Guide to Alternatives

4Q 2019 | As of November 30, 2019
Alts in aggregate
3. Alternatives fundraising
4. Public and private market correlations
5. Alternatives and manager selection
6. Yield alternatives
7. Alternatives and ESG

Global real estate
8. Global real estate investment
9. U.S. real estate dynamics
10. U.S. real estate: Residential and retail
11. U.S. real estate: Industrial
12. U.S. REITs and real estate
13. U.S. public and private real estate
14. U.S. REITs sector returns
15. European property yields and flows
16. Sources of European property returns
17. APAC real estate: Industrial
18. APAC real estate: Japan residential and Australia office

Global infrastructure and transport
19. The state of global infrastructure
20. Sources of global infrastructure returns
21. U.S. utilities: ROE, inflation and rates
22. Global renewable energy
23. Global trade by geography and product
24. Global banks’ shipping finance
25. Global transportation dynamics

Private markets
26. Private market dynamics
27. Private equity deals and multiples
28. Private equity deal trends
29. U.S. public vs. private equity
30. Private equity exit activity
31. Private equity distributions and the secondary market
32. Credit returns across recent economic cycles: 2004 - 2019
33. Credit market participants and issuance
34. U.S. middle market lending: Multiples and spreads
35. Adjusted EBITDA and M&A transactions
36. Distressed credit: Non-performing loans

Hedge funds
37. Hedge fund strategy returns
38. Hedge funds and manager selection
39. Hedge fund flows
40. Hedge fund exposures
41. Hedge funds and traditional portfolios
42. Hedge funds and volatility

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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. Data may not sum to total due to rounding.
Data is based on availability as of November 30, 2019.
### Public and private market correlations

10-years, quarterly returns

<table>
<thead>
<tr>
<th>2009 - 2019</th>
<th>Global Bonds</th>
<th>Global Equities</th>
<th>U.S. Core RE</th>
<th>Europe Core RE</th>
<th>APAC Core RE</th>
<th>Global Core Infra</th>
<th>Direct Lending</th>
<th>Venture Capital</th>
<th>Private Equity</th>
<th>Equity Long/Short</th>
<th>Relative Value</th>
<th>Macro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Bonds</td>
<td>1.0</td>
<td></td>
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<td></td>
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<tr>
<td>Global Equities</td>
<td>0.3</td>
<td>1.0</td>
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<td>U.S. Core RE</td>
<td>-0.3</td>
<td>-0.5</td>
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<tr>
<td>Europe Core RE (Continental Europe)</td>
<td>-0.4</td>
<td>-0.3</td>
<td>0.6</td>
<td>1.0</td>
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<tr>
<td>APAC Core RE</td>
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<td>-0.4</td>
<td>0.8</td>
<td>0.7</td>
<td>1.0</td>
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</tr>
<tr>
<td>Global Core Infra</td>
<td>-0.2</td>
<td>-0.3</td>
<td>0.4</td>
<td>0.1</td>
<td>0.2</td>
<td>1.0</td>
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<td></td>
</tr>
<tr>
<td>Direct Lending</td>
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<td>-0.3</td>
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<td>1.0</td>
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</tr>
<tr>
<td>Venture Capital</td>
<td>-0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Equity</td>
<td>0.2</td>
<td>0.8</td>
<td>-0.3</td>
<td>-0.1</td>
<td>-0.2</td>
<td>-0.1</td>
<td>0.6</td>
<td>0.5</td>
<td>1.0</td>
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<tr>
<td>Equity Long/Short</td>
<td>0.2</td>
<td>1.0</td>
<td>-0.4</td>
<td>-0.3</td>
<td>-0.4</td>
<td>-0.3</td>
<td>0.6</td>
<td>0.3</td>
<td>0.9</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative Value</td>
<td>0.3</td>
<td>0.9</td>
<td>-0.6</td>
<td>-0.5</td>
<td>-0.6</td>
<td>-0.3</td>
<td>0.7</td>
<td>0.1</td>
<td>0.7</td>
<td>0.9</td>
<td>1.0</td>
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<tr>
<td>Macro</td>
<td>0.3</td>
<td>0.5</td>
<td>-0.2</td>
<td>0.0</td>
<td>-0.2</td>
<td>-0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
<td>0.5</td>
<td>0.4</td>
<td>1.0</td>
</tr>
</tbody>
</table>


Data is based on availability as of November 30, 2019.
Private and public manager dispersion
Based on returns from 2Q 2009 – 2Q 2019

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: 2Q 2009 – 2Q 2019 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 10-year horizon internal rate of return (IRR) ending 2Q 2019.
Data is based on availability as of November 30, 2019.
Guide to Alternatives

Yield alternatives


Data is based on availability as of November 30, 2019.
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 is based on availability as of November 30, 2019.

Global real estate investment

Billions USD

Sources: CBRE Research, RCA (Americas), J.P. Morgan Asset Management.
APAC is Asia Pacific. EMEA is Europe, Middle East and Africa.
Data is based on availability as of November 30, 2019.
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 by property type
Percent

U.S. real estate construction costs
Nonresidential fixed investment in structures, price index, y/y % chg.


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 is based on availability as of November 30, 2019.
Guide to Alternatives

**U.S. real estate: Residential and retail**

**Employment growth**
Year-over-year % change

- **'13**
- **'14**
- **'15**
- **'16**
- **'17**
- **'18**

Average: 1.5%

Oct. 2019: 1.2%

**Retail leasing activity**
Share of square footage leased by retailer type

- **Food & Beverage: 10%**
- **General retail and apparel: 36%**
- **Health and fitness: 13%**
- **Discount: 5%**
- **Other: 36%**

**U.S. homeownership rate by age of householder**
Change since 1Q15

- **< 35**: 2.9%
- **35 - 44**: 1.9%
- **45 - 54**: 0.0%
- **55 - 64**: -0.7%
- **65 +**: -0.1%


Data is based on availability as of November 30, 2019.
U.S. warehouse space under construction
Millions of square feet (MSF), vacancy rate

Sources: CBRE Econometric Advisors, J.P. Morgan Asset Management.
Data is based on availability as of November 30, 2019.
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 is based on availability as of November 30, 2019.
U.S. public and private real estate

Guide to Alternatives | 13

Composition of U.S. private and public real estate indices

Percent

- Residential, 25.3%
- Industrial, 19.3%
- Office, 33.8%
- Retail, 17.1%
- Data Centers, 10.7%
- Self Storage, 7.9%
- Healthcare, 13.3%
- Hotels, 4.9%
- Other*, 4.5%

ODCE: NCREIF Fund Index – Open End Diversified Core Equity
WILRESI: Wilshire US Real Estate Securities Index

Global data center IP traffic growth

Zettabytes per year

- '16: 6.8
- '17: 9.1
- '18: 11.6
- '19E: 14.1
- '20E: 17.1
- '21E: 20.6

Source: NCREIF, Wilshire, CISCO, J.P. Morgan Asset Management.

ODCE is the NCREIF Fund Index – Open End Diversified Core Equity, which is a benchmark for U.S. core real estate. WILRESI is Wilshire US Real Estate Securities Index, which is a benchmark for U.S. REITs.

*Other in ODCE consists of hotels, healthcare, self-storage and land. **Other in WILRESI consists of single-family homes among additional property types. Data center IP traffic growth is based on forecasts from Cisco for 2019, 2020 and 2021.

Data is based on availability as of November 30, 2019.
U.S. REITs sector returns

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>63.0%</td>
<td>47.0%</td>
<td>35.2%</td>
<td>31.3%</td>
<td>10.5%</td>
<td>46.2%</td>
<td>30.7%</td>
<td>24.9%</td>
<td>11.4%</td>
<td>43.7%</td>
<td>22.2%</td>
<td>29.8%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>40.9%</td>
<td>34.6%</td>
<td>22.0%</td>
<td>28.2%</td>
<td>Self Storage</td>
<td>39.6%</td>
<td>Mfgd. Homes</td>
<td>39.6%</td>
<td>Mfgd. Homes</td>
<td>14.2%</td>
<td>20.6%</td>
<td>Industrial</td>
<td>7.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>Office</td>
<td>Shopping Centers</td>
<td>Mfgd. Homes</td>
<td>20.4%</td>
<td>Shopping Centers</td>
<td>25.0%</td>
<td>Health Care</td>
<td>7.4%</td>
<td>Health Care</td>
<td>33.3%</td>
<td>Apartments</td>
<td>Industrial</td>
<td>16.5%</td>
<td>7.7%</td>
<td>Apartments</td>
</tr>
<tr>
<td>2012</td>
<td>Apartments</td>
<td>Regional Malls</td>
<td>30.8%</td>
<td>20.4%</td>
<td>Industrial</td>
<td>5.6%</td>
<td>Mfgd. Homes</td>
<td>47.6%</td>
<td>Self Storage</td>
<td>4.7%</td>
<td>Regional Malls</td>
<td>All Equity</td>
<td>8.6%</td>
<td>5.2%</td>
<td>Self Storage</td>
</tr>
<tr>
<td>2013</td>
<td>All Equity</td>
<td>Self Storage</td>
<td>Apartments</td>
<td>29.3%</td>
<td>Health Care</td>
<td>13.6%</td>
<td>Office</td>
<td>Regional Malls</td>
<td>32.6%</td>
<td>Shopping Centers</td>
<td>All Equity</td>
<td>4.7%</td>
<td>2.9%</td>
<td>Office</td>
<td>Sal Equity</td>
</tr>
<tr>
<td>2014</td>
<td>Health Care</td>
<td>24.6%</td>
<td>Mfgd. Homes</td>
<td>27.0%</td>
<td>Office</td>
<td>Regional Malls</td>
<td>All Equity</td>
<td>2.9%</td>
<td>Industrial</td>
<td>2.8%</td>
<td>Shopping Centers</td>
<td>3.7%</td>
<td>Seymour</td>
<td>14.0%</td>
<td>Business</td>
</tr>
<tr>
<td>2015</td>
<td>Industrial</td>
<td>12.2%</td>
<td>Office</td>
<td>-0.8%</td>
<td>Regional Malls</td>
<td>-1.0%</td>
<td>All Equity</td>
<td>2.9%</td>
<td>6.0%</td>
<td>Office</td>
<td>Regional Malls</td>
<td>-7.0%</td>
<td>21.0%</td>
<td>6.0%</td>
<td>12.5%</td>
</tr>
<tr>
<td>2016</td>
<td>Self Storage</td>
<td>8.4%</td>
<td>Office</td>
<td>-1.7%</td>
<td>Industrial</td>
<td>5.2%</td>
<td>Apartments</td>
<td>-7.1%</td>
<td>25.9%</td>
<td>Office</td>
<td>Regional Malls</td>
<td>-14.5%</td>
<td>-2.7%</td>
<td>-7.2%</td>
<td>25.5%</td>
</tr>
<tr>
<td>2017</td>
<td>Shopping Centers</td>
<td>18.4%</td>
<td>Industrial</td>
<td>6.9%</td>
<td>Health Care</td>
<td>-7.2%</td>
<td>Industrial</td>
<td>Health Care</td>
<td>-8.1%</td>
<td>Self Storage</td>
<td>-14.5%</td>
<td>Regional Malls</td>
<td>-4.6%</td>
<td>6.0%</td>
<td>18.4%</td>
</tr>
</tbody>
</table>

Sources: FTSE NAREIT, FactSet, J.P. Morgan Asset Management.
All indices are from FTSE NAREIT. Mfgd. Homes represents manufactured homes. YTD (year-to-date) returns are through 9/30/2019.
Data is based on availability as of November 30, 2019.
**EU-15 property yields by sector**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Average</th>
<th>3Q19</th>
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</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>7.7%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Office</td>
<td>5.4%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Retail</td>
<td>5.1%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

**Capital flows by location and property type**

<table>
<thead>
<tr>
<th>Location</th>
<th>Domestic</th>
<th>Continental</th>
<th>Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paris Office</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>London Office</td>
<td></td>
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<td></td>
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<tr>
<td>Berlin Office</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Munich Office</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Madrid Apt</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Berlin Apt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amsterdam Office</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amsterdam Apt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frankfurt Office</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Madrid Office</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: RCA, CBRE, J.P. Morgan Asset Management.

EU-15 is Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom. Apt is apartment.

Data is based on availability as of November 30, 2019.
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 is based on availability as of November 30, 2019.
APAC real estate: Industrial

APAC online retail sales
Percent of total retail sales

APAC office and industrial pricing
Yields

Sources: Oxford Economics, Jones Lang LaSalle REIS, CBRE, J.P. Morgan Asset Management.
Data is based on availability as of November 30, 2019.
Sources: Association of Real Estate Securitization, Japan Property Index, Jones Lang LaSalle, J.P. Morgan Asset Management.
Data is based on availability as of November 30, 2019.
The state of global infrastructure

**Global infrastructure spending gap**

Percent, as a share of GDP

- Actual infrastructure spending, 2010 - 2015
- Gap between spending and infrastructure needs

<table>
<thead>
<tr>
<th>Country</th>
<th>2018: 24.8 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>8%</td>
</tr>
<tr>
<td>India</td>
<td>6%</td>
</tr>
<tr>
<td>Australia</td>
<td>4%</td>
</tr>
<tr>
<td>Canada</td>
<td>2%</td>
</tr>
<tr>
<td>Japan</td>
<td>0%</td>
</tr>
<tr>
<td>Mexico</td>
<td>-2%</td>
</tr>
<tr>
<td>United States</td>
<td>-4%</td>
</tr>
<tr>
<td>Brazil</td>
<td>-6%</td>
</tr>
<tr>
<td>France</td>
<td>-8%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>-10%</td>
</tr>
<tr>
<td>Germany</td>
<td>-12%</td>
</tr>
</tbody>
</table>

**Average age of U.S. infrastructure**

Years

- 2018: 24.8 years


The infrastructure spending gap is calculated by looking at the difference between actual and required infrastructure spending, converting to USD, and dividing by global GDP. This has been calculated from a set of 49 countries for which data are available for all sectors.

Data is based on availability as of November 30, 2019.
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 is based on availability as of November 30, 2019.
U.S. utilities: RoE, inflation and rates

Source: America’s Electric Utilities, Moody’s, SNL.com, Bloomberg, 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. Grey bars denote recessions.

Data is based on availability as of November 30, 2019.
Guide to Alternatives

Global renewable energy

Cost of wind, solar, natural gas and coal
Mean LCOE*, dollar per megawatt hour

Global new investment in clean energy
Billions USD

Source: Lazard, Bloomberg, 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 is based on availability as of November 30, 2019.
Global trade by geography and product

International shipping trade by region
Percent share in world tonnage, percent

<table>
<thead>
<tr>
<th>Region</th>
<th>Unloaded</th>
<th>Loaded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>Americas</td>
<td>14%</td>
<td>22%</td>
</tr>
<tr>
<td>Asia</td>
<td>41%</td>
<td>61%</td>
</tr>
<tr>
<td>Europe</td>
<td>19%</td>
<td>16%</td>
</tr>
<tr>
<td>Oceania</td>
<td>1%</td>
<td>14%</td>
</tr>
</tbody>
</table>

Source: UNCTAD, Clarksons, J.P. Morgan Asset Management.
Dry product consists of coal, ore, soybeans and bulk trade.
Data is based on availability as of November 30, 2019.

World seaborne trade by product
Estimated trillion ton miles

- Gas
- Container
- Oil and oil products
- Dry bulk

J.P.Morgan Asset Management
Global banks’ shipping finance

Shipping loans volume

Source: Dealogic, UNCTAD, J.P. Morgan Asset Management.
Data is based on availability as of November 30, 2019.
Numbers may not sum to 100% due to rounding.
Data is based on availability as of November 30, 2019.
Private market dynamics

Global private credit & equity fundraising
Billions USD

Returns by market and fund size
Public market PME’s vs. funds >$5bn AUM IRR

Global private capital dry powder
Trillions USD

Source: Preqin, Pitchbook, J.P. Morgan Asset Management.
IRR is internal rate of return.
Data is based on availability as of November 30, 2019.
Guide to Alternatives

Private equity deals and multiples

Global private equity deals
Share of total

- 2019
- Average (2006-2Q19)

U.S. LBOs: purchase price multiples
Equity and debt over trailing EBITDA

Data is based on availability as of November 30, 2019.
Private equity deal trends

Oil prices and natural resource exits
Energy & materials exit count, WTI oil price, y/y % change

Software investment and private equity
% U.S. PE deals targeting software companies, software inv. % GDP

Sources: BEA, Pitchbook, FactSet, J.P. Morgan Asset Management.
Software investment is represented by nonresidential fixed investment in software.
Data is based on availability as of November 30, 2019.
Number of listed U.S. companies*

Private vs. public equity sector weights


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

Data is based on availability as of November 30, 2019.
Private equity exit activity

**Private equity exits by type**

<table>
<thead>
<tr>
<th>Type</th>
<th>Sep. 2019</th>
<th>06-'18 avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary buyout</td>
<td>48.4%</td>
<td>34.1%</td>
</tr>
<tr>
<td>IPO</td>
<td>16.8%</td>
<td>15.9%</td>
</tr>
<tr>
<td>Corporate acquisition</td>
<td>34.9%</td>
<td>50.0%</td>
</tr>
</tbody>
</table>

**Number of IPOs**

- **U.S. IPOs with negative earnings**
  - Percent of all initial public offerings that year
  - 2018: 81%

**Sources:** Pitchbook, Jay Ritter, University of Florida, J.P. Morgan Asset Management.

Data is based on availability as of November 30, 2019.
Private equity distributions and the secondary market

Guide to Alternatives

Global capital calls and distributions
Billions USD

- Capital distributed
- Capital called
- Net distribution

Secondary market transaction volume and pricing
Secondary buyouts by year, $bn, percent of net asset value (NAV)

Credit returns across recent economic cycles: 2004 - 2019

**Expansion**
Manufacturing ISM > 50 and rising

- 10y UST: 0.2%
- 2y UST: -0.3%
- U.S. IG: 1.1%
- U.S. HY: 2.8%
- U.S. leveraged loans: 2.1%
- U.S. direct lending: 3.0%

**Recession**
Manufacturing ISM < 50 and falling

- 10y UST: 3.7%
- 2y UST: 1.5%
- U.S. IG: -0.6%
- U.S. HY: -4.1%
- U.S. leveraged loans: -4.7%
- U.S. direct lending: -1.4%

**Late cycle cooling**
Manufacturing ISM > 50 and falling

- 10y UST: -0.3%
- 2y UST: 0.7%
- U.S. IG: 1.6%
- U.S. HY: 1.7%
- U.S. leveraged loans: 1.0%
- U.S. direct lending: 2.5%

**Turnaround**
Manufacturing ISM < 50 and rising

- 10y UST: -1.6%
- 2y UST: 0.7%
- U.S. IG: 4.6%
- U.S. HY: 9.4%
- U.S. leveraged loans: 8.1%
- U.S. direct lending: 2.3%


Data is based on availability as of November 30, 2019.
Credit market participants and issuance

**U.S. leveraged loan market participants**
Share of total market, percent

- Global banks
- Non-bank companies and funds

<table>
<thead>
<tr>
<th>Year</th>
<th>Global banks</th>
<th>Non-bank companies and funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>72%</td>
<td>28%</td>
</tr>
<tr>
<td>2000</td>
<td>46%</td>
<td>54%</td>
</tr>
<tr>
<td>2006</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>2012</td>
<td>13%</td>
<td>87%</td>
</tr>
<tr>
<td>2018</td>
<td>9%</td>
<td>91%</td>
</tr>
</tbody>
</table>

**Covenant-lite loan issuance**
Percent of U.S. issuance in institutional leveraged loans

- '07: 30%
- '08: 13%
- '09: 9%
- '10: 8%
- '11: 7%
- '12: 6%
- '13: 5%
- '14: 4%
- '15: 3%
- '16: 2%
- '17: 1%
- '18: 0%


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 is based on availability as of November 30, 2019.
U.S. middle market: Multiples and spreads

**U.S. middle market LBOs: purchase price multiples**
Deals ≤ $50M EBITDA

<table>
<thead>
<tr>
<th>Year</th>
<th>Equity</th>
<th>Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>'07</td>
<td>3.4x</td>
<td>5.6x</td>
</tr>
<tr>
<td>'08</td>
<td>3.8x</td>
<td>4.5x</td>
</tr>
<tr>
<td>'09</td>
<td>3.4x</td>
<td>4.3x</td>
</tr>
<tr>
<td>'10</td>
<td>4.1x</td>
<td>3.2x</td>
</tr>
<tr>
<td>'11</td>
<td>3.7x</td>
<td>4.3x</td>
</tr>
<tr>
<td>'12</td>
<td>3.3x</td>
<td>4.5x</td>
</tr>
<tr>
<td>'13</td>
<td>4.1x</td>
<td>4.6x</td>
</tr>
<tr>
<td>'14</td>
<td>4.3x</td>
<td>5.3x</td>
</tr>
<tr>
<td>'15</td>
<td>5.3x</td>
<td>5.0x</td>
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<tr>
<td>'16</td>
<td>5.0x</td>
<td>5.8x</td>
</tr>
<tr>
<td>'17</td>
<td>6.1x</td>
<td>5.8x</td>
</tr>
<tr>
<td>'18</td>
<td>7.4x</td>
<td></td>
</tr>
<tr>
<td>'19</td>
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</tr>
</tbody>
</table>

**U.S. middle market and large corporate lending spreads**
Based on 3-month U.S. dollar LIBOR

<table>
<thead>
<tr>
<th>Year</th>
<th>Middle Market</th>
<th>Large Corporate</th>
</tr>
</thead>
<tbody>
<tr>
<td>'99</td>
<td>L + 600</td>
<td>L + 300</td>
</tr>
<tr>
<td>'00</td>
<td>L + 500</td>
<td>L + 400</td>
</tr>
<tr>
<td>'01</td>
<td>L + 400</td>
<td>L + 400</td>
</tr>
<tr>
<td>'02</td>
<td>L + 300</td>
<td>L + 400</td>
</tr>
<tr>
<td>'03</td>
<td>L + 200</td>
<td>L + 500</td>
</tr>
<tr>
<td>'04</td>
<td>L + 300</td>
<td>L + 400</td>
</tr>
<tr>
<td>'05</td>
<td>L + 200</td>
<td>L + 500</td>
</tr>
<tr>
<td>'06</td>
<td>L + 300</td>
<td>L + 500</td>
</tr>
<tr>
<td>'07</td>
<td>L + 200</td>
<td>L + 500</td>
</tr>
<tr>
<td>'08</td>
<td>L + 300</td>
<td>L + 500</td>
</tr>
<tr>
<td>'09</td>
<td>L + 200</td>
<td>L + 500</td>
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<td>'10</td>
<td>L + 300</td>
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<tr>
<td>'11</td>
<td>L + 200</td>
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<td>L + 300</td>
<td>L + 500</td>
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<td>L + 300</td>
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<tr>
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<td>L + 200</td>
<td>L + 500</td>
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<tr>
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<td>L + 300</td>
<td>L + 500</td>
</tr>
<tr>
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<td>L + 200</td>
<td>L + 500</td>
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<tr>
<td>'18</td>
<td>L + 300</td>
<td>L + 500</td>
</tr>
<tr>
<td>'19</td>
<td>L + 200</td>
<td>L + 500</td>
</tr>
</tbody>
</table>

Data is based on availability as of November 30, 2019.
Adjusted EBITDA (earnings before interest, taxes, depreciation, and amortization) is a measure computed for a company that takes its earnings and adds back interest expenses, taxes, and depreciation charges, plus other adjustments to the metric.

Data is based on availability as of November 30, 2019.
Distressed credit: Non-performing loans

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 is based on availability as of November 30, 2019.
Hedge fund strategy returns

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<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Equities 35.4%</td>
<td>Global Equities 13.2%</td>
<td>Global Bonds 5.6%</td>
<td>Global Equities 16.8%</td>
<td>Global Equities 23.4%</td>
<td>Global Macro 5.6%</td>
<td>Eq. Market Neutral 4.3%</td>
<td>Distressed 15.1%</td>
<td>Global Equities 24.6%</td>
<td>Merger Arbitrage 3.3%</td>
<td>Global Equities 16.7%</td>
<td>Global Equities 10.0%</td>
</tr>
<tr>
<td>Distressed 28.1%</td>
<td>Distressed 12.1%</td>
<td>Merger Arbitrage 1.5%</td>
<td>Relative Value 10.6%</td>
<td>Global Equities 14.3%</td>
<td>Global Equities 4.7%</td>
<td>Merger Arbitrage 3.3%</td>
<td>Global Equities 8.5%</td>
<td>Equity Long/Short 13.3%</td>
<td>Relative Value -0.4%</td>
<td>Equity Long/Short 7.8%</td>
<td>Relative Value 6.9%</td>
</tr>
<tr>
<td>Relative Value 25.8%</td>
<td>Relative Value 11.4%</td>
<td>Relative Value 0.1%</td>
<td>Distressed 10.1%</td>
<td>Distressed 14.0%</td>
<td>Relative Value 4.0%</td>
<td>Relative Value 7.7%</td>
<td>HFRI Composite 8.6%</td>
<td>Eq. Market Neutral -1.0%</td>
<td>HFRI Composite 6.8%</td>
<td>Distressed 6.8%</td>
<td>Distressed 7.8%</td>
</tr>
<tr>
<td>Equity Long/Short 24.6%</td>
<td>Equity Long/Short 10.5%</td>
<td>Distressed -1.8%</td>
<td>Equity Long/Short 7.4%</td>
<td>HFRI Composite 9.3%</td>
<td>Eq. Market Neutral 3.1%</td>
<td>Equity Long/Short -1.0%</td>
<td>Equity Long/Short 5.5%</td>
<td>Global Bonds 7.4%</td>
<td>Global Bonds -1.2%</td>
<td>Global Bonds 6.8%</td>
<td>Global Macro 5.6%</td>
</tr>
<tr>
<td>HFRI Composite 20.0%</td>
<td>HFRI Composite 10.2%</td>
<td>Eq. Market Neutral -2.1%</td>
<td>HFRI Composite 6.4%</td>
<td>HFRI Composite 7.1%</td>
<td>HFRI Composite 3.0%</td>
<td>HFRI Composite -1.1%</td>
<td>HFRI Composite 5.4%</td>
<td>Distressed 6.3%</td>
<td>Distressed -1.7%</td>
<td>HFRI Composite 6.3%</td>
<td>HFRI Composite 4.9%</td>
</tr>
<tr>
<td>Merger Arbitrage 11.6%</td>
<td>Global Macro 8.1%</td>
<td>Global Macro -4.2%</td>
<td>Global Bonds 4.3%</td>
<td>Eq. Market Neutral 6.5%</td>
<td>Equity Long/Short 1.8%</td>
<td>Global Macro -1.3%</td>
<td>Merger Arbitrage 3.6%</td>
<td>Relative Value 5.1%</td>
<td>Relative Value -4.1%</td>
<td>Merger Arbitrage 4.1%</td>
<td>Relative Value 4.8%</td>
</tr>
<tr>
<td>Global Bonds 6.9%</td>
<td>Global Bonds 5.5%</td>
<td>HFRI Composite -5.3%</td>
<td>Eq. Market Neutral 3.0%</td>
<td>Merger Arbitrage 4.7%</td>
<td>Merger Arbitrage 1.7%</td>
<td>Global Equities -1.8%</td>
<td>Eq. Market Neutral 2.2%</td>
<td>Eq. Market Neutral 4.9%</td>
<td>HFRI Composite -4.7%</td>
<td>Merger Arbitrage 4.3%</td>
<td>Global Bonds 2.5%</td>
</tr>
<tr>
<td>Global Macro 4.3%</td>
<td>Merger Arbitrage 4.6%</td>
<td>Global Equities -6.9%</td>
<td>Merger Arbitrage 2.8%</td>
<td>Global Macro -0.4%</td>
<td>Global Bonds 0.6%</td>
<td>Global Bonds -3.2%</td>
<td>Global Bonds 2.1%</td>
<td>Merger Arbitrage 4.3%</td>
<td>Equity Long/Short -7.1%</td>
<td>Distressed 3.0%</td>
<td>Eq. Market Neutral 2.5%</td>
</tr>
<tr>
<td>Eq. Market Neutral 1.4%</td>
<td>Eq. Market Neutral 2.9%</td>
<td>Equity Long/Short -8.4%</td>
<td>Global Bonds -0.1%</td>
<td>Global Bonds -2.6%</td>
<td>Distressed -1.4%</td>
<td>Distressed -8.1%</td>
<td>Global Macro 1.0%</td>
<td>Global Macro 2.2%</td>
<td>Global Equities -8.9%</td>
<td>Eq. Market Neutral 1.9%</td>
<td>Eq. Market Neutral 1.0%</td>
</tr>
</tbody>
</table>

Source: MSCI, Bloomberg Barclays, HFRI, FactSet, 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. HFRI Composite: HFRI FW Composite Index. Returns may fluctuate as hedge fund reporting occurs on a lag. Please see disclosure pages for index definitions. YTD (year-to-date) returns are through 9/30/2019.

Data is based on availability as of November 30, 2019.
Hedge fund manager dispersion
Based on returns from 2Q 2009 – 2Q 2019

Sources: HFRI, J.P. Morgan Asset Management.
Manager dispersion is based on: 2Q 2009 to 2Q 2019 monthly returns for hedge funds. Blue bar denotes median. All hedge funds: Fund Weighted Composite Index, Equity market neutral: Equity hedge – equity market neutral, Event-driven: Event-Driven (Total), Relative value: Relative Value (Total), Relative value multi-strategy: Relative Value Multi-Strategy, Macro total: Macro (Total), Equity hedge: Equity Hedge (Total), Emerging markets: Emerging Markets Global.
Data is based on availability as of November 30, 2019.
Hedge funds

Hedge fund net asset flow
Billions USD

Sources: HFRI, J.P. Morgan Asset Management.
Data is based on availability as of November 30, 2019.
Hedge fund exposures

Sector exposure of top 50 hedge funds
% of total portfolio

Computing power: transistors per microprocessor
Log

Global data size
Zettabytes

Sources: FactSet, Our World in Data, IDC, J.P. Morgan Asset Management.

Zettabyte is a measure of digital information storage. One zettabyte is equivalent to a billion terabytes.

Data is based on availability as of November 30, 2019.

J.P.Morgan
Asset Management
Hedge funds and traditional portfolios

Hedge fund correlation with a 60/40 stock-bond portfolio*
1990 – present, monthly

Sources: HFRI, Standard & Poor’s, Bloomberg, Barclays, FactSet, J.P. Morgan Asset Management.

*60/40 portfolio is 60% S&P 500 and 40% Bloomberg Barclays U.S. Aggregate. Hedge funds are represented by HFRI Macro.

Data is based on availability as of November 30, 2019.
Hedge funds and volatility

Average monthly hedge fund returns by VIX level, 1990 - present

Source: HFRI, CBOE, MSCI, FactSet, J.P. Morgan Asset Management.

Historical beta is based on regression analysis, where the HFRI is the dependent variable and the MSCI AC World Index is the independent variable.

Monthly VIX reading is an average. Numbers may not sum to 100% due to rounding.

Data is based on availability as of November 30, 2019.
**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.

**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.
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 a newly formed limited partnership.

Real estate investment trust (REITs) – 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.
The Market Insights program provides comprehensive data and commentary on global markets without reference to products. Designed as a tool to help clients understand the markets and support investment decision-making, the program explores the implications of current economic data and changing market conditions.

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