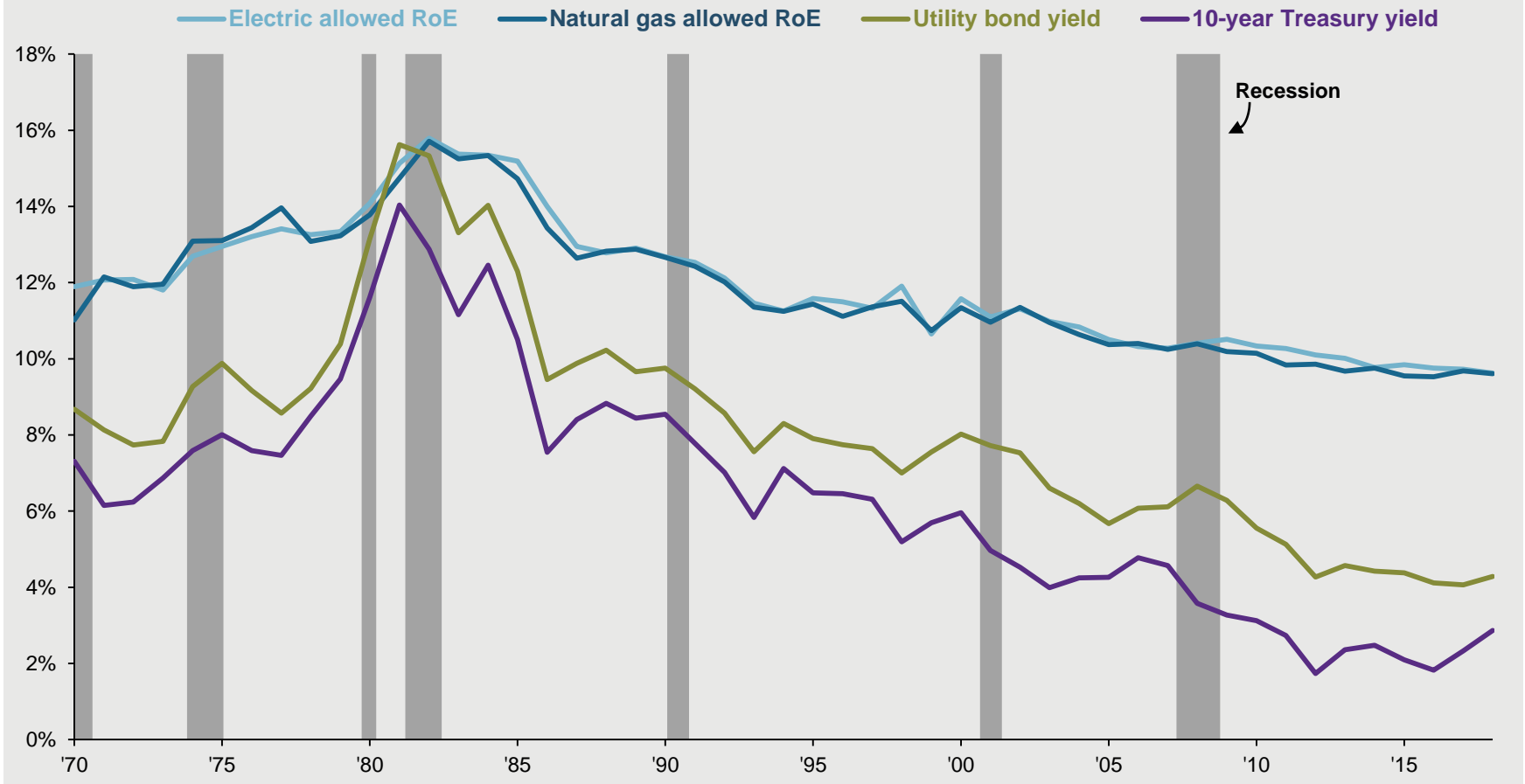
Source: MSCI, J.P. Morgan Asset Management. Infrastructure returns represented by the "low risk" category of the MSCI Global Quarterly Infrastructure Asset Index. Data show rolling one-year returns from income and capital appreciation. The chart shows the full index history, beginning in the first quarter of 2009.

Past performance is not indicative of future results. Alternative investments carry more risk than traditional investments and are recommended only for long-term investment. Some alternative investments may be highly leveraged and rely on speculative investments that can magnify the potential for loss or gain. Diversification does not guarantee investment returns or eliminate the risk of loss.

Data are as of December 31, 2018.

U.S. regulated utilities

U.S. utilities' average allowed return on equity and interest rates



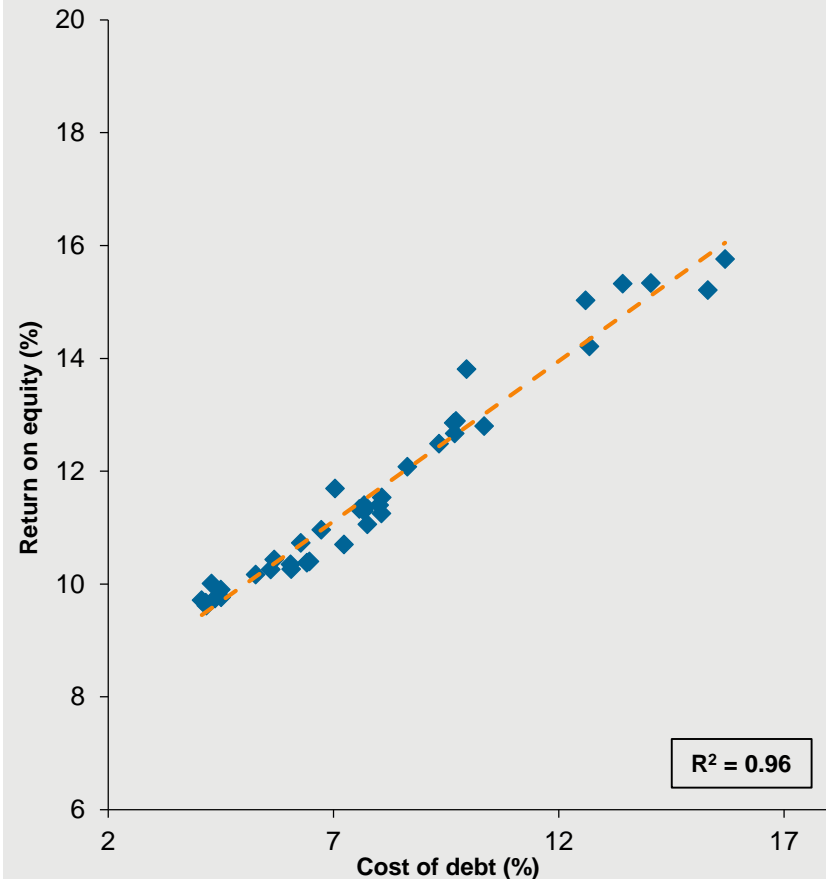
Source: Bloomberg, SNL.com, Moody's, America's Electric Utilities, J.P. Morgan Asset Management.

RoE is return on equity, which is the amount of net income returned as a percentage of shareholders' equity. Grey bars denote recessions.

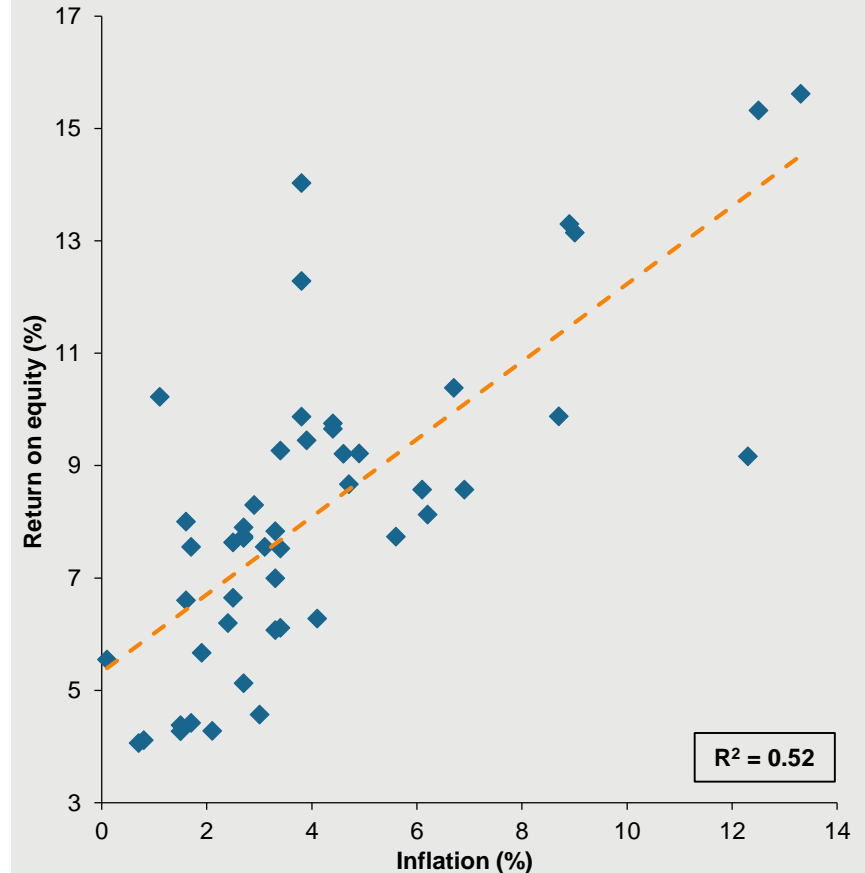
Data are as of December 31, 2018.

U.S. utilities: RoE, inflation and rates

U.S. utilities' return on equity and average cost of debt
1980-2018



U.S. utilities' return on equity and inflation
ROE (2-year lagged), CPI % change vs. prior year, 1980-2018



Source: Moody's, SNL.com, BLS, JPMAM Global Alternatives Research, J.P. Morgan Asset Management.

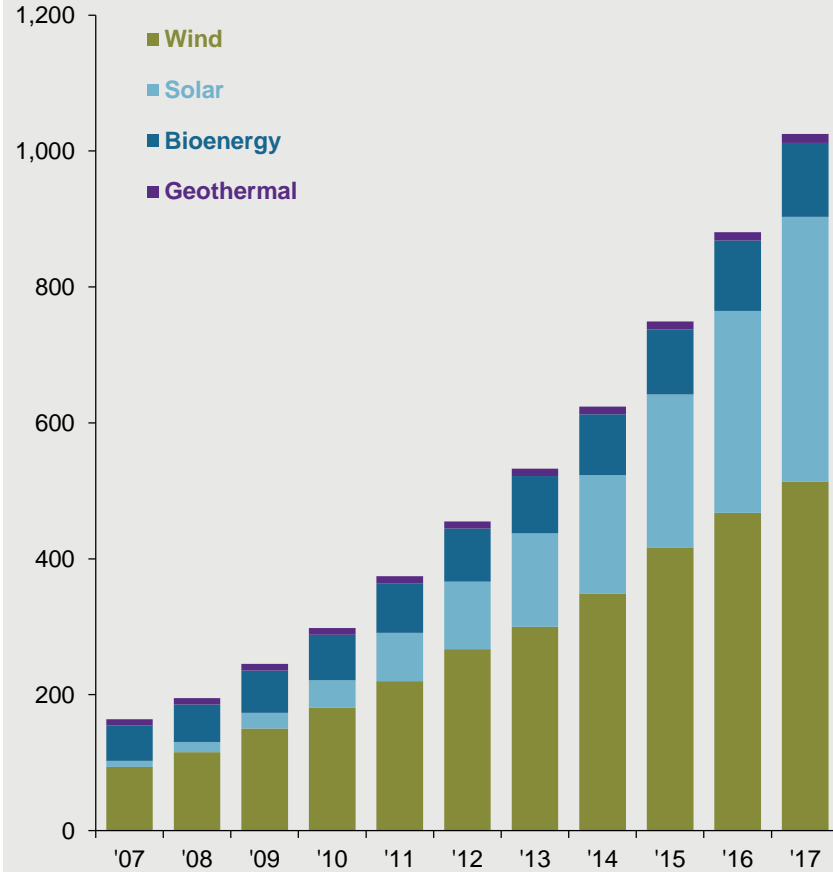
RoE is return on equity, which is the amount of net income returned as a percentage of shareholders' equity. Average cost of debt is represented by the trailing 6-month average of Moody's utilities yields.

Data are as of December 31, 2018.

Global renewable energy

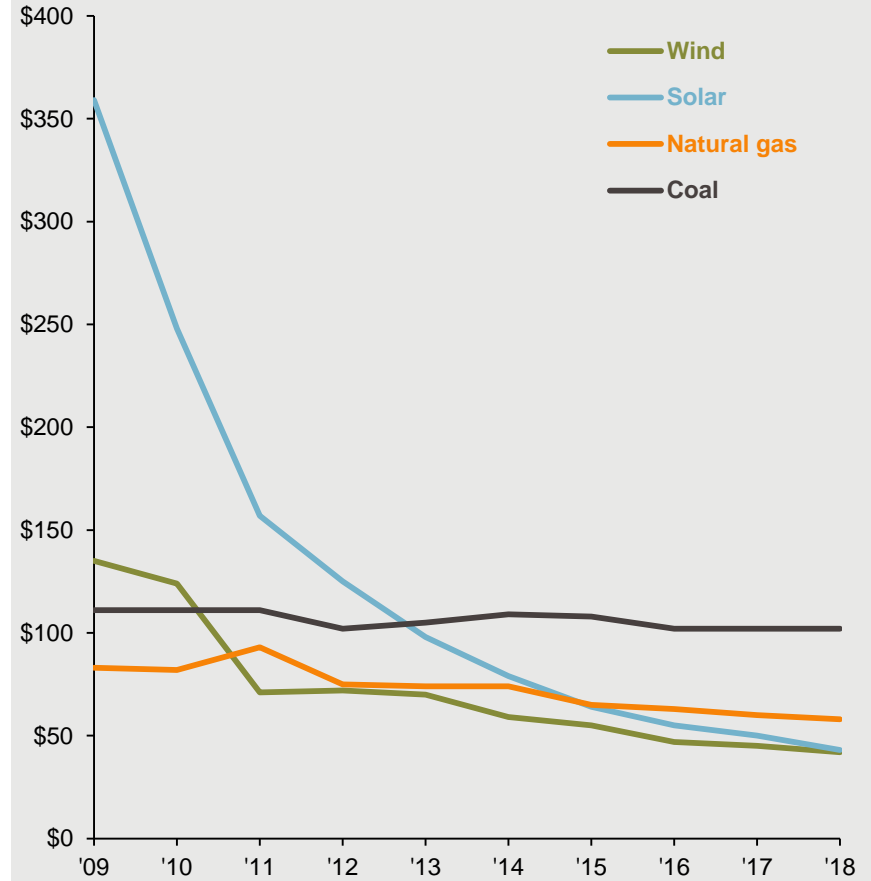
Global renewable generation capacity

Gigawatts



Cost of wind, solar, natural gas and coal

Mean LCOE*, dollar per megawatt hour



Source: International Renewable Energy Agency, Lazard, J.P. Morgan Asset Management.

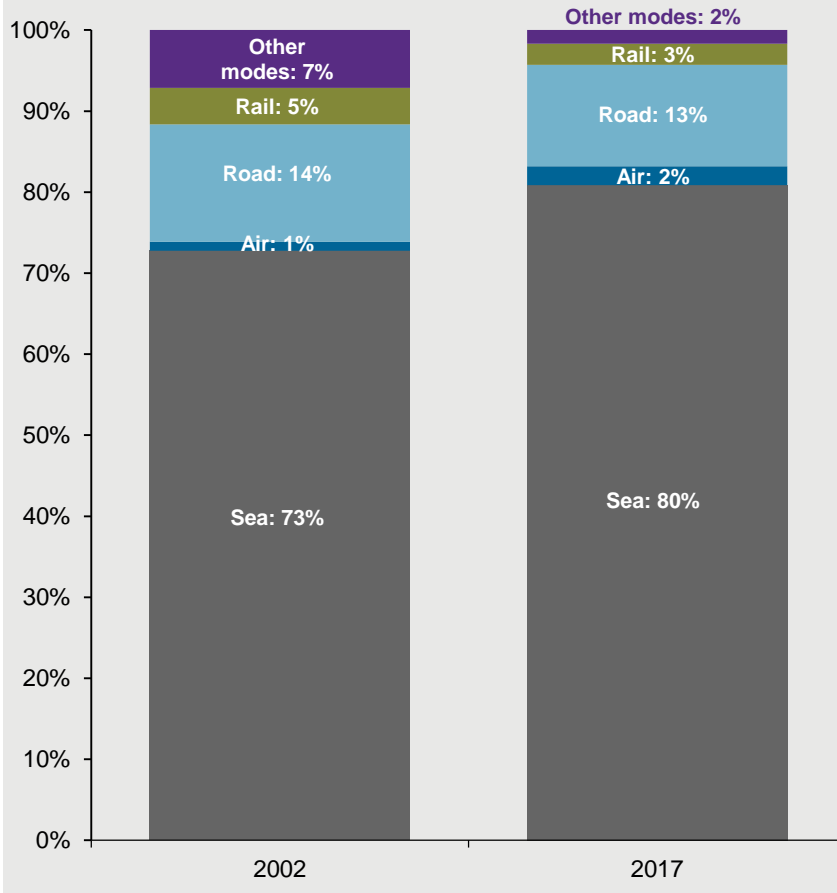
*LCOE is levelized cost of energy, the net present value of the unit-cost of electricity over the lifetime of a generating asset. It is often taken as a proxy for the average price that the generating asset must receive in a market to break even over its lifetime.

Data are as of December 31, 2018.

Global trade

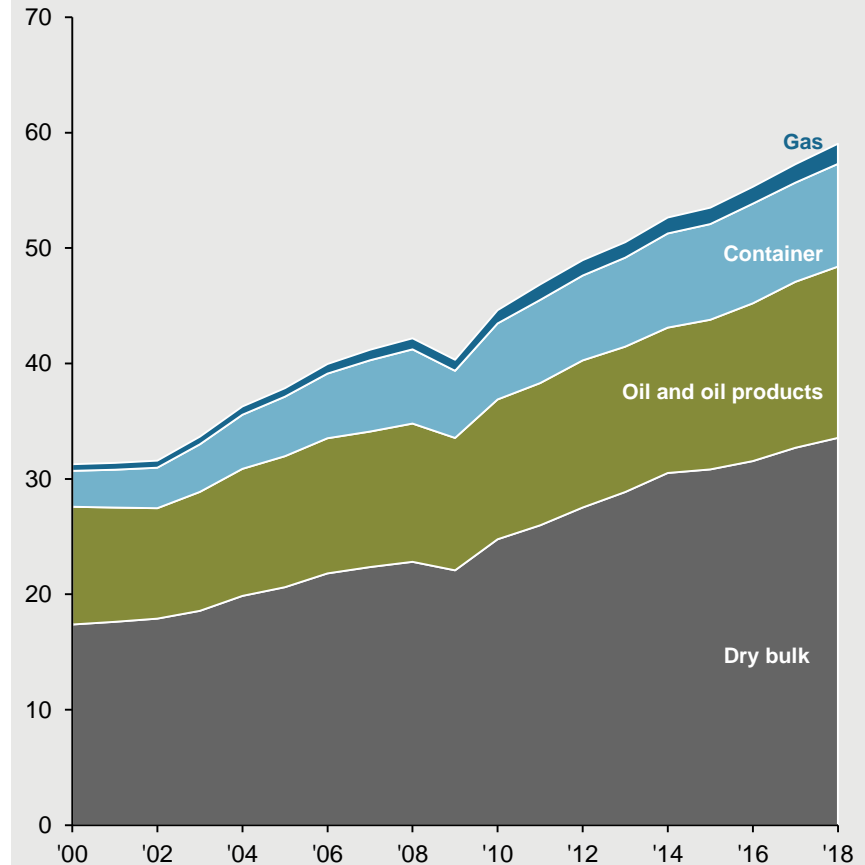
Extra EU trade quantity by mode of transport

Percent of total



World seaborne trade by product

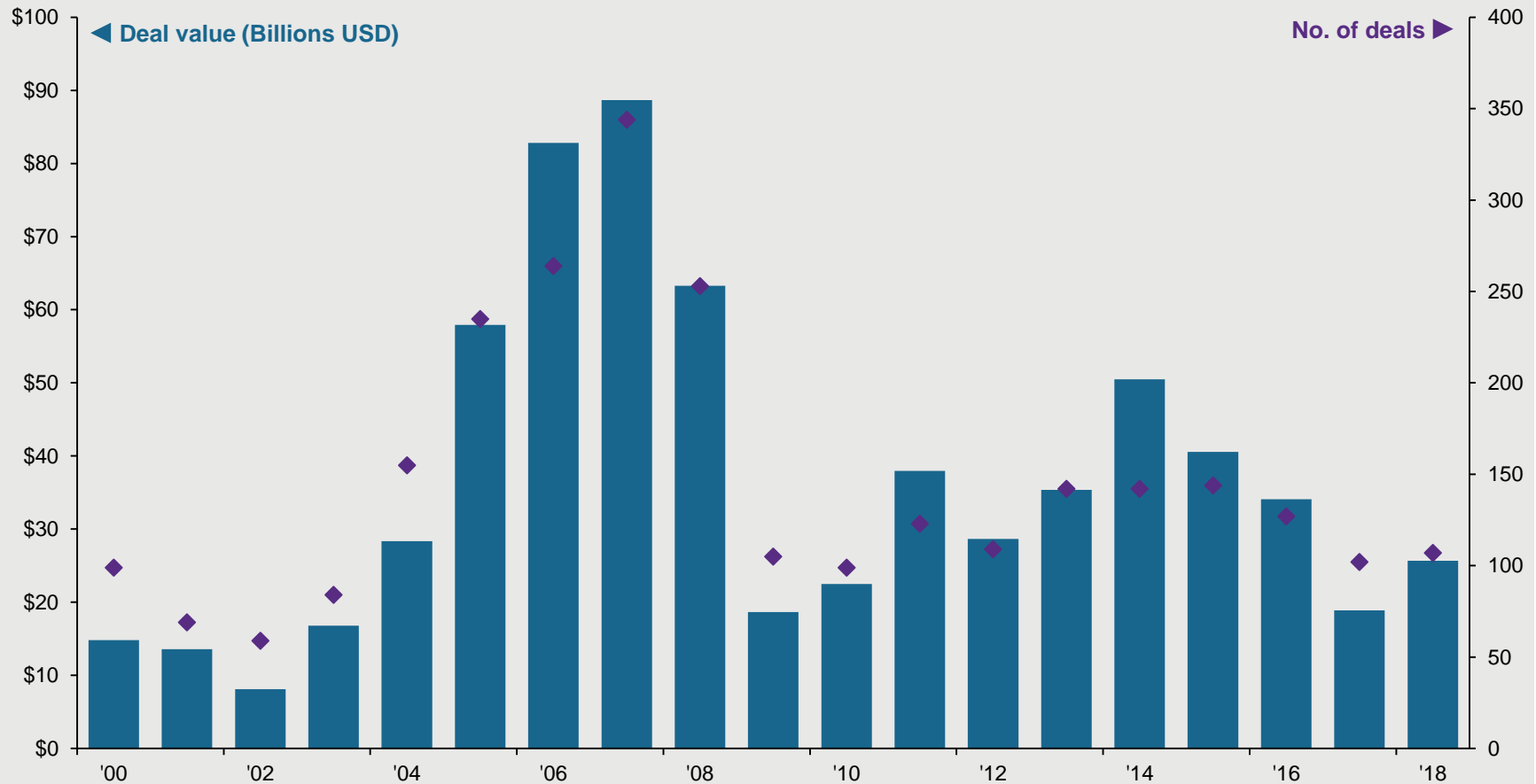
Estimated trillion ton miles



Source: Eurostat, Clarksons, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

Global banks' shipping finance

Shipping loans volume



Source: Dealogic, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

Private market dynamics

Global private credit & equity fundraising

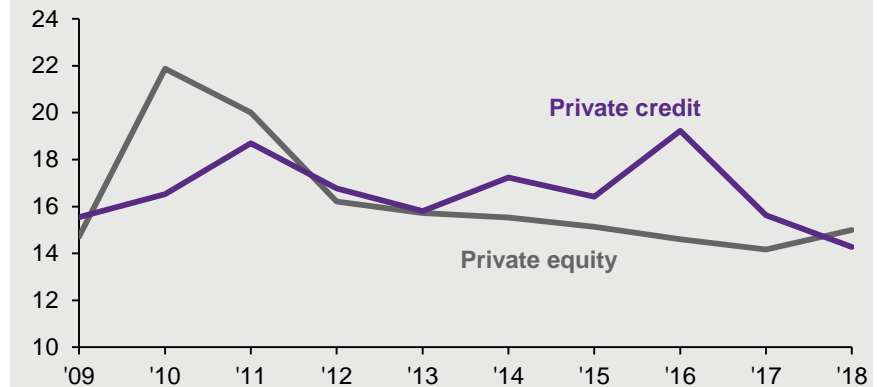
Quarterly, billions USD



Source: Preqin, Pitchbook, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

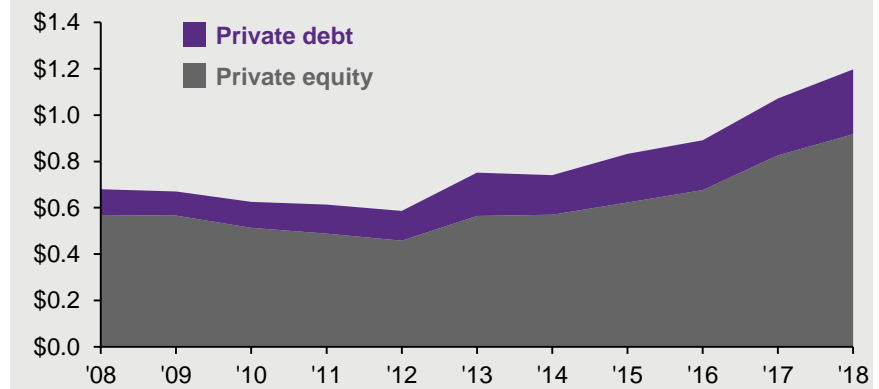
Time to close private equity and credit funds

Months to close



Global private capital dry powder

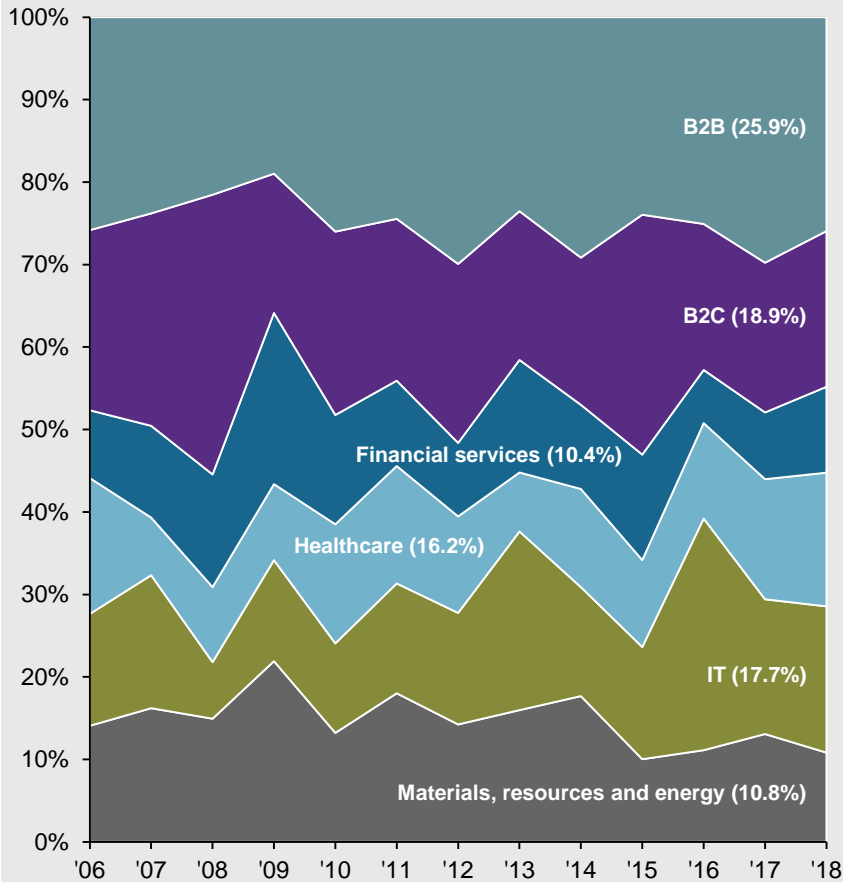
Trillions USD



U.S. private equity deal flow and multiples

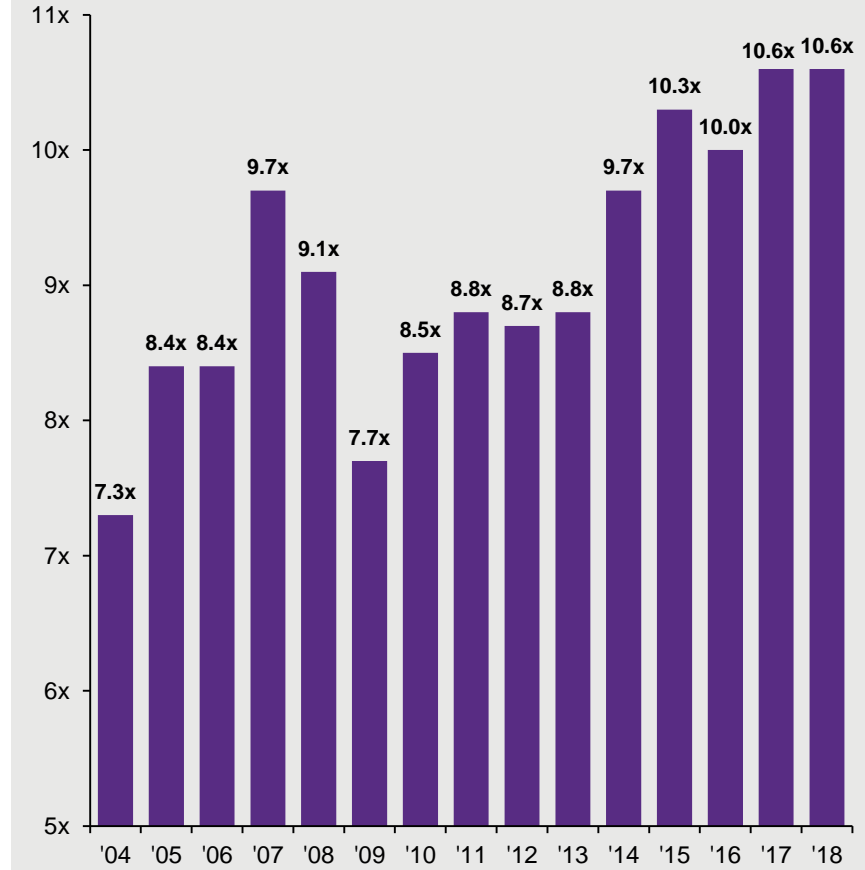
U.S. private equity deal flow by sector

Percent



Purchase price multiples: LBOs

Equity and debt over trailing EBITDA



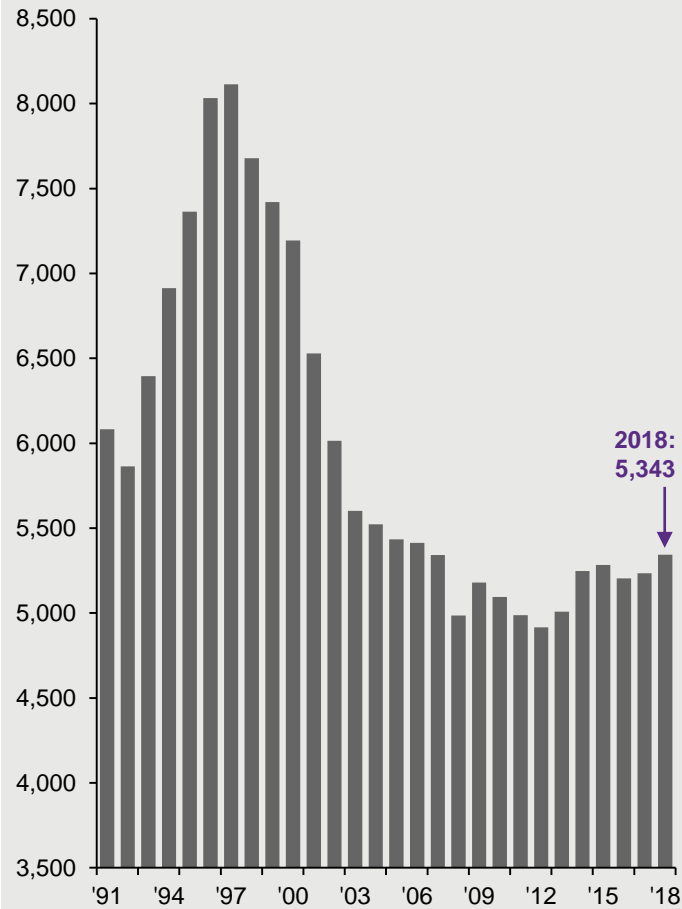
Source: Preqin, Pitchbook, S&P LCD, J.P. Morgan Asset Management.

For U.S. private equity deal flow by sector, B2B is Business to Business, B2C is Business to Consumer, IT is Information Technology. Most recent share of deals is shown in parentheses.

Data are as of December 31, 2018.

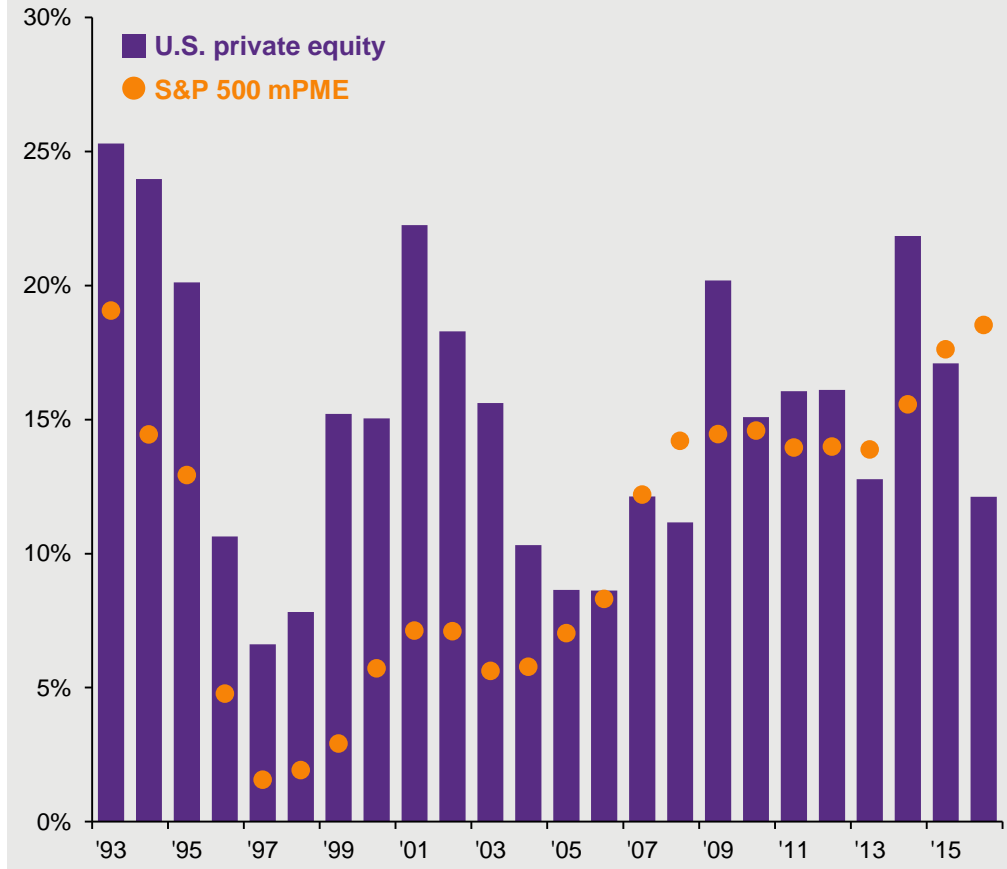
U.S. public vs. private equity

Number of listed U.S. companies*



U.S. public vs. private equity returns

By vintage year



Sources: Cambridge Associates, World Federation of Exchanges, Standard & Poor's, J.P. Morgan Asset Management.

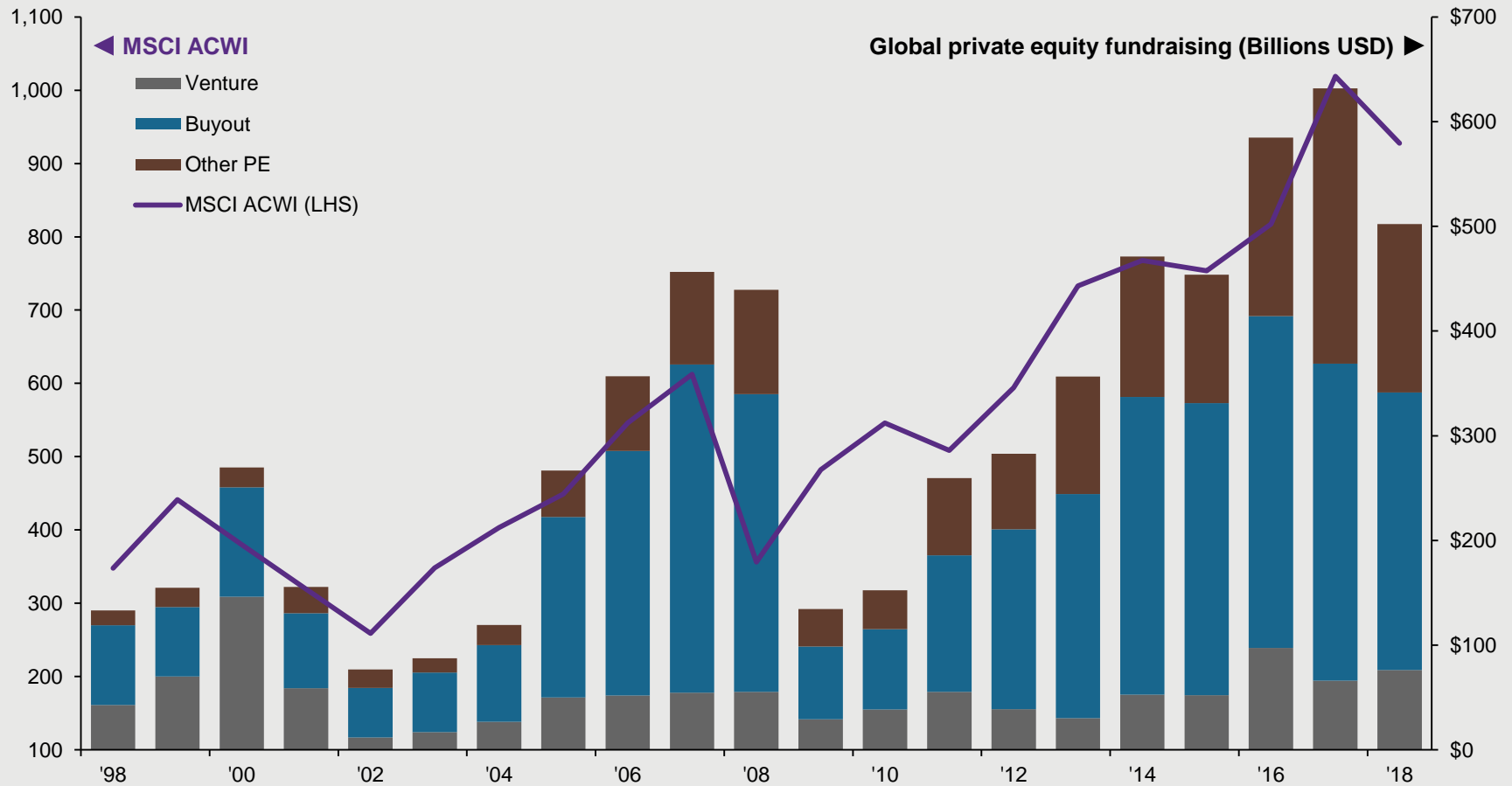
*Number of listed U.S. companies is represented by the sum of number of companies listed on the NYSE and the NASDAQ.

The Cambridge Associates Modified Public Market Equivalent (mPME) methodology determines how much the private equity funds' cash flows would have earned had they been invested in the S&P 500 instead.

Data are as of December 31, 2018.

Global private equity fundraising and sentiment

Global private equity fundraising and global equities

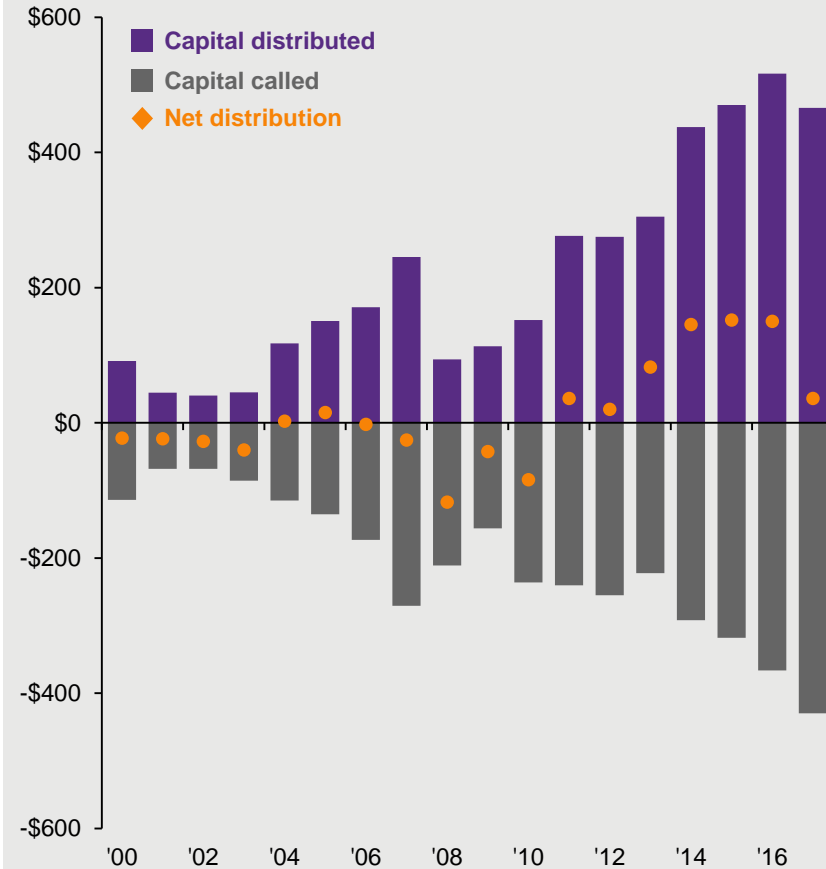


Source: MSCI, FactSet, Preqin, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

Private equity distributions and the secondary market

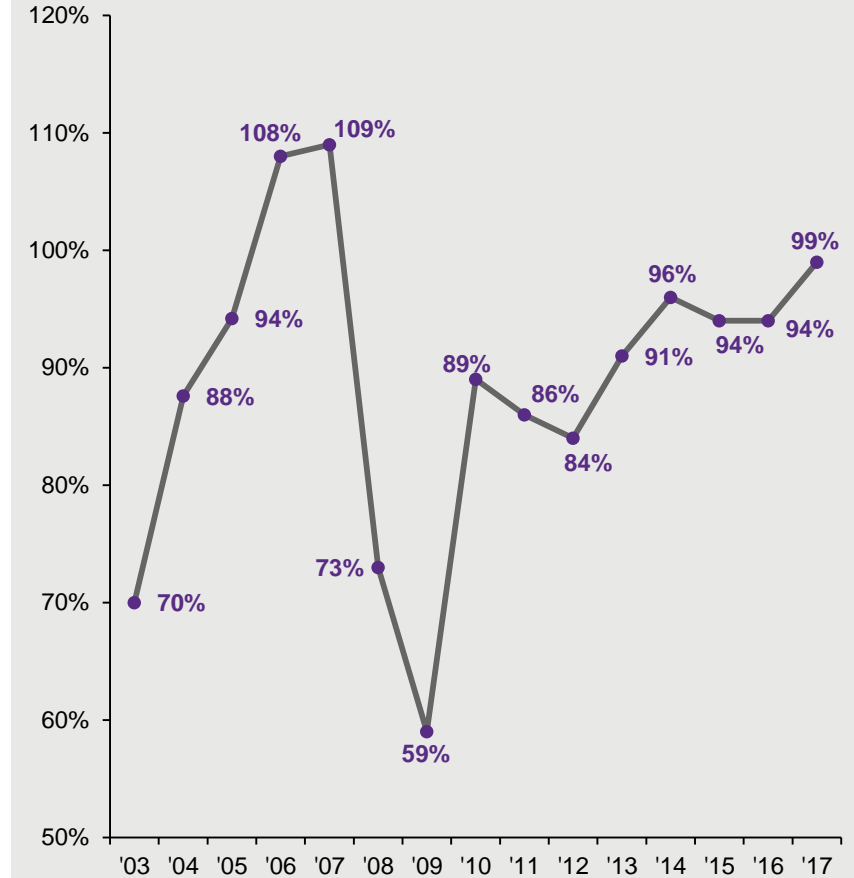
Global capital calls and distributions

Billions USD



Secondary market pricing

Percent of net asset value

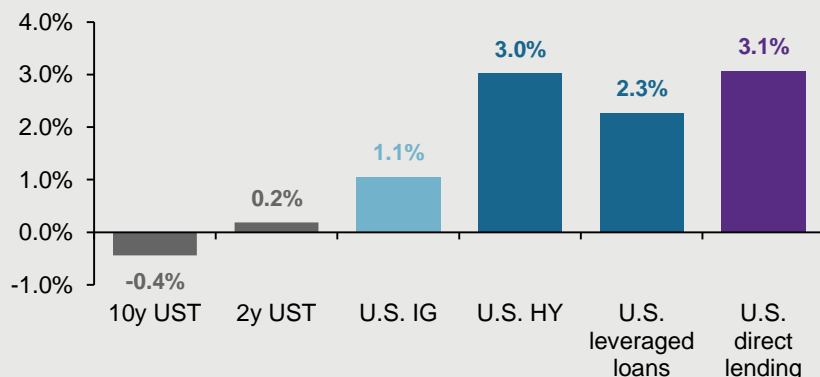


Sources: Preqin, Greenhill, London Business School, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

Credit returns across recent economic cycles: 2004 - 2018

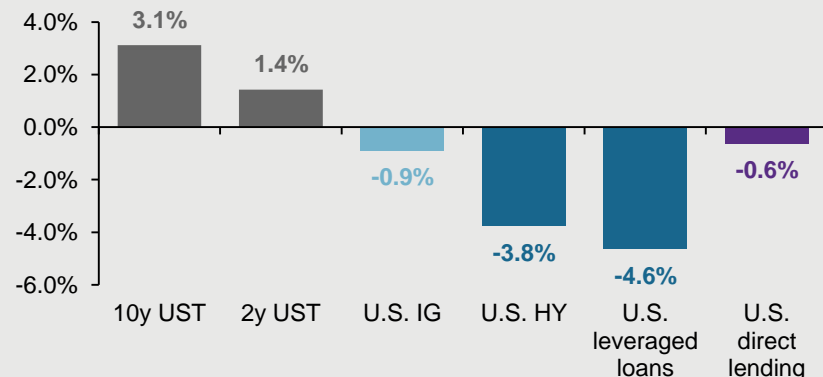
Expansion

Manufacturing ISM > 50 and rising



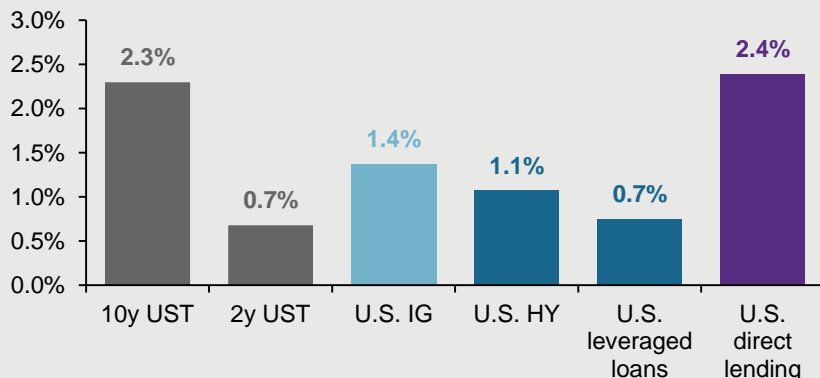
Recession

Manufacturing ISM < 50 and falling



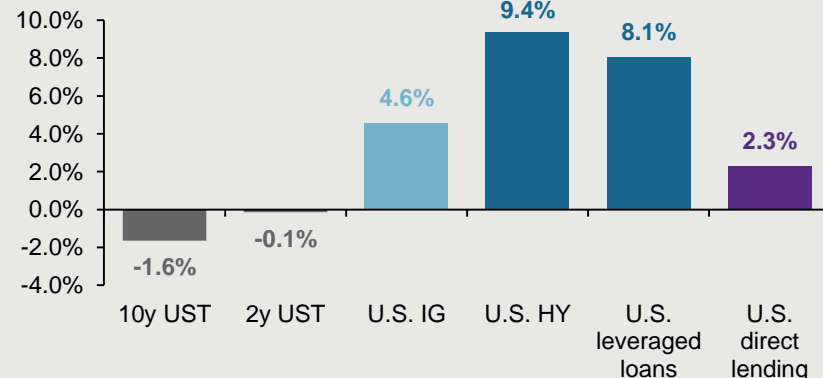
Late cycle cooling

Manufacturing ISM > 50 and falling



Turnaround

Manufacturing ISM < 50 and rising



Source: Institute for Supply Management, Bloomberg Barclays, Credit Suisse, Cliffwater, J.P. Morgan Asset Management.

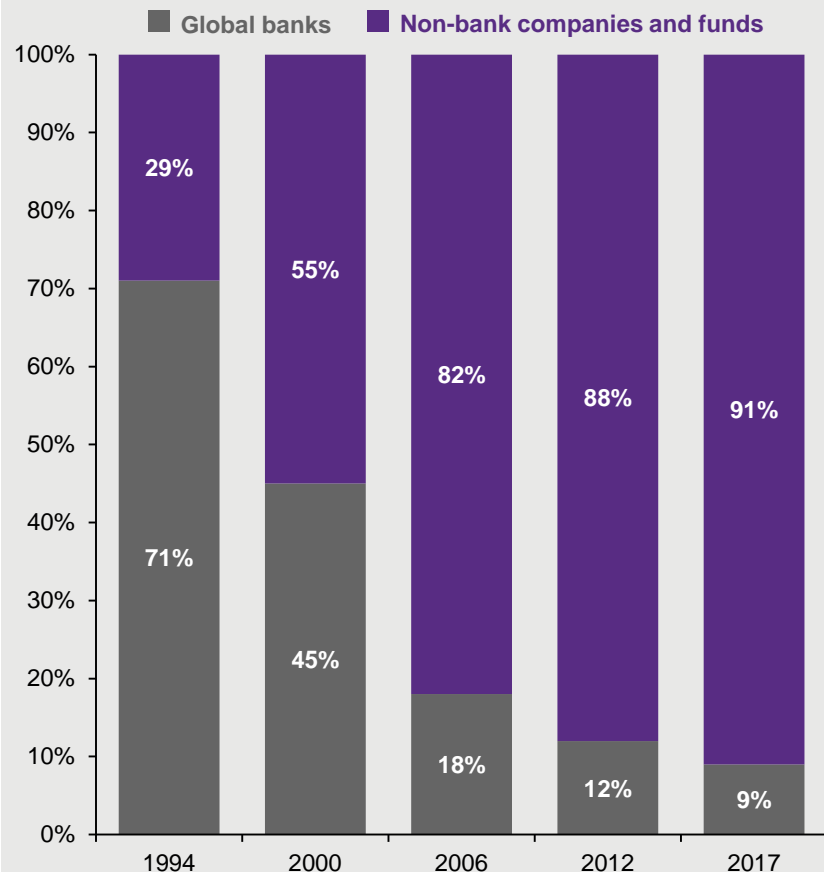
The ISM Manufacturing Index is a nationwide survey of purchasing executives. A reading greater than 50 indicates increased economic activity and a reading less than 50 indicates decreased economic activity. 10y UST: Bloomberg Barclays U.S. Treasury Bellwethers (10y), 2y UST: Bloomberg Barclays U.S. Treasury Bellwethers (2y), U.S. IG: Bloomberg Barclays U.S. Aggregate Corporate Investment Grade, U.S. HY: Bloomberg Barclays U.S. Aggregate Corporate High Yield, U.S. leveraged loans: Credit Suisse Leveraged Loan Index, U.S. direct lending: Cliffwater Direct Lending Index. All returns from 2004 through 9/30/2018 due to first data availability of direct lending index.

Data are as of December 31, 2018.

Credit market participants and issuance

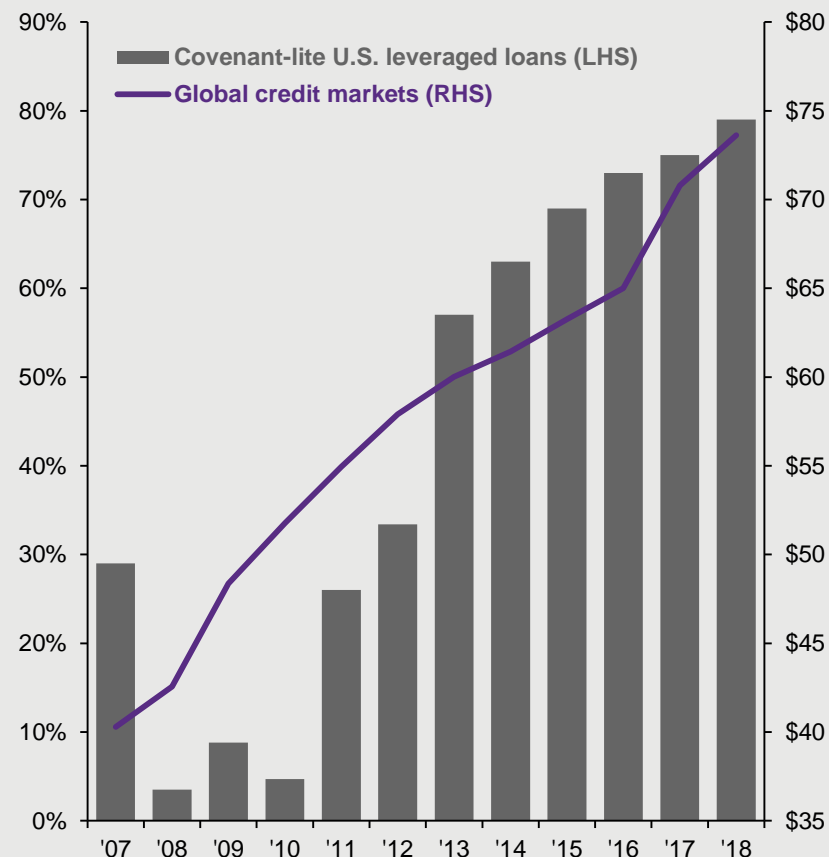
U.S. leveraged loan market participants

Share of total market, percent



Covenant-lite loan issuance and credit markets

Percent of issuance, trillions USD



Source: Ares, J.P. Morgan High Yield Research, S&P LCD, J.P. Morgan Asset Management.

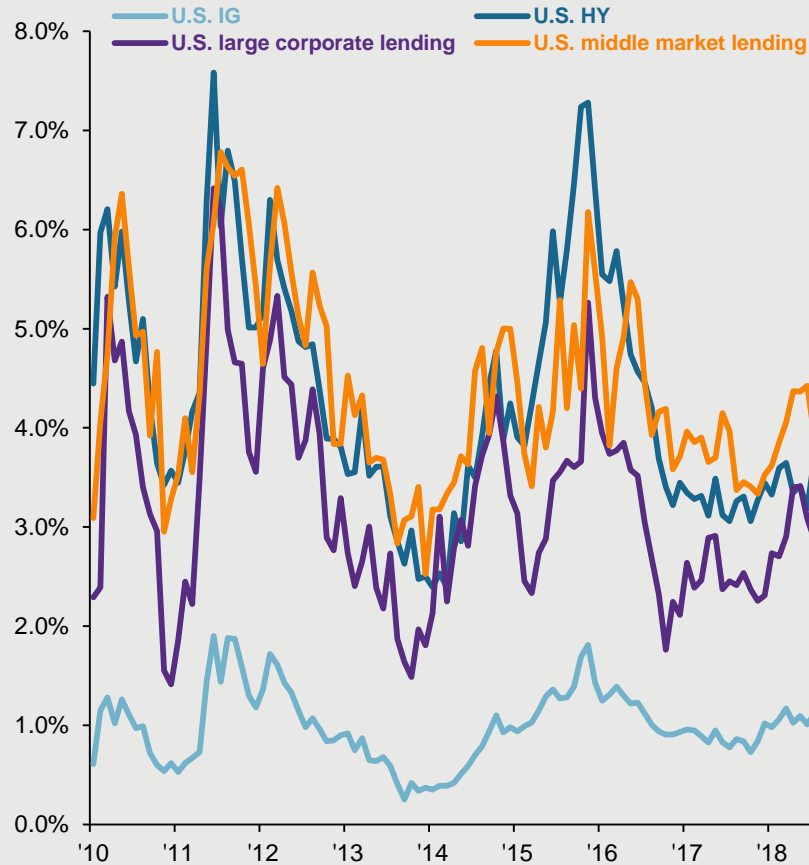
Covenant-lite loans are a type of financing that is issued with fewer restrictions on the borrower with regard to collateral, level of income, and loan payment terms, and fewer protections for the lender, including financial maintenance tests that measure the debt-service capabilities of the borrower.

Data are as of December 31, 2018.

U.S. direct lending: pricing and characteristics

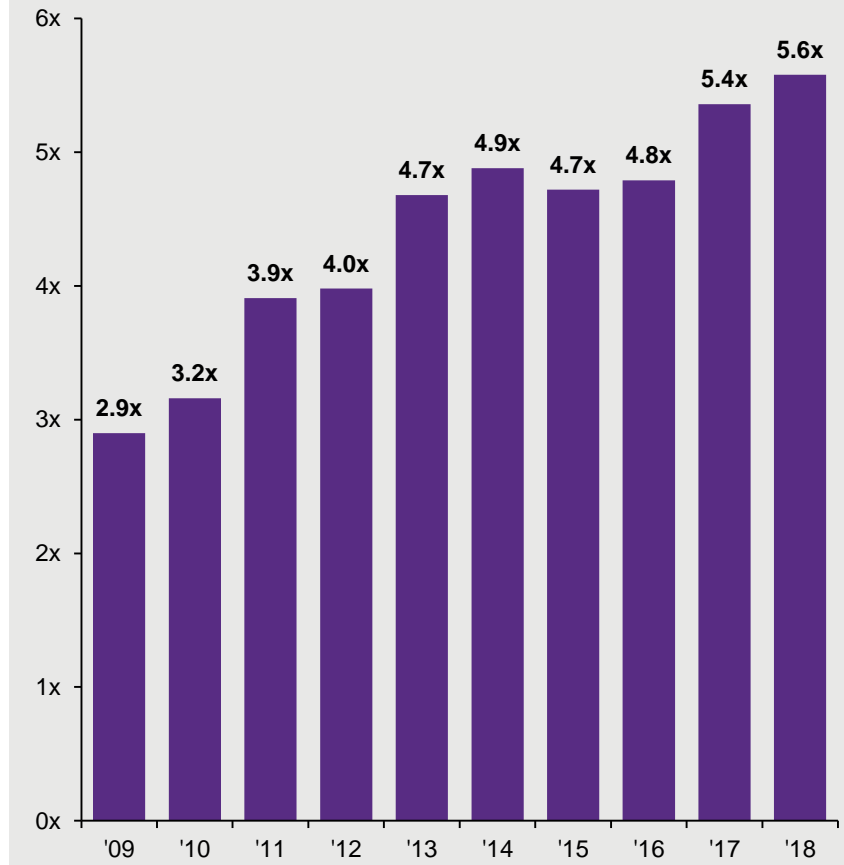
Public and private market spreads

Spread to 10y U.S. Treasury



U.S. middle market lending leverage

Senior Debt/EBITDA



Source: Bloomberg Barclays, Thomson Reuters, S&P LCD, J.P. Morgan Asset Management.

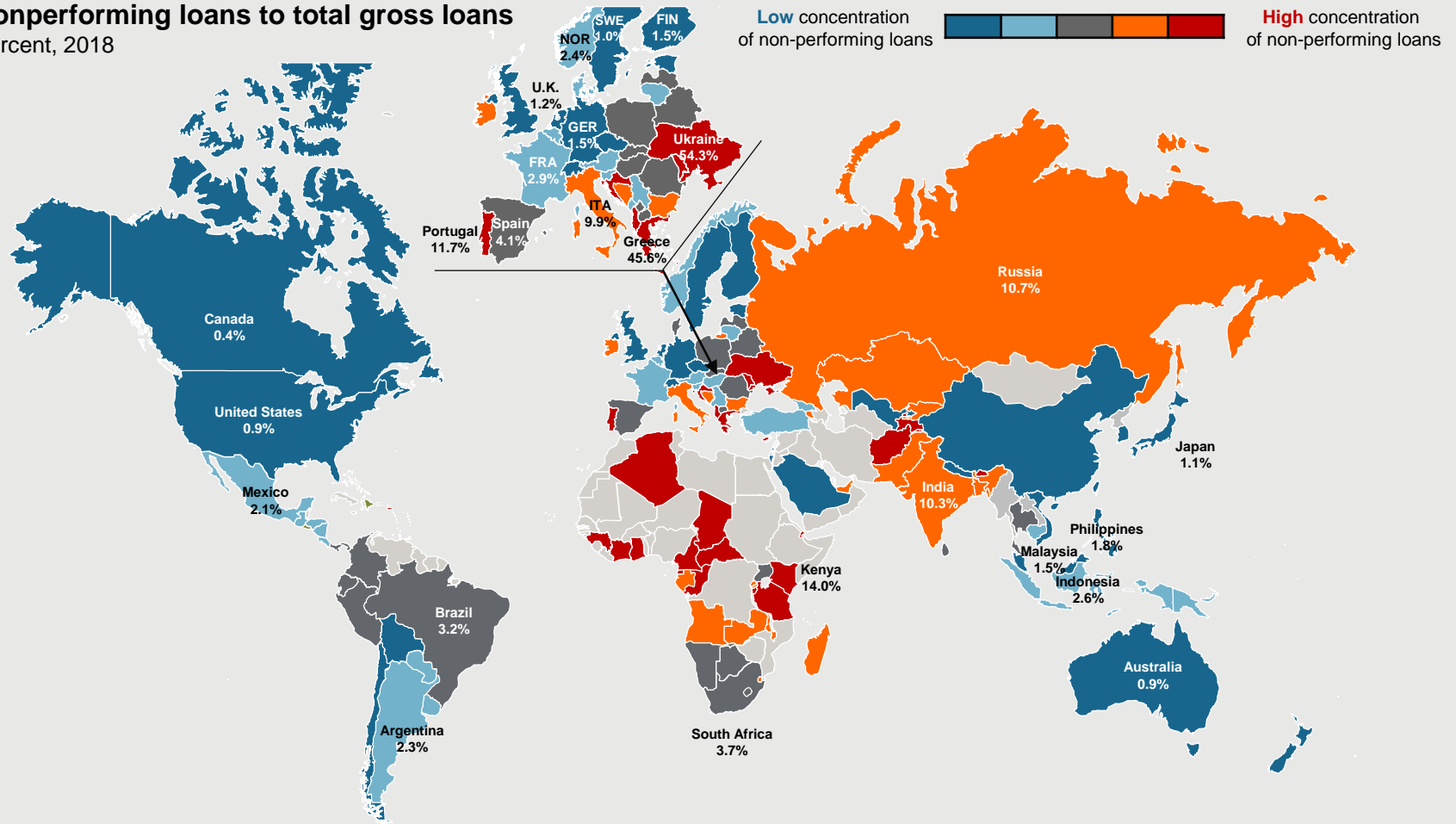
Large corporate lending refers to companies with more than \$50 million in EBITDA and middle market refers to companies with less than \$50 million in EBITDA. U.S. IG: Bloomberg Barclays U.S. Aggregate Corporate Investment Grade, U.S. HY: Bloomberg Barclays U.S. Aggregate Corporate High Yield, U.S. large corporate and middle market lending: Thomson Reuters large and middle market quarterly average first-lien institutional term loan yields.

Data are as of December 31, 2018.

Distressed credit: Non-performing loans

Nonperforming loans to total gross loans

Percent, 2018



Source: International Monetary Fund, J.P. Morgan Asset Management.

A nonperforming loan is a sum of borrowed money upon which the debtor has not made the scheduled payments for a period of usually at least 90 days for commercial banking loans and 180 days for consumer loans. Nonpayment means there have been zero interest or principal payments made on the loan within a specified period. Any definition of a nonperforming loan will depend on the loan's terms and agreement as there is no definitive definition of a nonperforming loan. NPL data based on most recently available numbers from the IMF. Color coding based on quintiles.

Data are as of December 31, 2018.

Hedge fund strategy returns

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2009-2018	
										Ann.	Vol.
Global Equities 35.4%	Global Equities 13.2%	Global Bonds 5.6%	Global Equities 16.8%	Global Equities 23.4%	Quant 10.7%	Eq. Market Neutral 4.3%	Distressed 15.1%	Global Equities 24.6%	Merger Arbitrage 3.3%	Global Equities 10.0%	Global Equities 15.6%
Distressed 28.1%	Distressed 12.1%	Merger Arbitrage 1.5%	Relative Value 10.6%	Equity Long/Short 14.3%	Global Macro 5.6%	Merger Arbitrage 3.3%	Global Equities 8.5%	Equity Long/Short 13.3%	Relative Value -0.2%	Relative Value 6.9%	Equity Long/Short 8.6%
Relative Value 25.8%	Relative Value 11.4%	Relative Value 0.1%	Distressed 10.1%	Distressed 14.0%	Global Equities 4.7%	Relative Value -0.3%	Relative Value 7.7%	HFRI Composite 8.6%	Eq. Market Neutral -1.0%	Distressed 6.8%	Distressed 7.8%
Equity Long/Short 24.6%	Equity Long/Short 10.5%	Distressed -1.8%	Equity Long/Short 7.4%	HFRI Composite 9.1%	Relative Value 4.0%	Equity Long/Short -1.0%	Equity Long/Short 5.5%	Global Bonds 7.4%	Global Bonds -1.2%	Equity Long/Short 5.6%	HFRI Composite 6.1%
HFRI Composite 20.0%	HFRI Composite 10.2%	Eq. Market Neutral -2.1%	HFRI Composite 6.4%	Relative Value 7.1%	Eq. Market Neutral 3.1%	HFRI Composite -1.1%	HFRI Composite 5.4%	Distressed 6.3%	Distressed -1.9%	HFRI Composite 4.9%	Quant 5.8%
Merger Arbitrage 11.6%	Quant 9.8%	Quant -3.5%	Global Bonds 4.3%	Eq. Market Neutral 6.5%	HFRI Composite 3.0%	Global Macro -1.3%	Merger Arbitrage 3.6%	Relative Value 5.1%	Global Macro -4.0%	Merger Arbitrage 4.1%	Global Bonds 5.6%
Global Bonds 6.9%	Global Macro 8.1%	Global Macro -4.2%	Eq. Market Neutral 3.0%	Merger Arbitrage 4.7%	Equity Long/Short 1.8%	Global Equities -1.8%	Eq. Market Neutral 2.2%	Eq. Market Neutral 4.9%	HFRI Composite -4.6%	Global Bonds 2.5%	Relative Value 4.8%
Global Macro 4.3%	Global Bonds 5.5%	HFRI Composite -5.3%	Merger Arbitrage 2.8%	Global Macro -0.4%	Merger Arbitrage 1.7%	Quant -2.4%	Global Bonds 2.1%	Merger Arbitrage 4.3%	Quant -6.6%	Eq. Market Neutral 2.5%	Global Macro 3.7%
Eq. Market Neutral 1.4%	Merger Arbitrage 4.6%	Global Equities -6.9%	Global Macro -0.1%	Quant -0.9%	Global Bonds 0.6%	Global Bonds -3.2%	Global Macro 1.0%	Global Macro 2.2%	Equity Long/Short -7.1%	Global Macro 1.1%	Eq. Market Neutral 2.8%
Quant -1.7%	Eq. Market Neutral 2.9%	Equity Long/Short -8.4%	Quant -2.5%	Global Bonds -2.6%	Distressed -1.4%	Distressed -8.1%	Quant -1.4%	Quant 2.1%	Global Equities -8.9%	Quant 0.2%	Merger Arbitrage 2.5%

Source: MSCI, Bloomberg Barclays, HFRI, J.P. Morgan Asset Management.

Global equities reflect the MSCI AC World Index and global bonds reflect the Bloomberg Barclays Global Aggregate Index. All hedge fund returns are from HFRI. Quant: Macro – Systematic Diversified, HFRI Composite: HFRI FW Composite Index. Returns may fluctuate as hedge fund reporting occurs on a lag. Please see disclosure pages for index definitions.

Data are as of December 31, 2018.

Hedge fund correlations

Hedge fund correlations

15-years, quarterly returns

	Global bonds	Global equities	HFRI composite	Equity long/short	Equity market neutral	Merger arbitrage	Distressed	Global macro	Quant	Relative value
Global bonds	1.0									
Global equities	0.2	1.0								
HFRI composite	0.1	0.9	1.0							
Equity long/short	0.1	0.9	1.0	1.0						
Equity market neutral	0.0	0.7	0.8	0.8	1.0					
Merger arbitrage	0.1	0.7	0.8	0.8	0.6	1.0				
Distressed	0.0	0.9	0.9	0.9	0.7	0.7	1.0			
Global macro	0.4	0.4	0.5	0.4	0.4	0.4	0.2	1.0		
Quant	0.3	0.1	0.2	0.1	0.2	0.2	-0.1	0.9	1.0	
Relative value	0.1	0.8	0.9	0.9	0.7	0.7	0.9	0.3	0.0	1.0

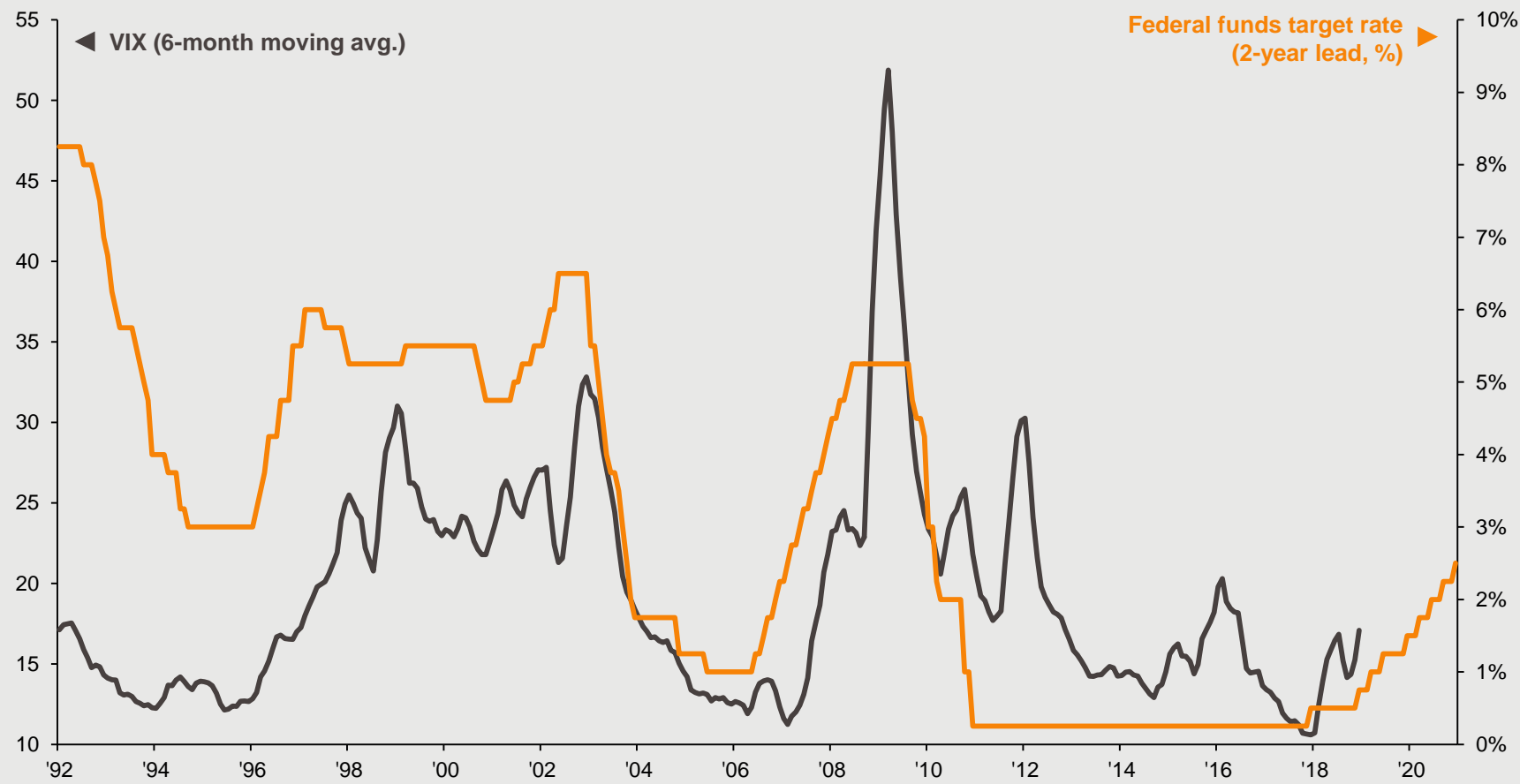
Source: MSCI, Bloomberg Barclays, HFRI, J.P. Morgan Asset Management. Global equities reflect the MSCI AC World Index and global bonds reflect the Bloomberg Barclays Global Aggregate Index. All hedge fund returns are from HFRI. Quant: Macro – Systematic Diversified, HFRI Composite: HFRI FW Composite Index. Returns may fluctuate as hedge fund reporting occurs on a lag. All correlation coefficients are calculated based on quarterly total return data for the period 12/31/2003 – 12/31/2018. Note the equity market neutral index is a member of the equity long/short family. Merger arbitrage and distressed are sub-components of the event-driven family. Quant is a member of the global macro family. Please see disclosure pages for index definitions.

Data are as of December 31, 2018.

Interest rates and volatility

Implied volatility and the federal funds rate

VIX index level, 6-month moving average, Fed funds %, 2-year lead

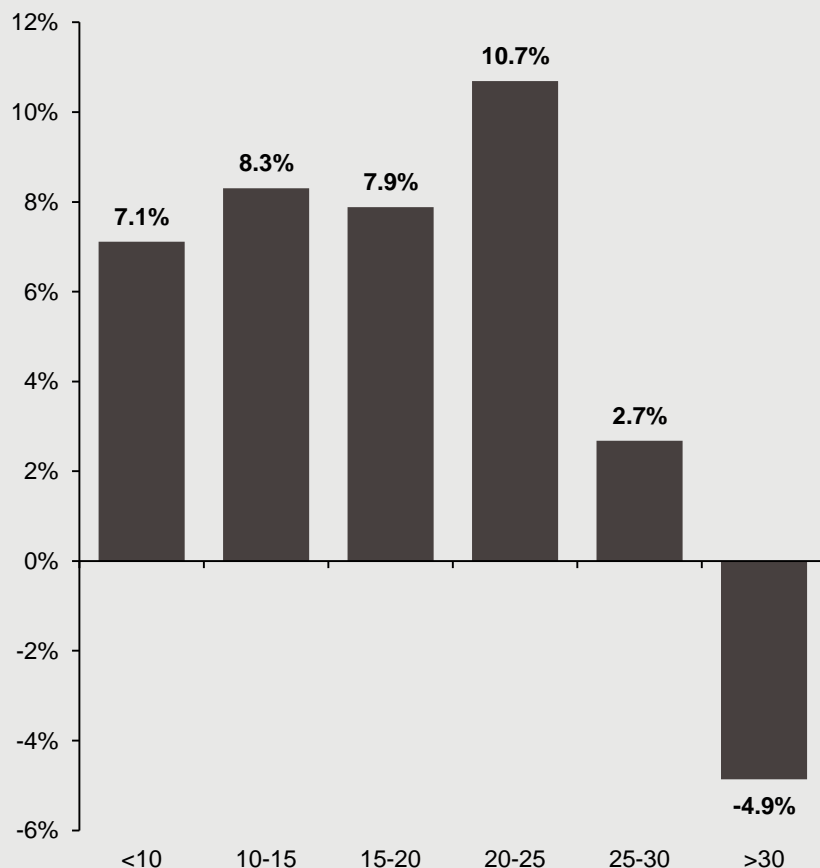


Source: CBOE, Federal Reserve, FactSet, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

Hedge funds and volatility

Hedge funds and volatility

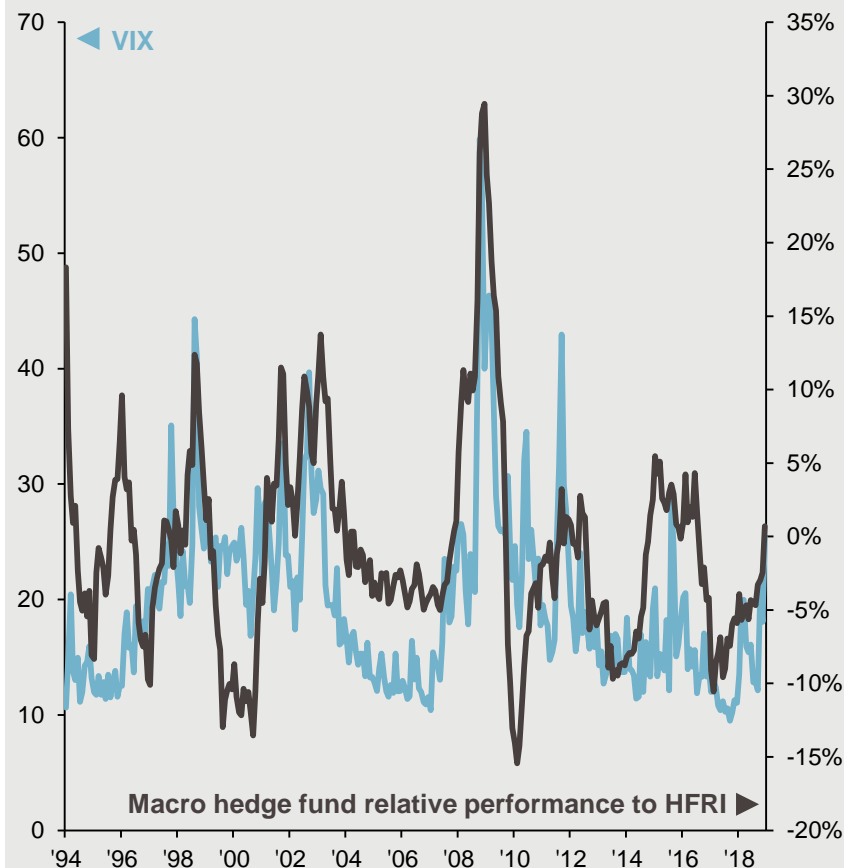
Average y/y hedge fund returns by VIX level, 25 years



Source: HFRI, CBOE, FactSet, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

Macro hedge fund relative performance & volatility

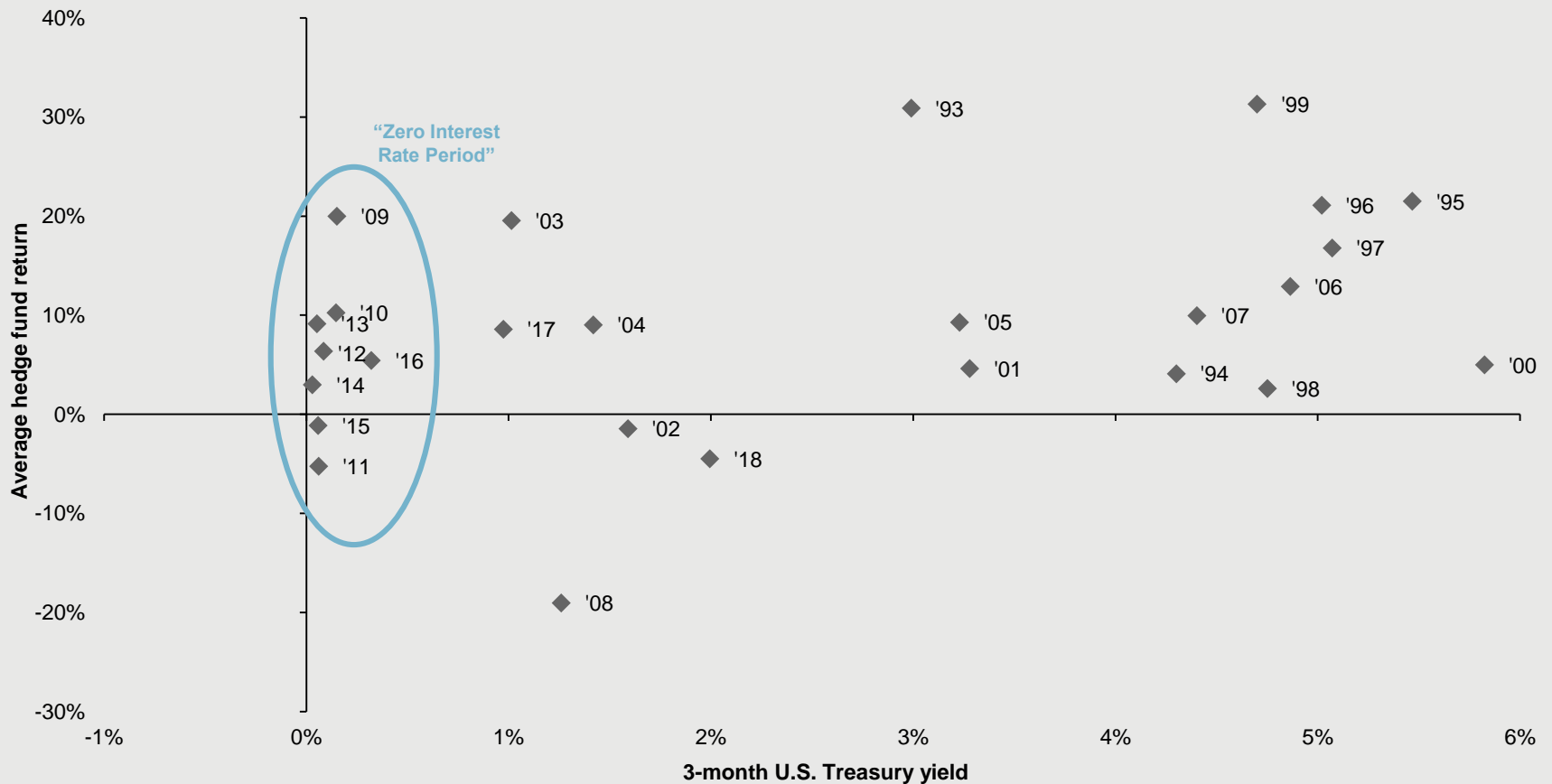
VIX index level, y/y change in rel. perf. of HFRI Macro index



Hedge fund returns and cash rates

Hedge fund returns and cash rate

Yearly average HFRI fund weighted composite return, 3-month U.S. Treasury yield

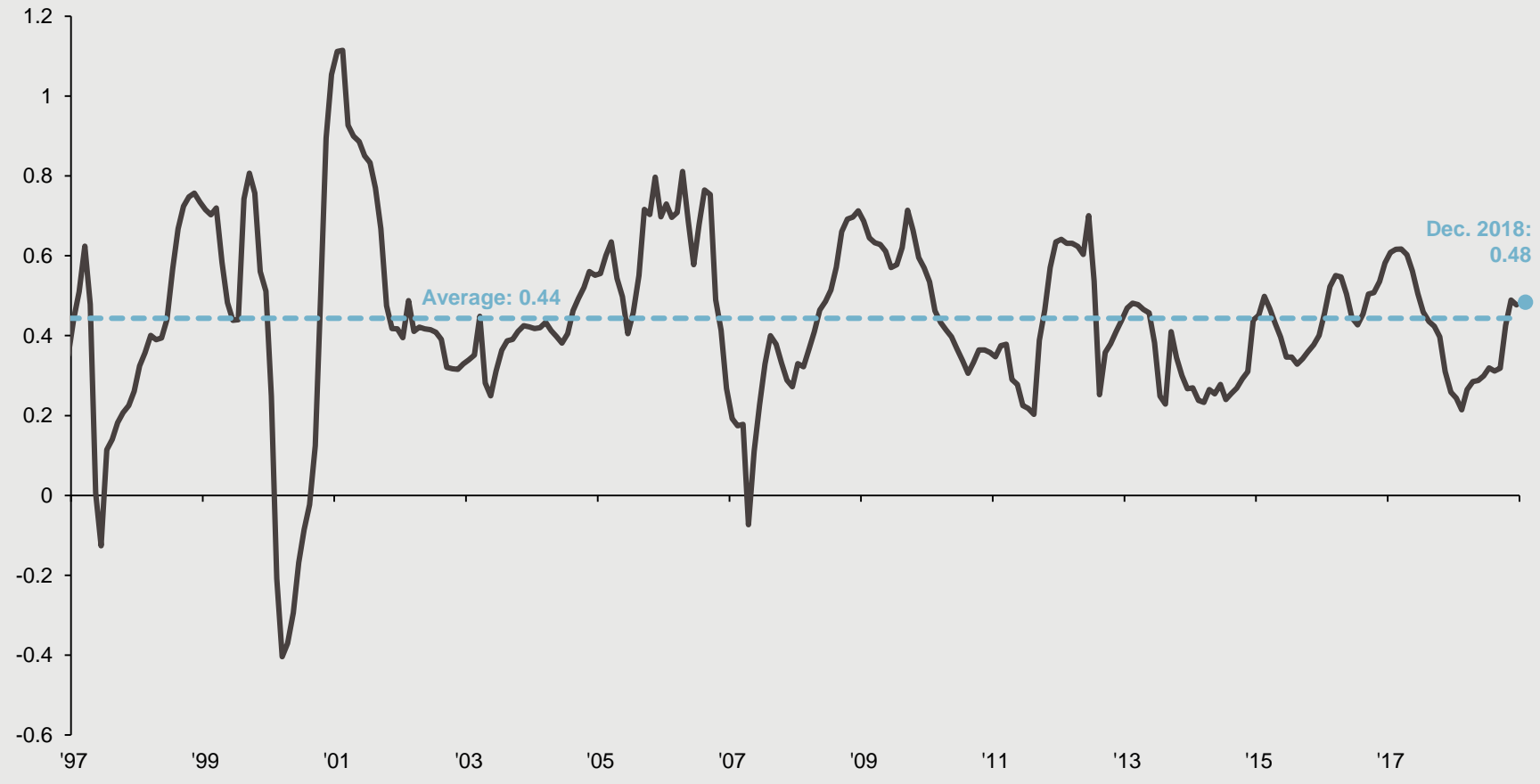


Source: Bloomberg, Federal Reserve, HFRI, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

Hedge funds and the U.S. equity market

Hedge fund beta to the S&P 500

Rolling 12-month beta



Source: HFRI, Standard & Poor's, FactSet, J.P. Morgan Asset Management.
Data are as of December 31, 2018.

J.P. Morgan Asset Management – Definitions

Alpha – Is the difference between an investment's return and its expected return, given its level of beta.

Accredited investor – Defined by Rule 501 of Regulation D, an individual (i.e. non-corporate) "accredited investor" is either a natural person who has individual net worth, or joint net worth with the person's spouse, that exceeds \$1 million at the time of the purchase OR a natural person with income exceeding \$200,000 in each of the two most recent years or joint income with a spouse exceeding \$300,000 for those years and a reasonable expectation of the same income level in the current year. For the complete definition of accredited investor, see the SEC website.

Capital commitment – A Limited Partner's obligation to provide a specific amount of capital to a Closed-end Fund (defined below) for investments. The Capital Commitment is "drawn down" or "called" over time, meaning a portion of the commitment must be wired to the Closed-end Fund by a set date.

Capital called – The amount of capital wired to a fund that is "drawn down" over time as the General Partner selects investments.

Carried interest (aka incentive fee) – A fee paid to a fund manager for generating returns over a benchmark; calculated as a percentage of investment profits over a hurdle rate and charged in addition to a management fee. In Private Equity, carried interest (typically up to 20% of the profits) becomes payable once the investors have achieved repayment of their original investment in the fund, plus a defined hurdle rate.

Catch-up – This is a common term of the private equity partnership agreement. Once the general partner provides its limited partners with their preferred return, if any, it then typically enters a catch-up period in which it receives the majority or all of the profits until the agreed upon profit-split, as determined by the carried interest, is reached.

Clawback – A clawback obligation represents the general partner's promise that, over the life of the fund, the managers will not receive a greater share of the fund's distributions than they bargained for. Generally, this means that the general partner may not keep distributions representing more than a specified percentage (e.g., 20%) of the fund's cumulative profits, if any. When triggered, the clawback will require that the general partner return to the fund's limited partners an amount equal to what is determined to be "excess" distributions.

Closed-end fund – A fund that has a finite capital raising period and stated term (i.e. 5 years, 10 years, etc.). Clients will have the ability to commit to the fund during the set fundraising period, after which point the fund will be closed to new investors. Unlike an open-ended fund, there is limited flexibility on when a client may invest and there is no liquidity/redemptions. Clients who invest are obligated to remain in the fund for the duration of the term; they will be required to fulfill capital calls during the stated commitment period and will receive periodic distributions based on underlying monetization of investments.

Commitment period – The period of time within which the fund can make investments as established in the Limited Partnership Agreement ("LPA"), meaning the governing document, for the fund.

Direct co-investment – An investment made directly in a single underlying asset of a fund. Example: The General Partner elects to invest in an operating company alongside a fund.

Dispersion – Difference between the best-performing and worst-performing strategies.

Distressed – A financial instrument in a company that is near or is currently going through bankruptcy. This usually results from a company's inability to meet its financial obligations. As a result, these financial instruments have suffered a substantial reduction in value. Distressed securities can include common and preferred shares, bank debt, trade claims (goods owed) and corporate bonds.

Distributions – The total proceeds distributed by the fund to the Limited Partners, which may include both return of capital and gain distributions.

General partner – The managing partner of a Limited Partnership. The General Partner is managed by the asset management team responsible for making fund investments (i.e., the intermediary between investors with capital and businesses seeking capital to grow)?

Gross IRR – The dollar-weighted internal rate of return, before management fees and carried interest generated by the fund.

Hedge Fund strategies:

Relative Value/Arbitrage involves the simultaneous purchase and sale of similar securities to exploit pricing differentials. Strategies in this sector offer potential to generate consistent returns while minimizing directional risk.

Opportunistic/Macro strategies involve investments in a wide variety of strategies and instruments, which often have a directional stance based on the manager's global macroeconomic views.

Long/Short (L/S) Equity involves long and/or short positions in equity securities deemed to be under- or overvalued, respectively. Exposures to sectors, geographies, and market capitalizations are often flexible and will change over time.

Merger Arbitrage/Event Driven strategies invest in opportunities created by significant corporate transactions and events which tend to alter a company's financial structure or operating strategy.

Distressed Securities invests in debt and equity securities of firms in reorganization or bankruptcy.

High watermark – The highest peak in value that an investment fund has reached. This term is often used in the context of fund manager compensation. For example, a \$1,000,000 investment is made in year 1 and the fund declines by 50%, leaving \$500,000 in the fund. In year 2, the fund returns 100%, bring the investment value back to \$1,000,000. If a fund has a high watermark, it will not take incentive fees on the return in year 2, since the investment has never grown. The fund will only take incentive fees if the investment grows above the initial level of \$1,000,000.

Hurdle rate – The rate of return that the fund manager must meet before collecting incentive fee.

Internal rate of return (IRR) – The dollar-weighted internal rate of return. This return considers the daily timing of cash flows and cumulative fair stated value, as of the end of the reported period.

J-Curve effect – Occurs when funds experience negative returns for the first several years. This is a common experience, as the early years of the fund include capital drawdowns and an investment portfolio that has yet to mature. If the fund is well managed, it will eventually recover from its initial losses and the returns will form a J-curve: losses in the beginning dip down below the initial value, and later returns show profits above the initial level.

K-1 – Tax document issued for an investment in partnership interests to report your share of income, deductions and credits. (Note that Private Investments generally issue a Schedule K-1 instead of a Form 1099 for tax reporting. K-1s may at times be issued later than 1099s, requiring investors to file for an extension).

Limited partner – An investor in a Limited Partnership, which is a form of legal entity used for certain hedge funds, private equity funds and real estate funds.

Management fee – Fee paid to a fund manager for managing the fund; typically calculated as a percentage of assets under management

Mezzanine finance – Loan finance that is half-way between equity and secured debt, either unsecured or with junior access to security. A mezzanine fund is a fund focusing on mezzanine financing.

Multiple of Invested Capital (MOIC) – Calculation performed by adding the remaining (reported) value and the distributions received (cash out) and subsequently dividing that amount by the total capital contributed (cash in).

Net asset value (NAV) – This is the current fair stated value for each of the investments, as reported by the administrator of the fund.

Net IRR – The dollar-weighted internal rate of return, net of management fees and carried interest generated by the fund. This return considers the daily timing of all cash flows and the cumulative fair stated value, as of the end of the reported period.

J.P. Morgan Asset Management – Definitions

Open-ended fund – As it relates to private alternatives (not mutual fund structure), an open-ended fund is a fund that has no stated term or maturity and allows clients to invest and redeem on an ongoing basis. The frequency of investments (aka subscriptions) and / or redemptions may vary. Redemptions from open-ended private alternative funds generally require advance notice in writing.

Pari Passu – At an equal rate or pace, without preference.

Portfolio company – A business entity that has secured at least one round of financing from one or more private equity funds. A company in which a given fund has invested.

Post-money valuation – The valuation of a company immediately after the most recent round of financing. For example, a venture capitalist may invest \$3.5 million in a company valued at \$2 million “pre-money” (before the investment was made). As a result, the startup will have a post money valuation of \$5.5 million.

Pre-money valuation – The valuation of a company prior to a round of investment. This amount is determined by using various calculation methods, such as multiples to earnings or comparable to other private and/or public companies.

Preferred return – Also known as Hurdle Rate.

Private equity – Equity capital invested in a private company through a negotiated process.

Primary investment – An investment made in newly formed limited partnership.

Real estate investment trust (REITs) – Are stocks listed on an exchange that represent an interest in a pool of real estate properties.

Realized value – The amount of capital extracted from an investment.

Reported/remaining value – The current stated value for each of the investments in a fund, as reported by the General Partner of the fund.

Return on equity (RoE) - Amount of net income returned as a percentage of shareholders' equity.

Secondary market investment – The buying and selling of pre-existing investor commitments.

Seed money – The first round of capital for a start-up business. Seed money usually takes the structure of a loan or an investment in preferred stock or convertible bonds, although sometimes it is common stock. Seed money provides startup companies with the capital required for their initial development and growth. Angel investors and early-stage venture capital funds often provide seed money.

Tax documents – See K-1

Total value – The combination of market value and realized value of an investment. Shows the total worth of an investment.

Unfunded commitment – Money that has been committed to an investment but not yet transferred to the General Partner.

Venture capital – A specialized form of private equity, characterized chiefly by high-risk investment in new or young companies following a growth path in technology and other value-added sectors.

Vintage year – The year of fund formation and first draw-down of capital.

Write-down – A reduction in the value of an investment.

J.P. Morgan Asset Management – Risks & disclosures

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