

EYE ON THE MARKET

Food Fight: An update on private equity performance vs public equity markets

MICHAEL CEMBALEST | JP MORGAN ASSET AND WEALTH MANAGEMENT



Food Fight. Every two years, we take a close look at the performance of the private equity industry given its rising share of institutional and individual portfolios. Our findings this year: the private equity industry is still outperforming public equity, but this outperformance is narrowing as all markets benefit from non-stop monetary and fiscal stimulus, and as private equity acquisition multiples rise. We examine manager dispersion, benchmarks, co-investing, GP-led secondary funds, the torrid pace of industry fundraising and manager fees in this year's piece.

J.P.Morgan

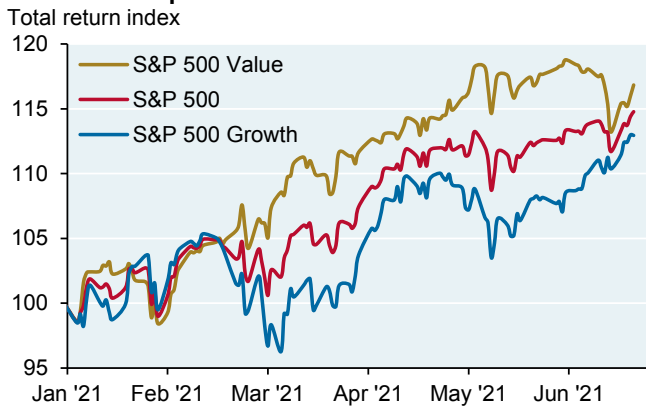
MICHAEL CEMBALEST
 Chairman of Market and Investment Strategy
 J.P. Morgan Asset Management

Every two years, we examine the performance of the private equity industry given its rising share of institutional and individual portfolios. Our findings: private equity is still outperforming public equity, but outperformance narrowed as all markets benefit from non-stop stimulus, and as private equity acquisition multiples rise. We examine manager dispersion, benchmarks, co-investing, GP-led secondary funds, the torrid pace of industry fundraising and manager fees in this year's piece.

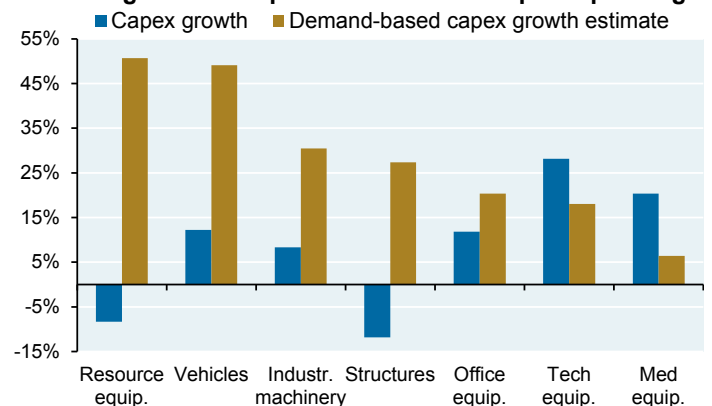
As for public equity markets, the slower rate of gains since April is consistent with data we're seeing. There's a robust recovery in earnings, household/capital spending and other activity, but there's also a disconnect between accommodative Fed policy, exhaustible supplies of labor and equity valuations. The latest comments from the Fed on gradual normalization of monetary policy are consistent with peak valuations and further market gains being driven by earnings only. The next hurdle for US equities: rising domestic and international taxes whose blueprints are still being worked out.

A brief comment on COVID, which you can continue to track on our [virus web portal](#). Infections and mortality are plummeting in the developed world, as Latin America stands out as the last unrelenting hotspot. But the US, whose vaccination rates are now being eclipsed by Europe, Canada and China, has pockets of unvaccinated people still heavily affected by the disease. As shown below, US COVID hospitalizations among the unvaccinated are 2x-3x levels for the entire population in certain states. The recent UK infection spike despite 65% vaccination is a warning of what could occur elsewhere.

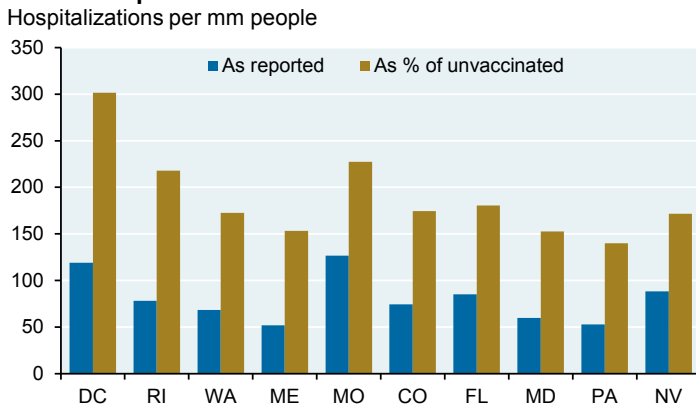
YTD S&P 500 performance



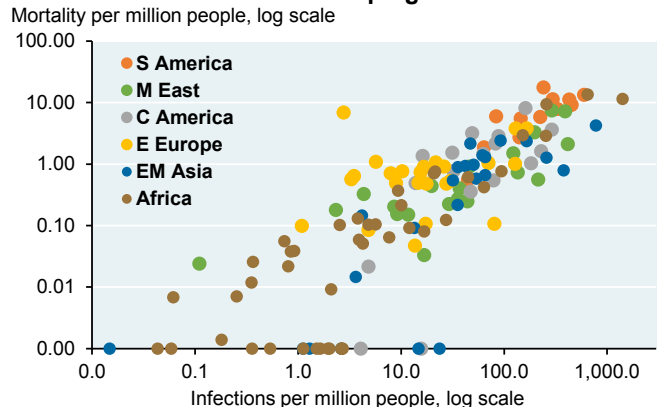
US leading indicators point to a lot more capital spending



COVID hospitalizations and the unvaccinated



Latest COVID trends in Developing Countries





Food Fight: 2021 private equity update

The question of whether private equity outperforms public equity continues to be a hotly debated issue in investment finance. In the latest food fight, Steve Kaplan at the University of Chicago takes on Ludovic Phalippou from the University of Oxford. Phalippou is the author of “*Private Equity Laid Bare*”, has a podcast with the same name, and asserts that private equity managers have not outperformed net of fees. Kaplan disagrees; the schematic below outlines the main points of dispute¹. We’ll get into the details later but for now, think of the public market equivalent (PME) measure as a multiple of invested capital of private equity *relative* to public equity, and where a PME > 1.00 indicates that private equity outperformed.

Phalippou: “Private equity has underperformed public equity”

Private equity PME = 0.99 from 2006 to 2015 using the S&P 500 as a benchmark

Kaplan: “Yes, but all other time periods show PE outperformance”

All contiguous periods from 1996 to 2015 show a private equity PME > 1 *except* for 2006 to 2015

Kaplan: “Phalippou’s definition of private equity is too broad”

Phalippou’s private equity universe includes real assets, real estate, infrastructure and energy. When private equity is defined just as **buyout, growth equity and venture capital**, private equity PME = 1.05 even when using Phalippou’s time period of 2006 to 2015

Phalippou: “If you remove underperforming real assets like oil & gas from the private equity universe, shouldn’t you remove them from the S&P benchmark too?”

Yes, in principle; the impact on the benchmark depends on the time period analyzed. For 2006 to 2017, the energy sector underperformed the S&P 500. However, given the 5%-15% modest weight of energy in the index, an S&P 500 ex-energy benchmark would only be 25-30 bps higher on an annualized basis.

Kaplan: “Phalippou’s use of the S&P 600 for an alternative small/mid-cap benchmark is odd”

Kaplan and Phalippou also compute PMEs using small/mid cap benchmarks. Kaplan uses the Russell 2000 while Phalippou uses the S&P 600. Around 90% of small cap managers use the Russell 2000, which is the industry standard. For buyout, growth equity and venture capital from 2006 to 2015: Private equity PME = 1.05 using S&P 500 or S&P 600, and 1.11 using Russell 2000

Phalippou: “Managers love to measure performance vs the Russell 2000 instead of the S&P 600”

The Russell 2000 has substantially underperformed the S&P 600 since the year 2000 due to the lack of an IPO seasoning requirement, no profitability tests, a smaller float requirement and its popularity with ETF investors since there is more buying/selling pressure when names are added or removed from the index

¹ **Another dispute:** Phalippou claimed in 2020 that private equity managers would need to increase earnings by 50% over a typical 4 year holding period to outperform public equity. Kaplan claims that Phalippou neglected to assume that private companies would use earnings to pay down debt (akin to ignoring dividends as part of total return on equities), in which case private equity earnings would need to grow by 10% rather than 50%.



Such differences of opinion have existed for years and date back to debates around which data sources to use for measuring private equity performance in the first place. Most analyses of private equity now use data sourced from limited partners rather than relying on other databases that can have significant problems due to voluntary reporting by managers and stale data (see page 21).

For our biennial private equity reviews, I find Kaplan’s analyses and similar ones from finance professors at Vanderbilt, University of Virginia and Duke to be sensible and devoid of an agenda to either praise or excoriate the private equity industry. Their analyses once again form the basis of this year’s Eye on the Market private equity review, which gets into detail on performance of buyout and venture capital on an industry-wide basis.

A few things to keep in mind. First, the private equity performance measures in this piece cover vintage years through and including 2017. For vintage years since then, not enough time has passed to analyze distributions and valuations relative to invested capital. Second, buyout and venture performance is net of management, incentive and other fees. Third, average industry returns weight each fund by the size of its commitments and distributions (i.e., size-weighted rather than equal-weighted).

Table of Contents

Absolute buyout performance	4
Relative buyout performance	5
Buyout funds: what is the “right” buyout performance benchmark?	6
Buyout manager dispersion	7
Drivers of buyout performance	8
Secondary private equity funds	9
Absolute and relative venture capital performance	10
Venture capital: performance benchmarks and manager dispersion	11
How are gains on venture-backed companies split between VC investors and post-IPO investors?	12
Buyout vs venture capital	13
What about private equity co-investments?	14
Fundraising and the pace of investment	15
Private equity fundraising vs market capitalization	16
On private equity fees	17
Recent academic papers on private equity	18
Appendix I: Other industry data	19
Appendix II: Return dispersion on buyout and venture transactions <i>within</i> commingled funds	20
Appendix III: Sources for private equity manager performance	21
Appendix IV: On IRR, Direct Alpha, cash flow timing and subscription lines	22

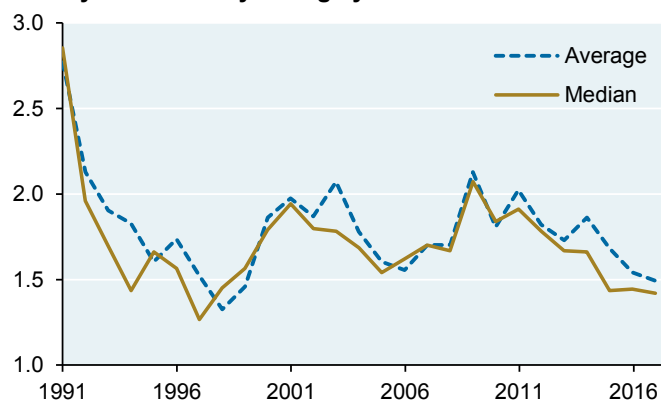


Absolute buyout performance

Let's start with buyout funds. The charts below show average and median multiples of invested capital (MOIC) and internal rate of return (IRR) since the early 1990's. MOIC is a simple measure of cash-in vs cash-out, while IRR is a time-weighted measure of return. Note how there's only a small gap between average and median buyout manager results.

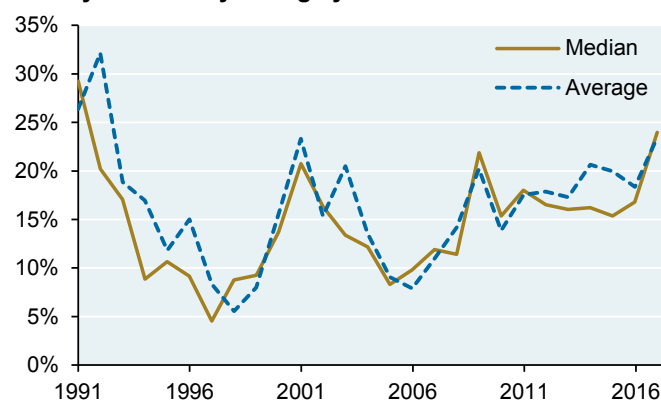
Before 2009, average MOICs and IRRs generally moved in tandem with each other. Since 2009, MOICs have been declining while IRRs have been rising. In theory, this could happen if managers generate smaller gains vs invested capital but deliver distributions to investors more quickly. In reality, the reason for rising IRRs despite falling MOIC is increased use of **subscription lines**: managers finance investments with bank loans and delay capital calls to LPs until later in the investment period. This practice increases the IRR of a fund at the expense of a small rise in MOIC, since LPs end up paying subscription line interest.

US buyout MOICs by vintage year



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

US buyout IRRs by vintage year



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

On subscription lines

- **IRR impact.** Estimates of the IRR impact of subscription lines vary. Cambridge Associates estimates that subscription lines could boost IRRs by 3% per year, while a Notre Dame study found that such lines would be less likely to materially impact IRR. In terms of actual data, Carnegie Mellon found a 2.6% increase in IRR while the Institutional Limited Partners Association points to a median IRR impact of no more than 0.45%²
- **Impact drivers.** The IRR impact depends on how long the lines are used for and what percentage of invested capital they are applied to. As an extreme example, assume that a manager used subscription lines for 100% of invested capital and held such lines outstanding until the end of the investment period. In this case, the IRR would rise by 7% from 15% to 22% (see Appendix III Base Case)
- **Arms race.** 87% of private equity poll respondents indicate that they are using or plan to use subscription lines. According to Mercer, the use of subscription lines of credit (SLCs) has grown 6x since 2010 with more than 90% of funds now using them³

² "Should you avoid commitment (facilities)?", Cambridge Associates, June 2018; "Private equity returns, cash flow timing, and investor choices", Larocque (Notre Dame) et al, August 2019; "Private Equity Fund Debt: Capital Flows, Performance, and Agency Costs", Albertus and Denes (Carnegie Mellon), May 2020; "Enhancing Transparency Around Subscription Lines of Credit", Institutional Limited Partners Association, June 2020.

³ "Fund Finance: Utilizing Credit Lines/Subscription Lines of Credit at the Fund Level", Haynes and Boone LLP, February 2018; "Dry powder meets low interest rates", Mercer, March 2021.



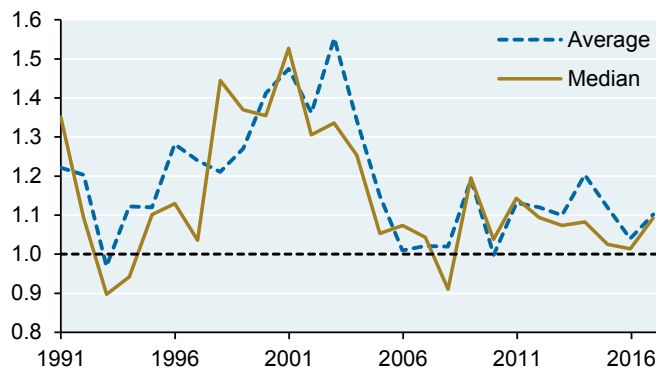
Relative buyout performance

MOIC is not time weighted and neither MOIC nor IRR measures performance vs public equity. Many analysts have converged on two concepts that address these shortfalls: **the Public Market Equivalent ratio and Direct Alpha**. PME compares private equity commitments and distributions to investments in public equity markets in the exact same time periods. The result is essentially an MOIC ratio of private equity performance vs the public equity benchmark used⁴. Direct Alpha converts the PME into annualized outperformance in percentage terms. Note how average and median results for buyout are similar, as they were for MOIC and IRR. Since subscription loans impact the timing of upfront cash flows, they can materially boost Direct Alpha as well as IRR.

Why have relative buyout returns declined? After the financial crisis in 2008-2009, the Fed and other central banks adopted “maximum accommodation” policies. These policies led to a sharp rise in public equity valuations. In addition, buyout acquisition multiples have increased as the food fight over private companies continues, propelled further by the SPAC boom (which we wrote about in detail [earlier this year](#)). So, higher buyout purchase prices and better-performing public equities have reduced buyout outperformance.

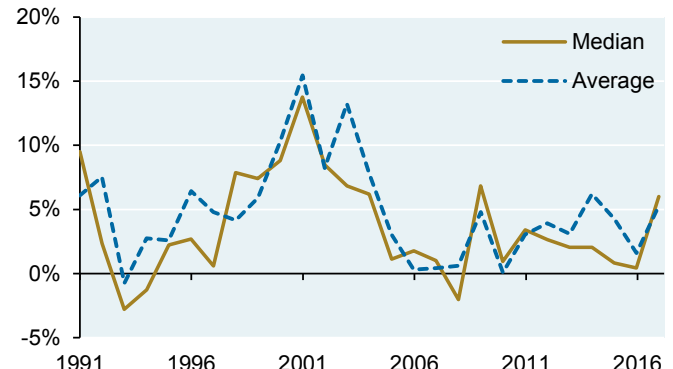
Are the recent annualized 1%-5% excess returns over public equity markets since 2009 enough given the illiquidity of private equity? Rather than apply an abstract derived cost of liquidity, most investors will judge for themselves whether these returns suffice based on their consistency and magnitude.

US buyout PMEs by vintage year
PME ratio vs S&P 500



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

US buyout direct alpha by vintage year
%, annualized vs S&P 500



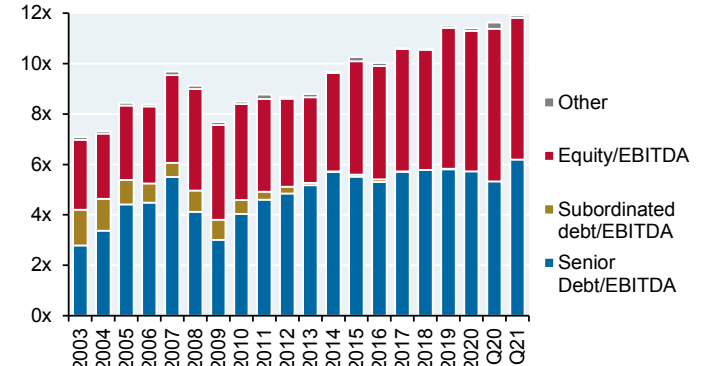
Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

S&P 500 price / earnings ratio
Price / forward 2 year earnings per share



Source: Bloomberg, J.P. Morgan. June 25, 2021.

Buyout purchase price multiples
Average EBITDA purchase price multiple for US LBO transactions



Source: S&P Global. 2021.

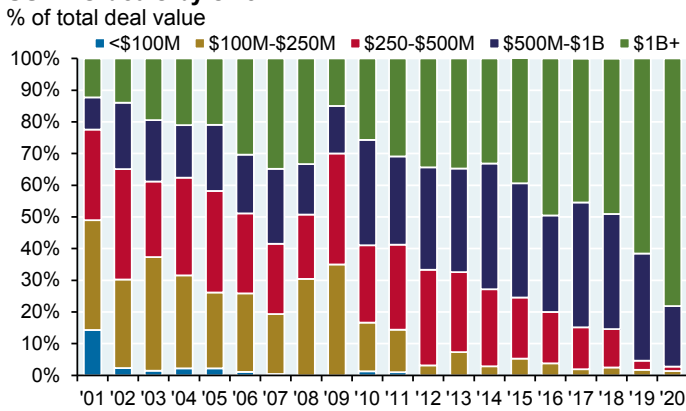
⁴ See “Private Equity Performance: Returns, Persistence and Capital Flows”, Kaplan and Schoar, University of Chicago, 2005 and “Benchmarking Private Equity: The Direct Alpha Method”, Gredil (UNC) et al, 2014.



Buyout funds: what is the “right” buyout performance benchmark?

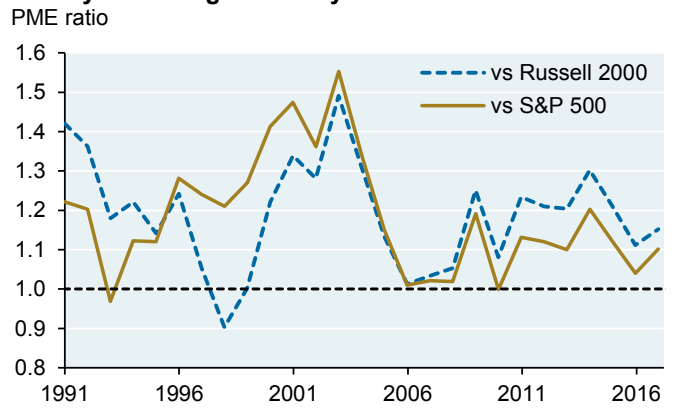
Some analysts are reluctant to use the S&P 500 as a benchmark for buyout managers that invest in smaller companies. While US buyout deal sizes have been rising (first chart), the average buyout is still much smaller than a typical large cap company. The median S&P 500 market cap is \$21 billion, the average US buyout is \$2.5 billion and the median Russell 2000 market cap is \$1.1 billion. In any case, the second chart shows PME using the Russell 2000 instead. The results reflect the relative performance of the S&P 500 vs the Russell 2000 over time. The third chart shows rolling performance of the Russell 2000 vs the S&P 600.

US LBO deals by size



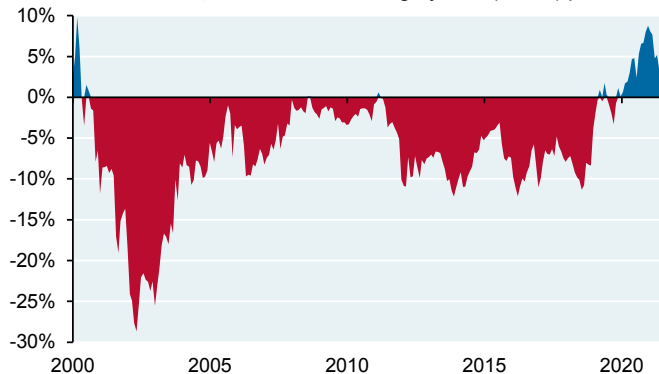
Source: S&P Global. 2021.

US buyout average PME by benchmark



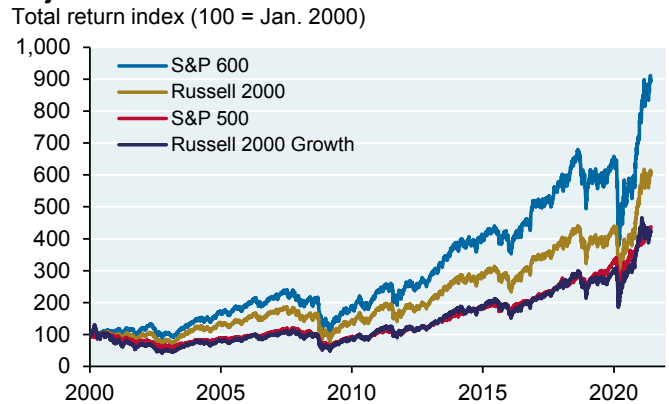
Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

The Russell 2000 has trailed the S&P 600 for most of the last two decades, Russell 2000 rolling 3yr out (under) performance



Source: Bloomberg. June 25, 2021.

Major index returns



Source: Bloomberg. June 25, 2021.

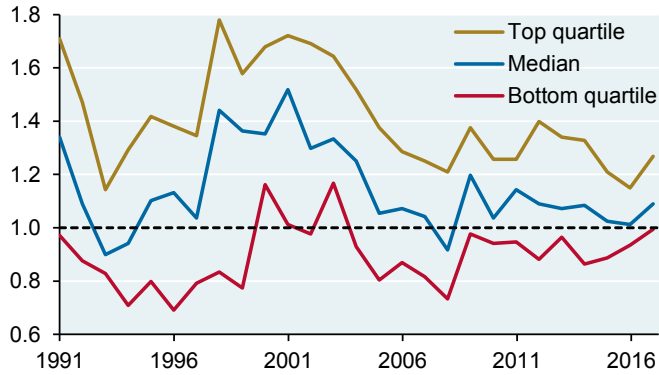


Buyout manager dispersion

Average/median managers have consistently outperformed, but what happens if you pick a below-average buyout manager? Since 2010, the gap between top and bottom quartile managers has narrowed compared to prior decades, and the degree of underperformance for bottom quartile managers is pretty modest.

US buyout PME quartiles by vintage year

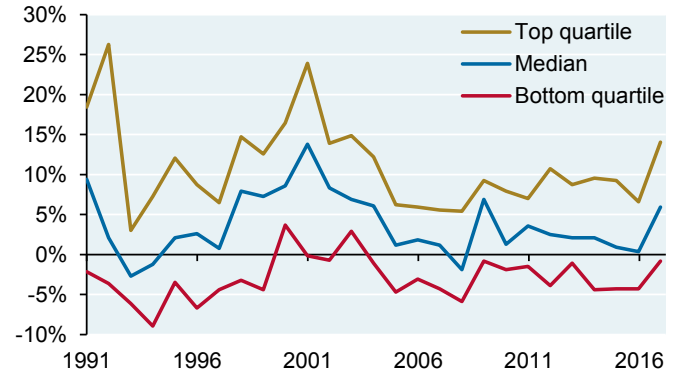
PME ratio vs S&P 500



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

US buyout direct alpha quartiles by vintage year

Direct alpha, annualized vs S&P 500

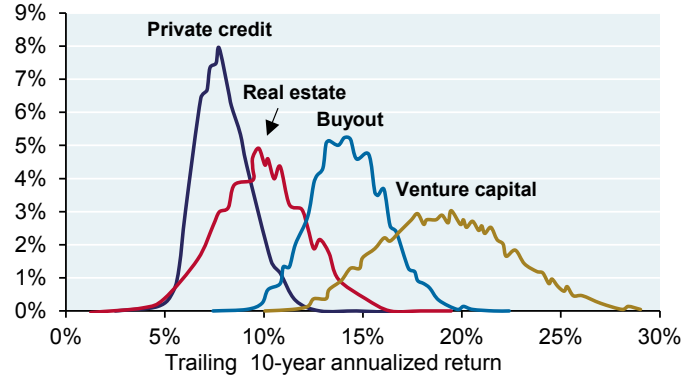


Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

The next chart illustrates absolute performance dispersion across venture, buyout, real estate and private credit.

Distribution of performance by strategy

% of funds



Source: Hamilton Lane. January 2021. Includes 2010-2019 vintage years.

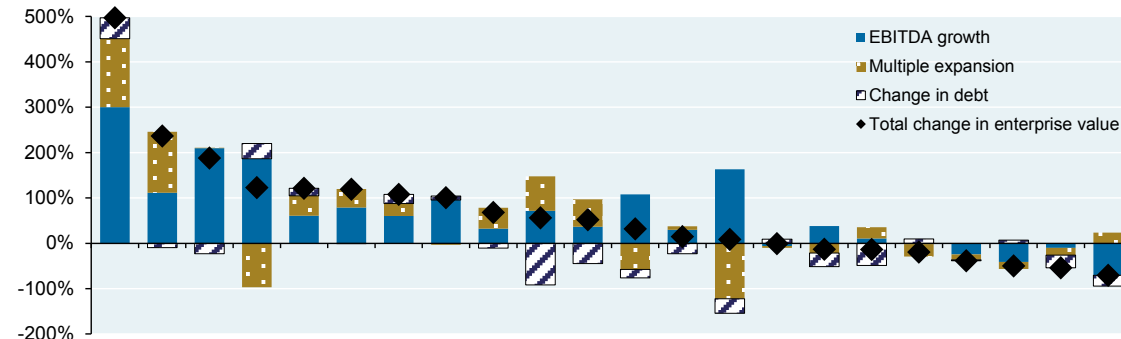


Drivers of buyout performance

While cash flow data sourced from limited partners is a reliable way to measure performance of private equity funds, it does not allow a closer look under the hood to see what drives that performance. We asked one of the larger buyout managers we know for company-specific data for three consecutive buyout funds they managed. We decomposed the change in enterprise value into three sources: cash flow (EBITDA) growth, changes in valuation multiples and change in debt levels. **In each case, operating cash flow improvements at the company accounted for more than half of the total change in enterprise value, and for more than the impact of multiple expansion.** This is not meant to be indicative of the industry as a whole, but it does illustrate that operating improvements can play a primary role in generation of returns.

Pre-GFC fund: Buyout return components

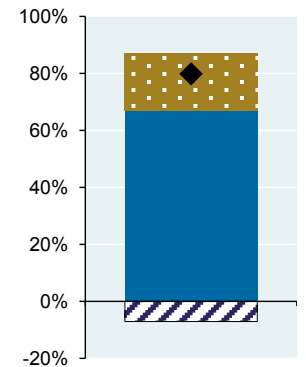
Investments sorted by cumulative enterprise value growth



Source: JP Morgan Private Bank. 2021.

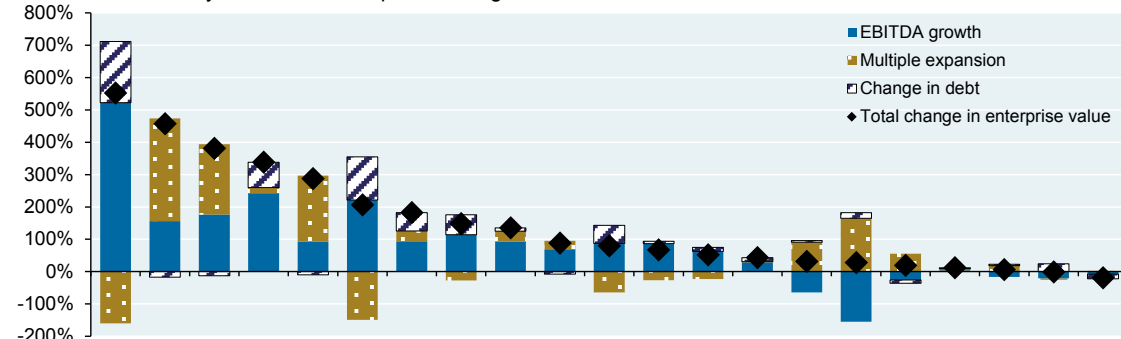
Aggregate results

Enterprise value weighted



Post-GFC fund I: Buyout return components

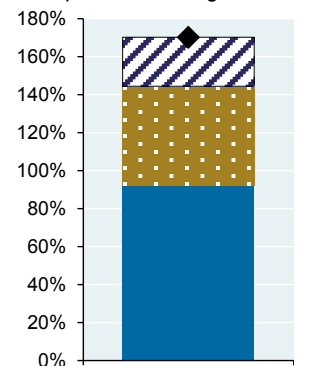
Investments sorted by cumulative enterprise value growth



Source: JP Morgan Private Bank. 2021.

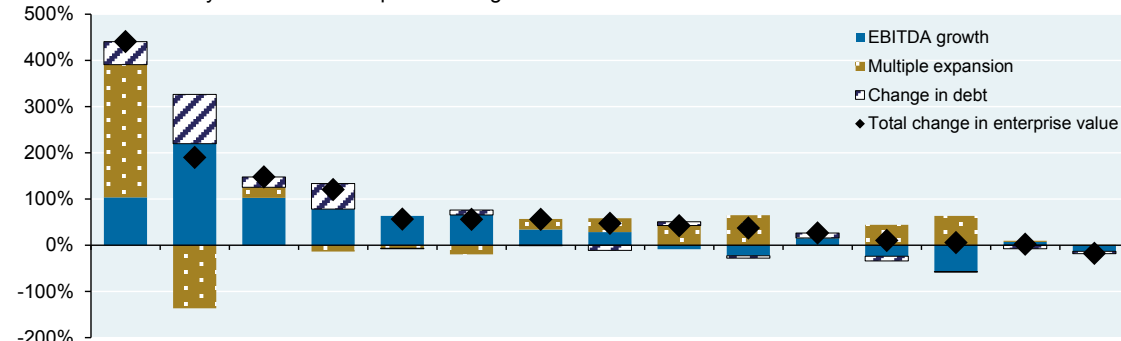
Aggregate results

Enterprise value weighted



Post-GFC fund II: Buyout return components

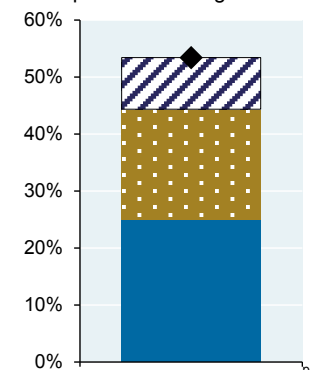
Investments sorted by cumulative enterprise value growth



Source: JP Morgan Private Bank. 2021.

Aggregate results

Enterprise value weighted



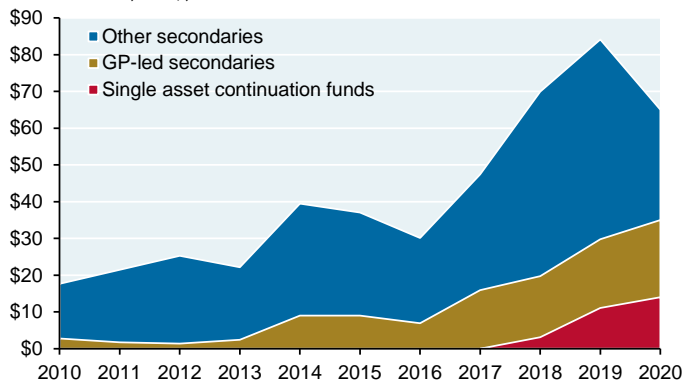


Secondary private equity funds

- Secondary private equity funds are pooled vehicles which buy seasoned private equity units or companies
- The original iteration of secondary funds involved the purchase of limited partner units, typically when LPs have liquidity needs, are repositioning private equity portfolios or when making some other asset allocation adjustment. These are referred to as “**LP-led transactions**” since the LPs are the one deciding to sell their units. Since 2010, average secondary market buyout prices for LP units have ranged between 85% and 100% of NAV, while average VC secondary prices have ranged from 75% to 85% of NAV
- Since 2014, another form of secondary fund has emerged: **GP-led transactions**. In this iteration, a lead LP investor approaches a GP with financing for a continuation fund to provide a “new lease on life” for the last remaining companies in a seasoned fund, perhaps when only a few companies are left. Normally, a GP would have to monetize these investments at the end of a fund’s life to a strategic buyer or another private equity fund. In GP-led transactions, these remaining deals are rolled into a new fund with the possibility of added capital investment from the original GPs and new LPs. LPs in the legacy fund have the option to either roll into the new fund or cash out
- In the earliest versions of GP-led transactions, some “zombie” managers with poor returns and no expectations of future fund-raising were simply looking to keep deals alive and earn more management fees. Since then, our general sense is that GP-led secondary funds have improved, but this is not something easy to empirically demonstrate

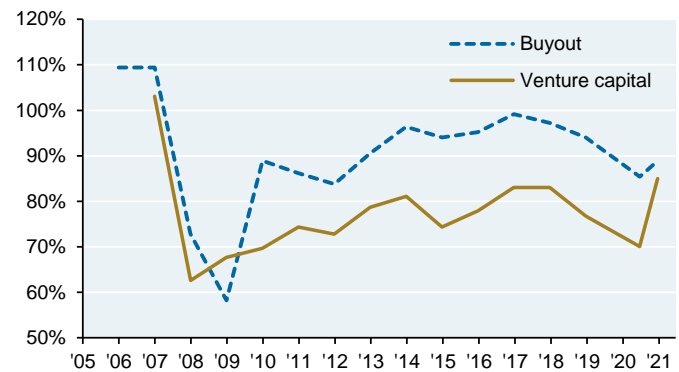
Secondary market volume

Deal volume, US\$, billions



Source: Credit Suisse. March 2021.

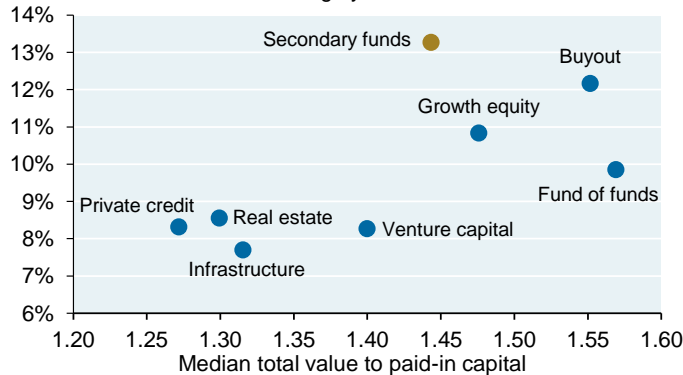
Average secondary market pricing for private equity LP positions, % of net asset value



Source: Collier Capital. 2021.

Alternative investment performance by type

Median IRR for 1999-2018 vintage years



Source: Cambridge Associates. Q3 2020.

The third chart shows how secondary funds (both LP- and GP-led) performed from 1999 to 2018. However:

- this data is not from our regular source and relies on self-reported performance from Cambridge Associates
- some GP-led secondary funds use 30%-50% leverage at the fund level **in addition** to leverage that already exists at the company level within LP interests they’re buying.

That’s a lot of leverage to carry into a downturn

Note: total value to paid-in capital (TVPI) = distributions plus remaining market value of investments divided by total paid-in capital. In most cases, TVPI = MOIC

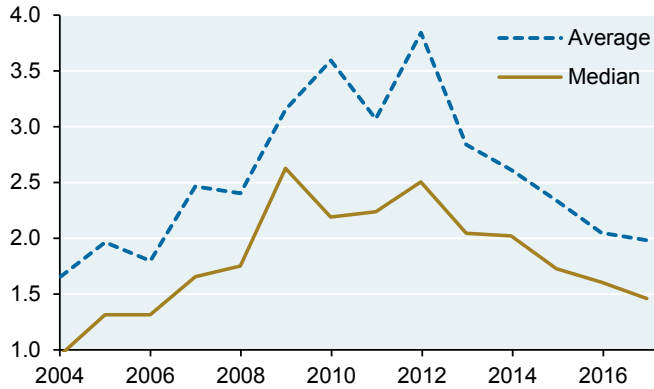


Absolute and relative venture capital performance

We have performance data for venture capital starting in the mid-1990s, but the period is so distorted by the late 1990’s boom and bust that we start our VC performance discussion in 2004⁵. In my view, the massive gains earned by VC managers in the mid-1990s are not relevant to a discussion of VC investing today.

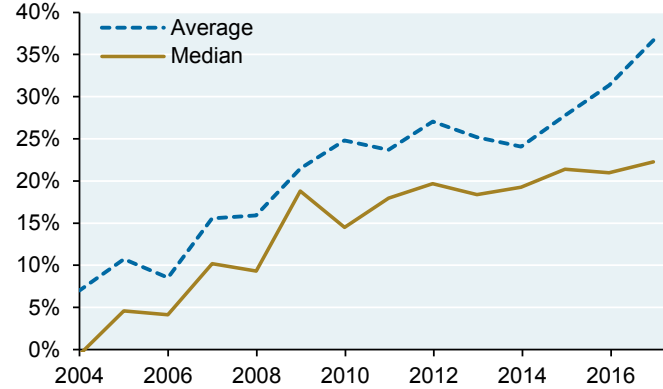
As with buyout managers, VC manager MOIC and IRR also tracked each other until 2012 after which a combination of subscription lines and faster distributions led to rising IRRs despite falling MOICs. **There’s a larger gap between average and median manager results than in buyout, indicating that there are a few VC managers with much higher returns and/or larger funds that pull up the average relative to the median.**

US venture capital MOICs by vintage year



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

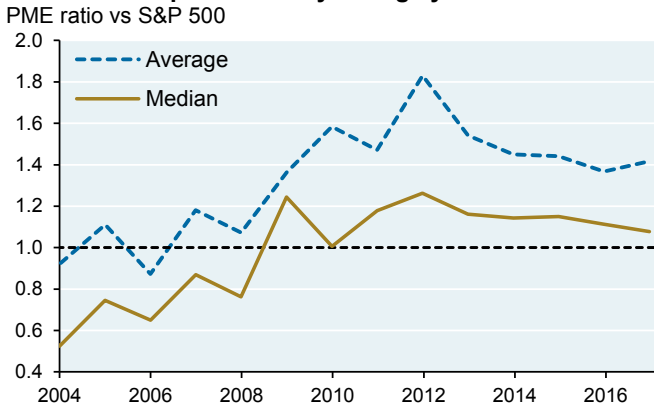
US venture capital IRRs by vintage year



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

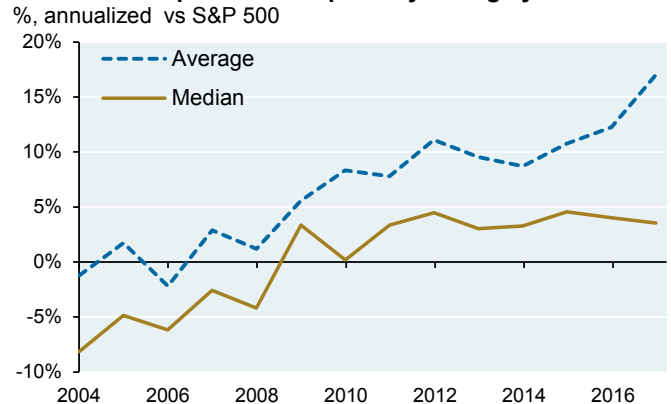
VC managers have consistently outperformed public equity markets when looking at the “average” manager. But to reiterate, the gap between average and median results are substantial and indicate outsized returns posted by a small number of VC managers. **For vintage years 2004 to 2008, the median VC manager actually underperformed the S&P 500 pretty substantially.**

US venture capital PME ratios by vintage year



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

US venture capital direct alphas by vintage year



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

⁵ The year of peak VC performance was the 1996 vintage whose MOIC was 7x and whose IRR reached 120%. The subsequent bust took a toll on returns: the 1999 vintage ended up with MOIC of 1x and an IRR of -1%.

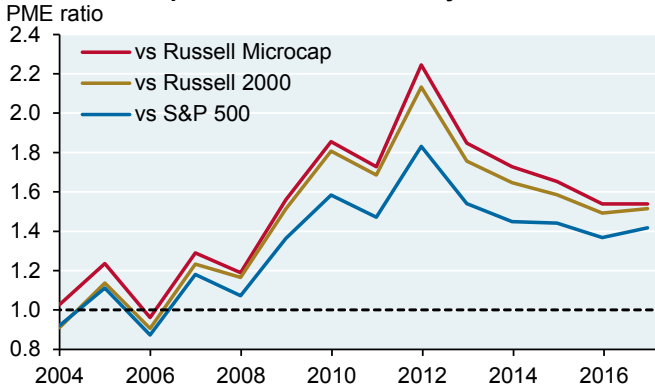


Venture capital: performance benchmarks and manager dispersion

One could make an even stronger argument that the S&P 500 is not the right benchmark for venture capital given much smaller deal sizes (see last chart). The first two charts show average and median PME ratios for VC using different benchmark options. **Since the S&P 500 outperformed the Russell 2000 Index, the Russell 2000 Growth Index, the Russell Microcap Index and most other US equity benchmarks since 2010, using a different benchmark than the S&P 500 would simply make venture outperformance look larger since that date.**

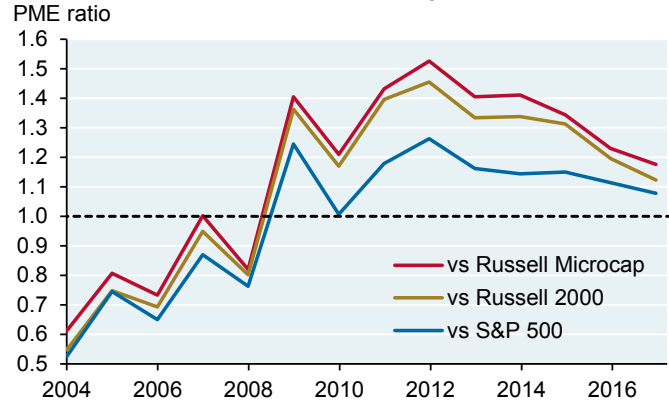
As for manager performance dispersion, VC trends are similar to buyout. Since 2010 the gap between top and bottom quartile VC managers has narrowed and bottom quartile VC manager underperformance vs public equity is very modest. To be frank, I was expecting much worse from bottom quartile VC managers.

US venture capital AVERAGE PMEs by benchmark



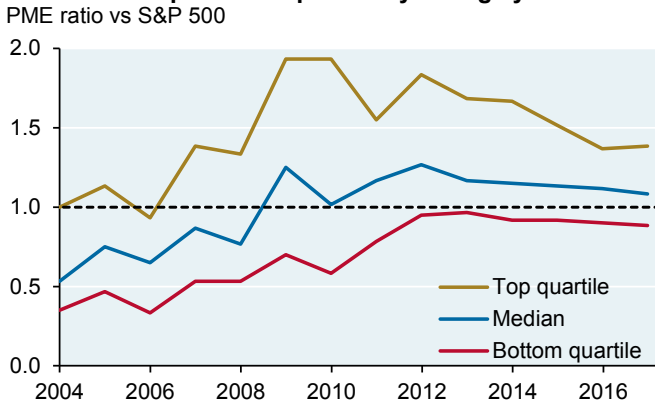
Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

US venture capital MEDIAN PMEs by benchmark



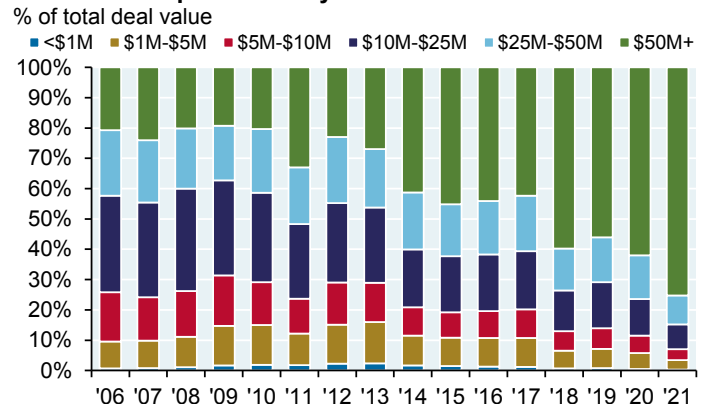
Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

US venture capital PME quartile by vintage year



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

US venture capital deals by size



Source: Pitchbook. Q1 2021.



How are gains on venture-backed companies split between VC investors and post-IPO investors?

One of the other “food fight” debates relates to pricing of venture-backed companies that go public. In other words, do venture investors reap the majority of the benefits, leaving public market equity investors “holding the bag”? **Actually, the reverse has been true over the last decade when measured in terms of total dollars of value creation accruing to pre- and post-IPO investors: post-IPO investor gains have often been substantial.**

We analyzed all US tech, internet retailing and interactive media IPOs from 2010 to 2019. We computed the total value created since each company’s founding, from original paid-in capital by VCs to its latest market capitalization. We then examined how total value creation has accrued to pre- and post-IPO investors⁶. Sometimes both investor types share the gains, and sometimes one type accrues the vast majority of the gains. Pre-IPO investors earn the majority of the pie when IPOs collapse or flat-line after being issued, and post-IPO investors reap the majority of the pie when IPOs appreciate substantially after being issued.

There are three general regions in the chart. As you can see, **the vast majority of the 165 IPOs analyzed resulted in a large share of the total value creation accruing to public market equity investors**; nevertheless, there were some painful exceptions (see lower left region on the chart).

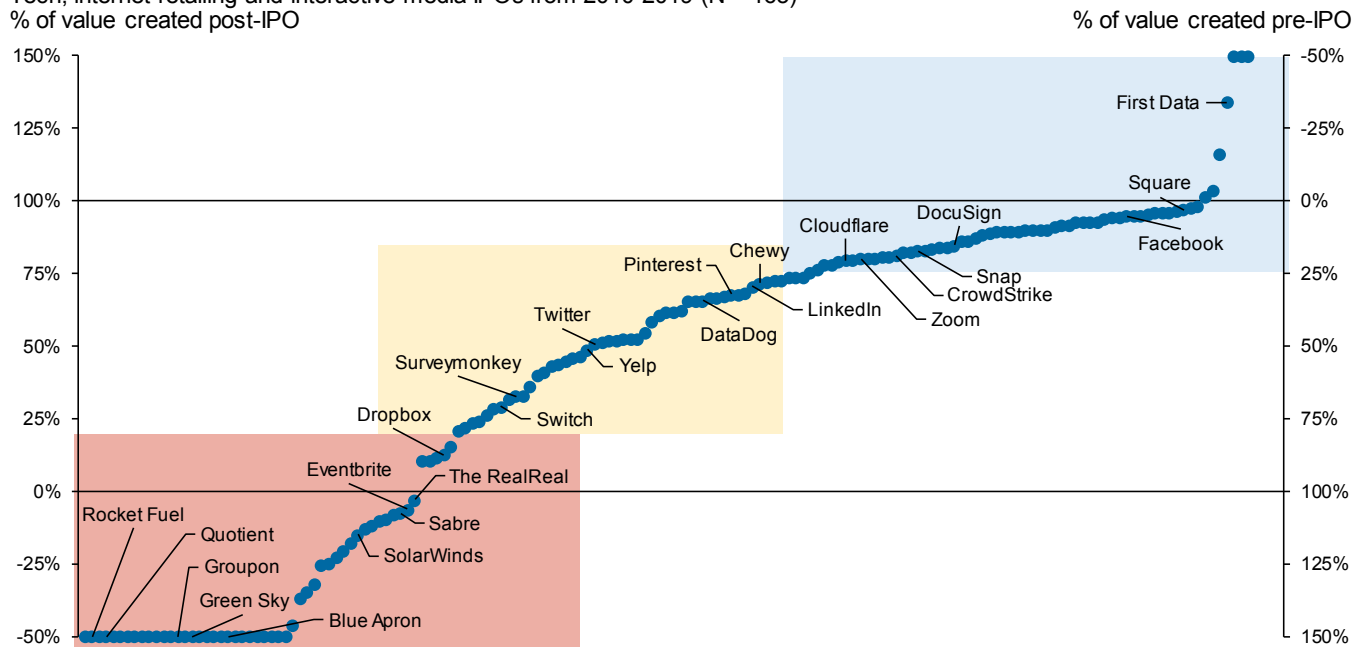
Pre-IPO investors earned all or practically all of the value that was created, leaving public market investors with losses or no gains

Pre-IPO and Post-IPO investors shared the total value creation

Post-IPO investors earned the vast majority of total value creation

Value creation in pre-IPO and post-IPO markets

Tech, internet retailing and interactive media IPOs from 2010-2019 (N = 165)
 % of value created post-IPO



Source: PitchBook, Bloomberg, JPMAM. 2020. Total value creation measured as market capitalization less pre-IPO paid in capital less primary and secondary issuance. Value creation shares capped at 150% with values over 100% reflecting situations where value creation for one group of investors was negative.

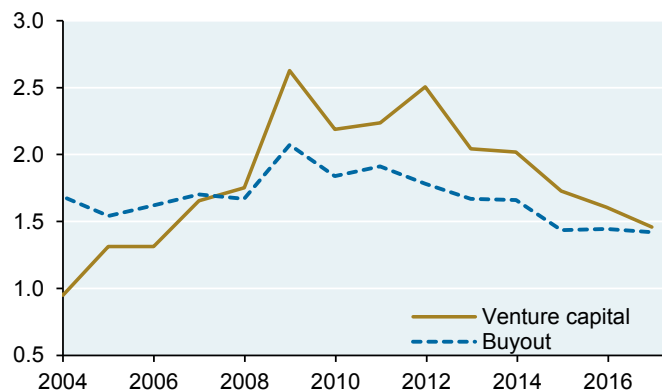
⁶ For pre-IPO investors, we include the post-IPO lockup period as part of their pre-IPO performance; after the lockup expires, they are assumed to be the same as other public investors



Buyout vs venture capital

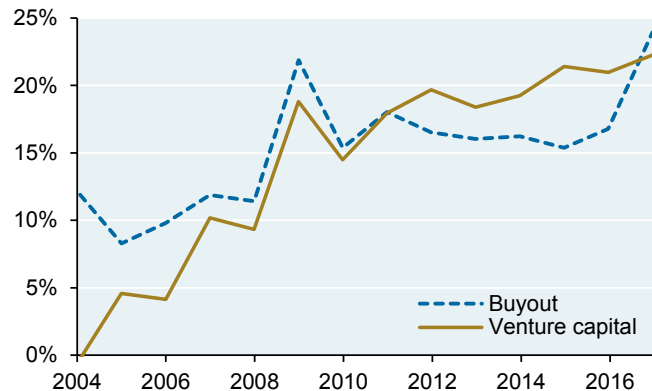
The charts below compare buyout and VC across the 4 main performance measures for the median manager. Venture capital has outperformed buyout since 2010, but not by as much as you might think. If we were to look at these charts for the *average* manager, the performance advantage for VC would be much higher (see table). However, we believe that median results are a better reflection of the opportunity set for an individual LP.

US buyout vs VC median MOICs by vintage year



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

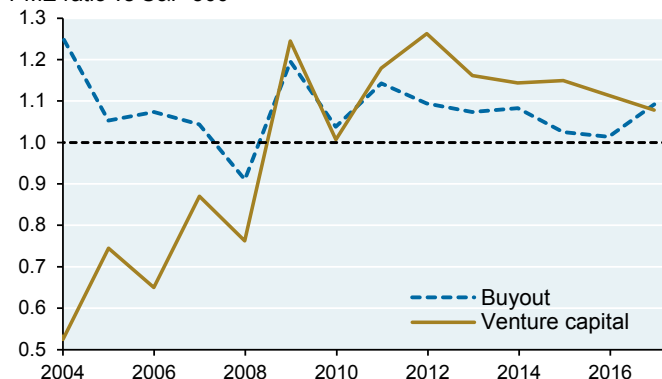
US buyout vs VC median IRRs by vintage year



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

US buyout vs VC median PMEs by vintage year

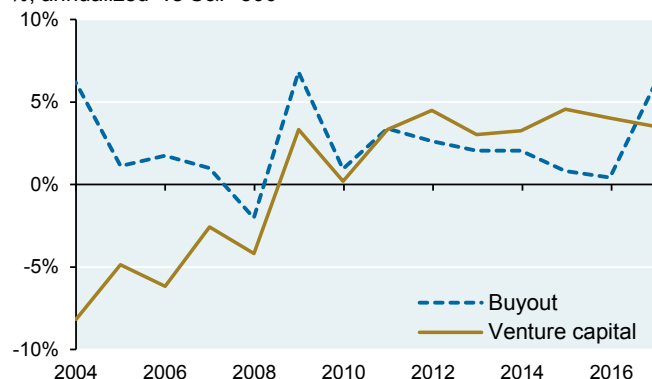
PME ratio vs S&P 500



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

US buyout vs VC median direct alphas by vintage year

%, annualized vs S&P 500



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

MEDIAN manager for 2004-2017 vintage years

	MOIC	IRR	PME	Direct Alpha
Venture capital	1.8	14.3%	1.0	0.3%
Buyout	1.7	15.3%	1.1	2.4%
Difference	0.1	-0.9%	-0.1	-2.1%

AVERAGE manager for 2004-2017 vintage years

	MOIC	IRR	PME	Direct Alpha
Venture capital	2.6	21.4%	1.3	6.7%
Buyout	1.7	16.1%	1.1	3.2%
Difference	0.8	5.4%	0.3	3.5%

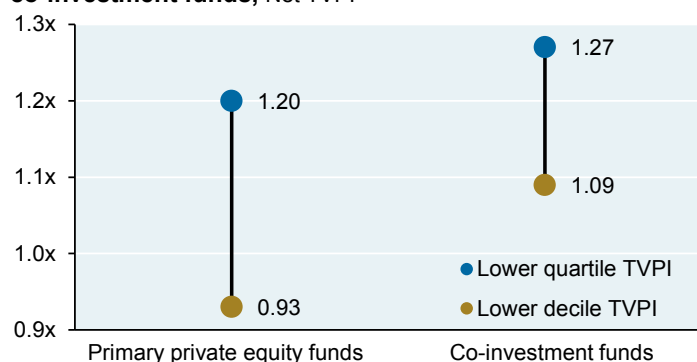
Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.



What about private equity co-investments?

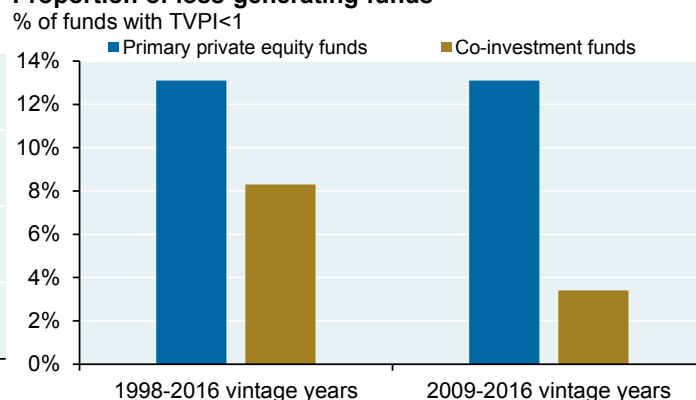
- Co-investment opportunities typically arise when a target acquisition requires more capital than a sponsor wants to provide from their fund alone; as a result, co-investors join the sponsor to make up the shortfall
- The premise behind co-investment is that lower fees increase LP returns, and that security selection will be at least as good as in overall diversified private equity funds
- Our private equity performance universe excludes co-investments that LPs make into individual deals and only includes co-investment funds that invest in transactions led by multiple private equity managers. As a result, if co-investment returns exceed those on underlying funds, average and median returns we cited earlier would understate actual returns for LPs participating in individual deal co-investments
- **The history of buyout and growth co-investment funds does show outperformance vs the overall industry.** For 2009-2016 vintages, 80% of co-investment funds outperformed primary private equity funds. For the longer period of 1998 to 2016, 60% of co-investment funds outperformed. The net median IRR for co-investment funds was 18.9% for 2009-2016 vintages vs 14.6% for primary private equity funds⁷
- LPs also benefit from downside risk mitigation benefits from co-investment funds, illustrated in the next two charts on how co-investment impacts MOIC and the number of loss-generating funds

Downside risk mitigation: Primary private equity vs co-investment funds, Net TVPI



Source: Capital Dynamics. 2020.

Proportion of loss-generating funds



Source: Capital Dynamics. 2020.

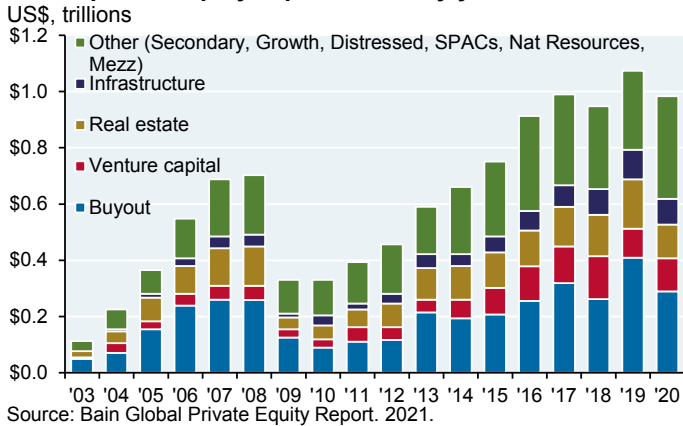
⁷“Private equity co-investment funds – a comparison of risks and returns”, Capital Dynamics, February 2020.



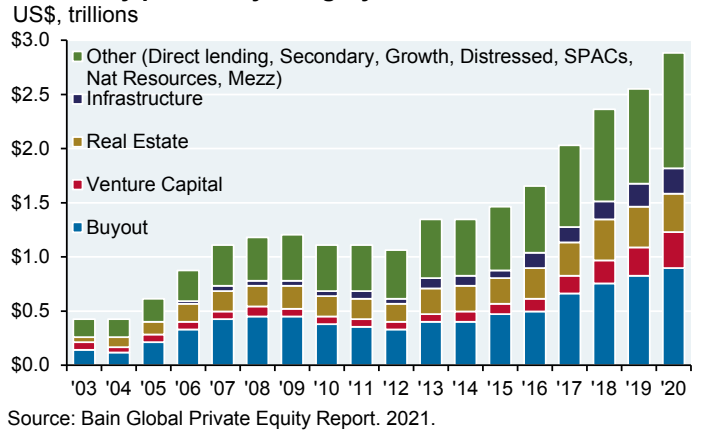
Fundraising and the pace of investment

- **Since the pace of new investment has trailed fundraising, global “dry powder” has exploded since our last analysis, rising from \$2 trillion to ~\$3 trillion.** However, this figure includes all private equity categories and not just buyout and venture capital. For the latter two categories, dry powder is closer to \$1 trillion
- Increased use of subscription lines also overstates the “real” amount of undrawn and committed capital. The latest estimates indicate \$500 billion in subscription lines outstanding, which is a meaningful portion of the increase in global dry powder since 2012⁸

Global private equity capital raised by year

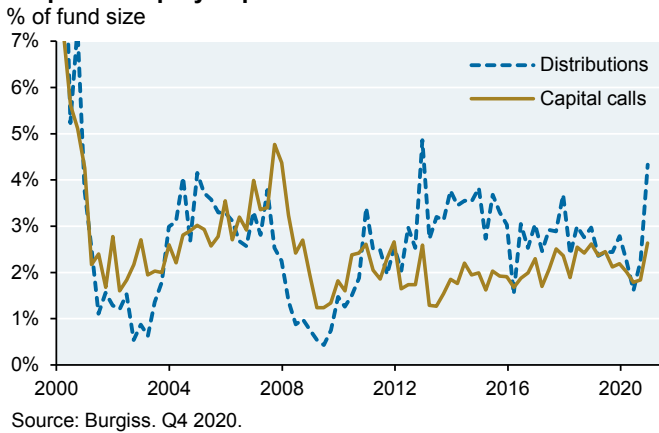


Global dry powder by category

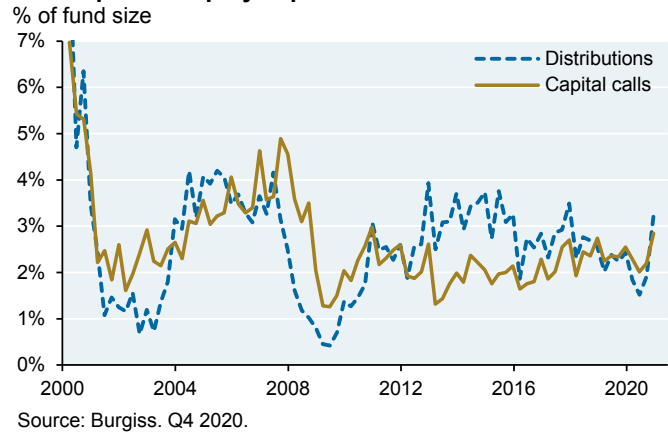


- As one might expect at a time of elevated valuations in both public and private equity, exits and distributions exceed capital calls, particularly in the US
- A lot of exits in 2020 have been through IPOs and SPACs. Much of that is public but not yet distributed. So, we expect to see distributions remain high in 2021

US private equity capital calls and distributions



Global private equity capital calls and distributions



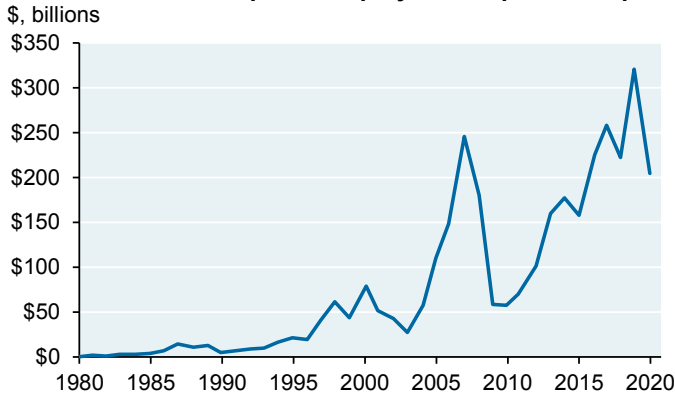
⁸ “Subscription credit’s shifting landscape”, Private Equity International, Oct 2020.



Private equity fundraising vs market capitalization

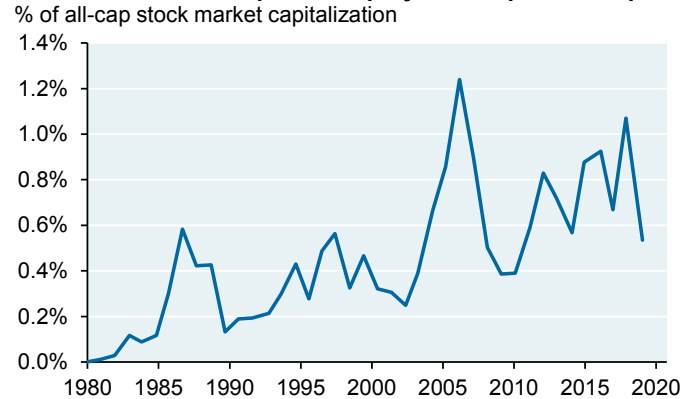
- While commitments to buyout and VC have been rising sharply, they look a little less ominous when measured against stock market capitalization

Commitments to US private equity & LBO partnerships



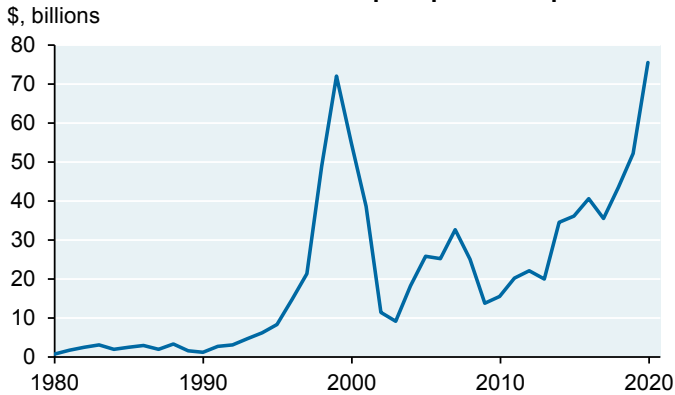
Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

Commitments to US private equity & LBO partnerships



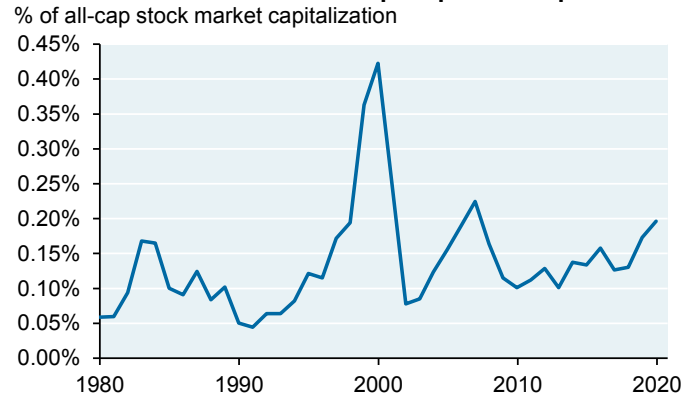
Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

Commitments to US venture capital partnerships



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.

Commitments to US venture capital partnerships



Source: Steve Kaplan (Chicago Booth) and Burgiss. 2020.



On private equity fees

Private equity fees fall into three categories. They are described below, with estimates of fees earned from 2008 to 2020 by private equity companies with public filings (Carlyle, KKR, Blackstone, Apollo)⁹:

[1] **Carried interest**, paid if returns exceed a specified threshold level; \$30 billion

Academic research generally supports the notion that there is alignment of interest between general and limited partners. A 2013 study of 20 years of private equity history found no evidence that higher fee levels resulted in lower net-of-fee performance. If anything, the authors found that *higher* fee levels were associated with superior performance. One agency conflict they did spot: GPs tend to accelerate realizations right after the LP’s preferred return has been paid in what is known as the “waterfall quarter”, illustrated by the chart on the right below. This approach sacrifices LP upside in exchange for certainty of GPs earning a catch-up return.¹⁰

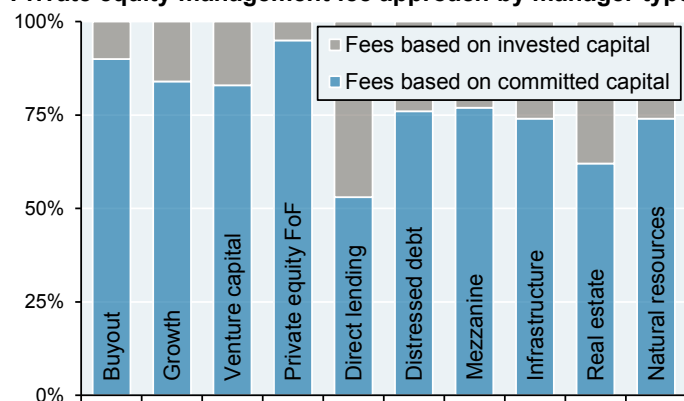
[2] **Management fees**, typically earned based on committed capital; \$26 billion

As shown below, 90% of buyout managers charge fees on committed (rather than invested) capital. Within other categories of private equity, larger numbers of managers charge on invested capital instead.

[3] **Net monitoring and transaction fees** (“company fees”); \$4.6 billion

This segment generates controversy since these fees are paid by companies whose boards the GP controls. In the past, the SEC has fined some managers for inadequate disclosure. Fees charged to portfolio companies are not specified in Limited Partnership Agreements (LPA); they are laid out in Management Services Agreements, signed by GPs after documents are finalized. The LPA does state the % of each type of portfolio company fee that is rebated against management fees paid by LPs. From 2011-2014, 80%-85% of such fees were rebated to LPs; this reflects three common rebate levels of 50%, 80% and 100%.

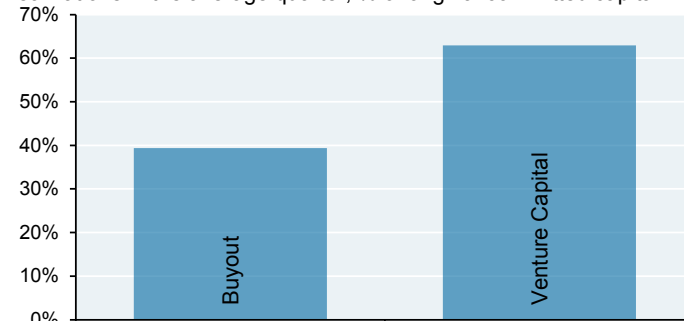
Private equity management fee approach by manager type



Source: Preqin. March 2021.

Managers cluster realizations around waterfall quarter

Excess realizations in manager’s waterfall quarter compared to realizations in the average quarter; % of original committed capital



Source: “Do Private Equity fund managers earn their fees?”, Robinson (Duke) and Sensoy (Vanderbilt). 2013.

⁹ “Big 4 revenue sources: What do we learn?”, Phalippou (Oxford) et al, June 2021

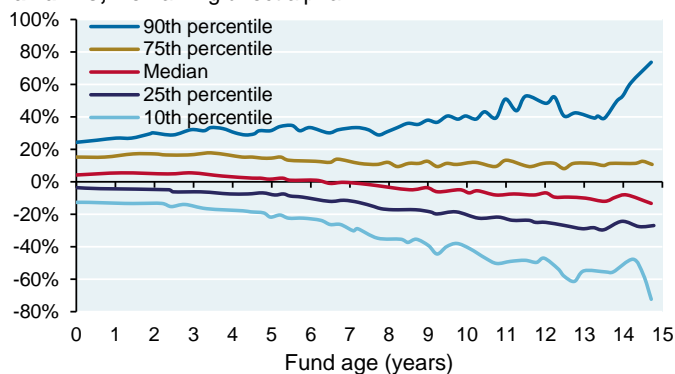
¹⁰ “Do Private Equity Fund Managers Earn their Fees?”, Robinson (Duke) and Sensoy (Vanderbilt), June 2013



Recent academic papers on private equity

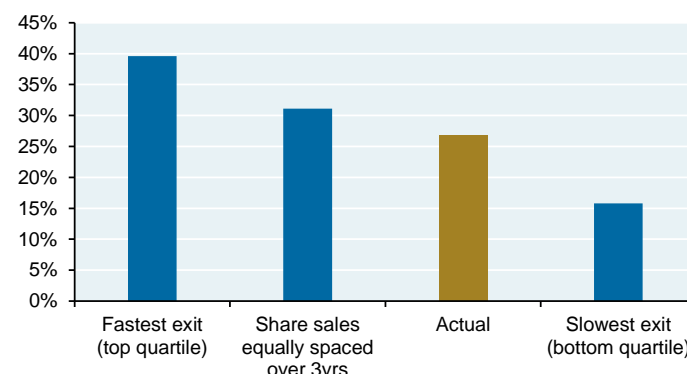
- **Top performer persistence¹¹**. The performance of top quartile VC and buyout funds is likely to persist in subsequent funds. However, final performance is typically unavailable to LPs at the time of fundraising. For buyout, interim performance of prior funds is not an accurate indicator of future fund performance. In contrast, the average PME for VC funds with top quartile interim performance was 0.8x higher than those with bottom quartile performance. In other words, partial performance information could be useful to VC LPs at the time of fundraise, but less useful to buyout investors
- **Secondary market volatility¹²**. As illustrated in the chart, investors should expect wide dispersion in mature fund performance (dispersion increases 7-8 years into a fund’s life), probably due to a diminishing number of remaining deals. This has implications for secondary private equity funds purchasing mature funds
- **Second time around¹³**. After exceptionally strong performance, private equity firms often increase fund sizes for subsequent raises. Historically, these later funds experience performance declines vs the original fund. This can be attributed to an inability to scale investment operations, or it may be simply be due to reversion to the mean (early outperformance was due to luck)
- **Investor timing¹⁴**. Updated analysis confirms earlier conclusions that timing private equity commitments has only generated modest benefits since GPs respond to market cycles and valuations
- **Post-IPO manager decision making¹⁵**. Buyout funds tend to hold companies for 3 years on average post-IPO. **Typically this does not result in value-added to investors**, and requires LPs to continue paying management fees to GPs for keeping them in the portfolio. One study finds that faster disposition of buyout IPOs would have lowered overall management fees by 7%. Note that this paper did not analyze the retention of venture IPOs.

Dispersion of remaining buyout fund performance over fund life, Remaining direct alpha



Source: Burgiss; "Evolution of PE fund value", Brown et al. June 2020.

Faster exits post-IPO improve buyout fund performance
Net IRR of median deal



Source: Jenkinson et al. (Oxford). February 2021.

¹¹ "Evidence from Buyout and Venture Funds", Harris (UVA) et al., November 2020

¹² "Evolution of Private Equity Fund Value", Brown (UNC) et al., June 2020

¹³ "Decreasing Returns or Reversion to the Mean?", Rossi (Arizona), December 2019

¹⁴ "Can Investors time their exposure to private equity?", Brown (UNC) et al., October 2019

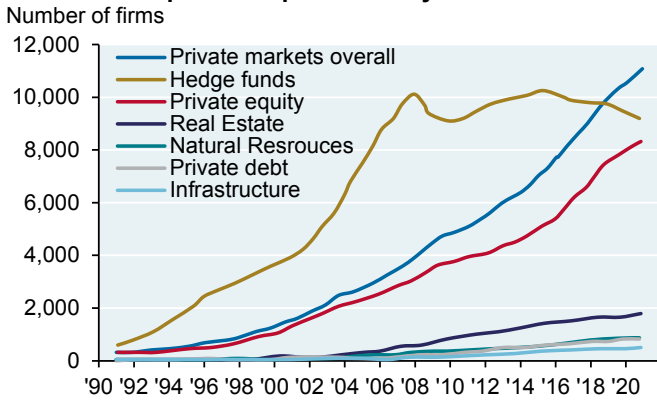
¹⁵ "Long Goodbyes: Why do Private Equity Funds hold onto Public Equity?", Jenkinson et al. (Oxford), Feb 2021



Appendix I: Other industry data

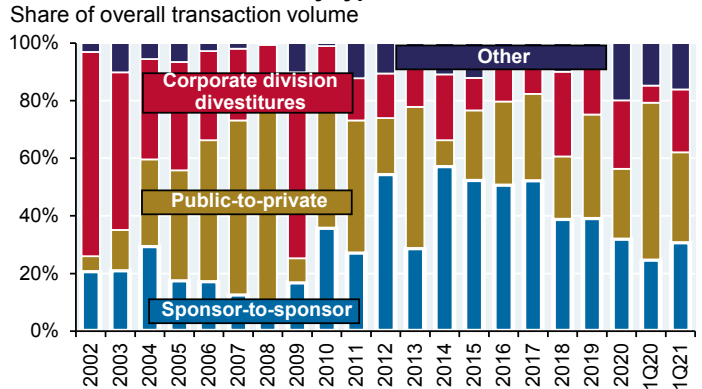
- The number of private equity funds has now surpassed the number of hedge funds, which is perhaps an ominous development given what excess proliferation of hedge funds did to hedge fund returns
- Since 2014, sponsor-to-sponsor buyouts have been declining as a % of overall US deals relative to public-to-private buyouts and corporate divestitures
- While acquisitions account for the highest *number* of VC deal exits (65% in 2021), public listings account for 90% of the total exit *value*
- Over the last decade, institutional investors have incrementally rotated away from public equities into bonds, private equity and other alternatives
- Buyouts saw fewer poorly-performing investments in 2020 vs the GFC due to rapid central bank response

Global active private capital firms by asset class



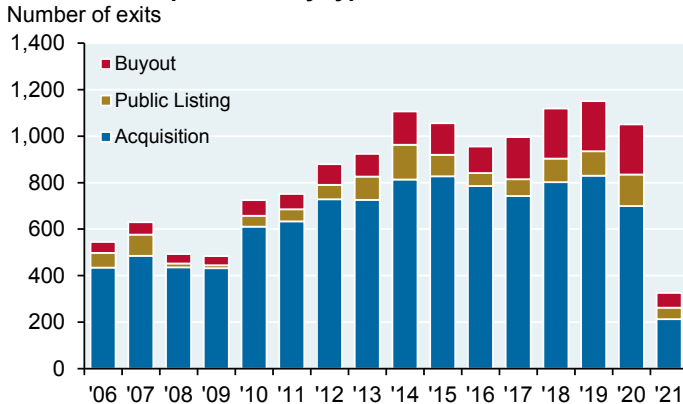
Source: McKinsey. 2020.

Distribution of US LBOs by type



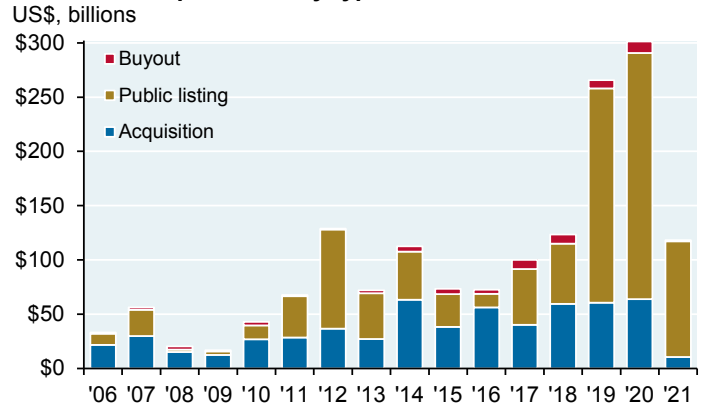
Source: S&P Global. 2021.

US venture capital exits by type



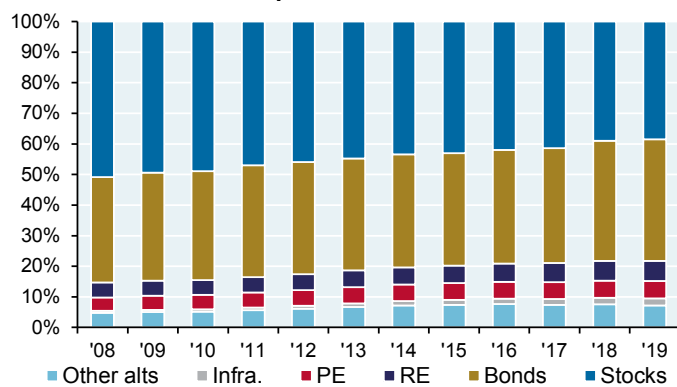
Source: Pitchbook. Q1 2021.

US venture capital exits by type



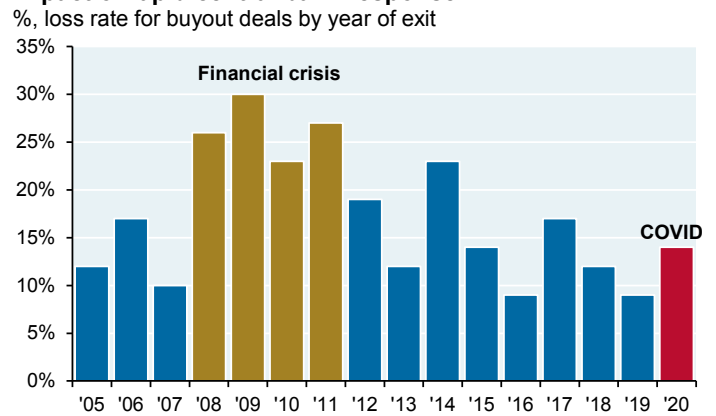
Source: Pitchbook. Q1 2021.

Institutional investors' portfolio allocation



Source: McKinsey. 2021.

Impact of rapid central bank response



Source: Bain Global Private Equity Report. 2021.



Appendix II: Return dispersion on buyout and venture transactions *within* commingled funds

Our biennial private equity analysis is primarily focused on the performance of commingled buyout and venture capital funds that our institutional and high net worth clients invest in. From time to time, clients will ask about performance dispersion *within* these funds, on the companies they invest in. The data source used to obtain fund performance can now also be used to analyze returns on individual private equity transactions¹⁶. This particular database covers transactions from the mid 1990’s to 2018.

As you might imagine, there is a wide range of dispersion on individual buyout and venture investment returns, which is why we typically advocate diversified private equity funds. As an example, look at the last column: **More than 60% of all venture capital transactions entered into by private equity managers ended up losing money** (this outcome incorporates a lot of the failed deals during the dotcom boom at the end of the 1990’s). And yet the average venture capital return was still positive, which indicates that some mega-winners ended up offsetting a lot of the losing transactions. The last chart shows the cumulative dollar value resulting from a given percentage of transactions; **the reliance of VC managers on around 20% of transactions to drive overall fund returns is striking, particularly when compared to buyout.**

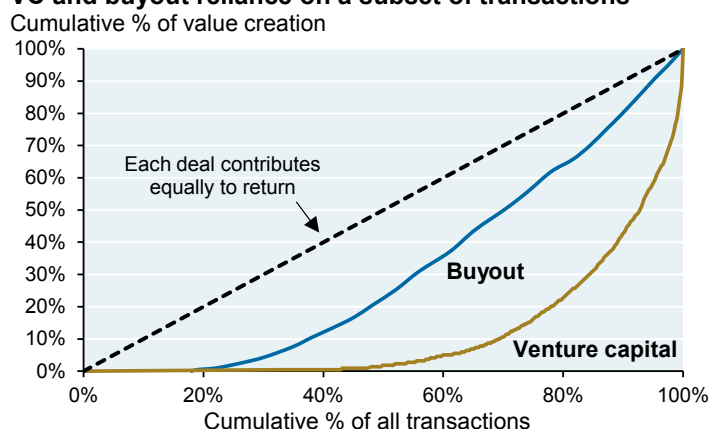
As a reminder, Total Value to Paid-in Capital is the same as Multiple on Invested Capital.

Deal specific performance data (mid 1990's to 2018)

	Mean (value-weighted)	Mean (equal-weighted)	Standard deviation	25th percentile	50th percentile	75th percentile	Percent of transactions with TVPI < 0.5x	Percent of transactions with TVPI < 1.0x
Buyout								
TVPI	1.9	2.1	2.8	1.0	1.6	2.7	21%	27%
PME	1.2	1.5	2.1	0.6	1.1	1.7		
Venture capital								
TVPI	2.2	2.1	6.9	0.1	1.0	2.0	54%	61%
PME	1.3	1.4	4.2	0.1	0.7	1.3		

Source: "A first look at Burgiss holdings data", Brown et al. 2020.

VC and buyout reliance on a subset of transactions



Source: Brown (UNC) et al. 2020. Transaction data from mid 1990's - 2018.

¹⁶ "Private equity portfolio companies: A first look at Burgiss holdings data", Brown, Harris, Hu, Jenkinson, Kaplan and Robinson, January 2020



Appendix III: Sources for private equity manager performance

For many years, data aggregators such as Venture Economics were the primary sources for academics, analysts, asset allocators and others trying to figure out how diversified private equity portfolios were performing vs the public equity market. However, as explained in a 2013 paper from the University of Oxford, Venture Economics databases had substantial problems such as survivorship bias (selective reporting by funds) and incomplete data:

*“A detailed analysis of its aggregate and individual numbers, however, reveals severe anomalies. **Over 40% of the funds in the database stopped being updated during their active lifetime. Incomplete funds are missing over 60% of their cash distributions. The result is a significant downward bias of the whole benchmark with major implications for a large fraction of the established literature on private equity**” ...and*

“Reengineering the findings of some earlier studies turns the previously estimated underperformance of 3-6% against the S&P 500 into an outperformance by 4% per annum.”¹⁷

To compound the problem, some analysts assumed that constant residual values were in effect “living dead investments” and that they were worthless for purposes of computing fund returns.

The Burgiss database. A few years ago, a new approach was devised that sources private equity cash flow data **directly from limited partners** via Burgiss, a global provider of analytics to investors in private equity. The Burgiss investor universe includes 300 state and corporate pension fund, endowment and foundation limited partner investors in 1,400 private equity funds, and contains net-of-fee cash flow data. Burgiss believes its universe represents at least 70% of all private equity funds ever raised¹⁸. As a result, I have not looked at any self-reported performance data in years.

¹⁷ “Updating History”, Rudiger Stucke, Oxford, 2013.

¹⁸ “Private Equity, Buyouts and Venture Capital: Past, Present and Future”, Steve Kaplan (Chicago Booth), June 2018.

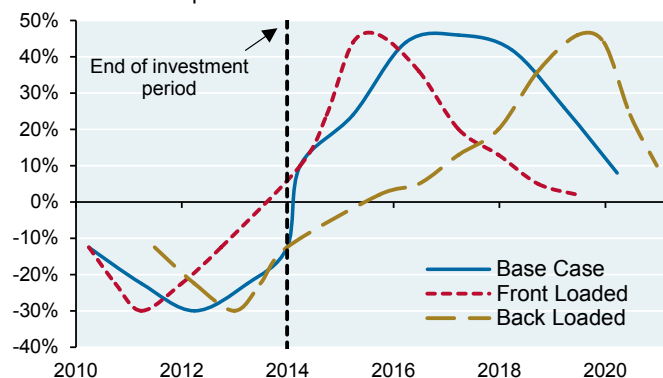


Appendix IV: On IRR, Direct Alpha, cash flow timing and subscription lines

Scenario analyses can be useful in understanding the drivers of IRR and Direct Alpha. We assume a Base Case for commitments and distributions, and also assume more front-loaded and back-loaded outcomes. We use an extreme case for subscription lines: every dollar called is funded by the line and is not paid back until the end of the investment period. We assume a hypothetical 2010 fund with a 4 year investment period and a 7 year harvesting period that distributes 2x committed capital. Relative performance metrics are benchmarked to the S&P 500 Index.

Illustrative net cash flows

% of committed capital



Source: JPMAM. 2021.

The tables illustrate the sensitivity of IRR and Direct Alpha to changes in cash flow timing, and to the use of a subscription line as described above. For example, subscription lines have a much bigger impact when distributions are front-loaded vs when they are back-loaded.

IRR based on commitment and distribution timing (without subscription line)

Distribution schedule	Commitment schedule		
	Base Case	Front Loaded	Back Loaded
Base Case	15%	13%	18%
Front Loaded	20%	16%	26%
Back Loaded	10%	9%	12%

Source: JPMAM. 2021.

Direct Alpha based on commitment and distribution timing (without subscription line)

Distribution schedule	Commitment schedule		
	Base Case	Front Loaded	Back Loaded
Base Case	2%	-1%	4%
Front Loaded	6%	2%	10%
Back Loaded	-2%	-4%	-2%

Source: JPMAM. 2021.

IRR based on commitment and distribution timing (with subscription line)

Distribution schedule	Commitment schedule		
	Base Case	Front Loaded	Back Loaded
Base Case	22%	21%	24%
Front Loaded	40%	37%	43%
Back Loaded	12%	11%	13%

Source: JPMAM. 2021.

Direct Alpha based on commitment and distribution timing (with subscription line)

Distribution schedule	Commitment schedule		
	Base Case	Front Loaded	Back Loaded
Base Case	11%	10%	13%
Front Loaded	29%	26%	32%
Back Loaded	1%	0%	1%

Source: JPMAM. 2021.

**IMPORTANT INFORMATION**

This report uses rigorous security protocols for selected data sourced from Chase credit and debit card transactions to ensure all information is kept confidential and secure. All selected data is highly aggregated and all unique identifiable information, including names, account numbers, addresses, dates of birth, and Social Security Numbers, is removed from the data before the report's author receives it. The data in this report is not representative of Chase's overall credit and debit cardholder population.

The views, opinions and estimates expressed herein constitute Michael Cembalest's judgment based on current market conditions and are subject to change without notice. Information herein may differ from those expressed by other areas of J.P. Morgan. This information in no way constitutes J.P. Morgan Research and should not be treated as such.

The views contained herein are not to be taken as advice or a recommendation to buy or sell any investment in any jurisdiction, nor is it a commitment from J.P. Morgan or any of its subsidiaries to participate in any of the transactions mentioned herein. Any forecasts, figures, opinions or investment techniques and strategies set out are for information purposes only, based on certain assumptions and current market conditions and are subject to change without prior notice. All information presented herein is considered to be accurate at the time of production. This material does not contain sufficient information to support an investment decision and it should not be relied upon by you in evaluating the merits of investing in any securities or products. In addition, users should make an independent assessment of the legal, regulatory, tax, credit and accounting implications and determine, together with their own professional advisers, if any investment mentioned herein is believed to be suitable to their personal goals. Investors should ensure that they obtain all available relevant information before making any investment. It should be noted that investment involves risks, the value of investments and the income from them may fluctuate in accordance with market conditions and taxation agreements and investors may not get back the full amount invested. Both past performance and yields are not reliable indicators of current and future results.

Non-affiliated entities mentioned are for informational purposes only and should not be construed as an endorsement or sponsorship of J.P. Morgan Chase & Co. or its affiliates.

For J.P. Morgan Asset Management Clients:

J.P. Morgan Asset Management is the brand for the asset management business of JPMorgan Chase & Co. and its affiliates worldwide.

To the extent permitted by applicable law, we may record telephone calls and monitor electronic communications to comply with our legal and regulatory obligations and internal policies. Personal data will be collected, stored and processed by J.P. Morgan Asset Management in accordance with our privacy policies at <https://am.jpmorgan.com/global/privacy>.

ACCESSIBILITY

For U.S. only: If you are a person with a disability and need additional support in viewing the material, please call us at 1-800-343-1113 for assistance.

This communication is issued by the following entities:

In the United States, by J.P. Morgan Investment Management Inc. or J.P. Morgan Alternative Asset Management, Inc., both regulated by the Securities and Exchange Commission; in Latin America, for intended recipients' use only, by local J.P. Morgan entities, as the case may be.; in Canada, for institutional clients' use only, by JPMorgan Asset Management (Canada) Inc., which is a registered Portfolio Manager and Exempt Market Dealer in all Canadian provinces and territories except the Yukon and is also registered as an Investment Fund Manager in British Columbia, Ontario, Quebec and Newfoundland and Labrador. In the United Kingdom, by JPMorgan Asset Management (UK) Limited, which is authorized and regulated by the Financial Conduct Authority; in other European jurisdictions, by JPMorgan Asset Management (Europe) S.à r.l. In Asia Pacific ("APAC"), by the following issuing entities and in the respective jurisdictions in which they are primarily regulated: JPMorgan Asset Management (Asia Pacific) Limited, or JPMorgan Funds (Asia) Limited, or JPMorgan Asset Management Real Assets (Asia) Limited, each of which is regulated by the Securities and Futures Commission of Hong Kong; JPMorgan Asset Management (Singapore) Limited (Co. Reg. No. 197601586K), which this advertisement or publication has not been reviewed by the Monetary Authority of Singapore; JPMorgan Asset Management (Taiwan) Limited; JPMorgan Asset Management (Japan) Limited, which is a member of the Investment Trusts Association, Japan, the Japan Investment Advisers Association, Type II Financial Instruments Firms Association and the Japan Securities Dealers Association and is regulated by the Financial Services Agency (registration number "Kanto Local Finance Bureau (Financial Instruments Firm) No. 330"); in Australia, to wholesale clients only as defined in section 761A and 761G of the Corporations Act 2001 (Commonwealth), by JPMorgan Asset Management (Australia) Limited (ABN 55143832080) (AFSL 376919). For all other markets in APAC, to intended recipients only.

For J.P. Morgan Private Bank Clients:**ACCESSIBILITY**

J.P. Morgan is committed to making our products and services accessible to meet the financial services needs of all our clients. Please direct any accessibility issues to the Private Bank Client Service Center at 1-866-265-1727.

LEGAL ENTITY, BRAND & REGULATORY INFORMATION

In the **United States**, bank deposit accounts and related services, such as checking, savings and bank lending, are offered by **JPMorgan Chase Bank, N.A.** Member FDIC.

JPMorgan Chase Bank, N.A. and its affiliates (collectively "**JPMCB**") offer investment products, which may include bank-managed investment accounts and custody, as part of its trust and fiduciary services. Other investment products and services, such as brokerage and advisory accounts, are offered through **J.P. Morgan Securities LLC ("JPMS")**, a member of [FINRA](#) and [SIPC](#). Annuities are made available through Chase Insurance Agency, Inc. (CIA), a licensed insurance agency, doing business as Chase Insurance Agency Services, Inc. in Florida. JPMCB, JPMS and CIA are affiliated companies under the common control of JPM. Products not available in all states.

In **Luxembourg**, this material is issued by **J.P. Morgan Bank Luxembourg S.A. (JPMBL)**, with registered office at European Bank and Business Centre, 6 route de Treves, L-2633, Senningerberg, Luxembourg. R.C.S Luxembourg B10.958. Authorized and regulated by Commission de Surveillance du Secteur Financier (CSSF) and jointly supervised by the European Central Bank (ECB) and the CSSF. J.P. Morgan Bank Luxembourg S.A. is authorized as a credit institution in accordance with the Law of 5th April 1993. In the **United Kingdom**, this material is issued by **J.P. Morgan Bank Luxembourg S.A., London Branch**, registered office at 25 Bank Street, Canary Wharf, London E14 5JP. Authorized and regulated by Commission de Surveillance du Secteur Financier (CSSF) and jointly supervised by the European Central Bank (ECB) and the CSSF. Deemed authorised by the Prudential Regulation Authority. Subject to regulation by the Financial Conduct Authority and limited regulation by the Prudential Regulation Authority. Details of the Temporary Permissions Regime, which allows EEA-based firms to operate in the UK for a limited period while seeking full authorisation, are available on the Financial Conduct Authority's website. In **Spain**, this material is distributed by **J.P. Morgan Bank Luxembourg S.A., Sucursal en España**, with registered office at Paseo de la Castellana, 31, 28046 Madrid, Spain. J.P. Morgan Bank Luxembourg S.A., Sucursal en



España is registered under number 1516 within the administrative registry of the Bank of Spain and supervised by the Spanish Securities Market Commission (CNMV). In **Germany**, this material is distributed by **J.P. Morgan Bank Luxembourg S.A., Frankfurt Branch**, registered office at Taunustor 1 (TaunusTurm), 60310 Frankfurt, Germany, jointly supervised by the Commission de Surveillance du Secteur Financier (CSSF) and the European Central Bank (ECB), and in certain areas also supervised by the Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin). In **Italy**, this material is distributed by **J.P. Morgan Bank Luxembourg S.A.– Milan Branch**, registered office at Via Cordusio 3, 20123 Milano, Italy and regulated by Bank of Italy and the Commissione Nazionale per le Società e la Borsa (CONSOB). In the **Netherlands**, this material is distributed by **J.P. Morgan Bank Luxembourg S.A., Amsterdam Branch**, with registered office at World Trade Centre, Tower B, Strawinskyalaan 1135, 1077 XX, Amsterdam, The Netherlands. J.P. Morgan Bank Luxembourg S.A., Amsterdam Branch is authorized and regulated by the Commission de Surveillance du Secteur Financier (CSSF) and jointly supervised by the European Central Bank (ECB) and the CSSF in Luxembourg; J.P. Morgan Bank Luxembourg S.A., Amsterdam Branch is also authorized and supervised by De Nederlandsche Bank (DNB) and the Autoriteit Financiële Markten (AFM) in the Netherlands. Registered with the Kamer van Koophandel as a branch of J.P. Morgan Bank Luxembourg S.A. under registration number 71651845. In **Denmark**, this material is distributed by **J.P. Morgan Bank Luxembourg, Copenhagen Br**, filial af J.P. Morgan Bank Luxembourg S.A. with registered office at Kalvebod Brygge 39-41, 1560 København V, Denmark. J.P. Morgan Bank Luxembourg, Copenhagen Br, filial af J.P. Morgan Bank Luxembourg S.A. is authorized and regulated by Commission de Surveillance du Secteur Financier (CSSF) and jointly supervised by the European Central Bank (ECB) and the CSSF. J.P. Morgan Bank Luxembourg, Copenhagen Br, filial af J.P. Morgan Bank Luxembourg S.A. is also subject to the supervision of Finanstilsynet (Danish FSA) and registered with Finanstilsynet as a branch of J.P. Morgan Bank Luxembourg S.A. under code 29009. In **Sweden**, this material is distributed by **J.P. Morgan Bank Luxembourg S.A., Stockholm Bankfilial**, with registered office at Hamngatan 15, Stockholm, 11147, Sweden. J.P. Morgan Bank Luxembourg S.A., Stockholm Bankfilial is authorized and regulated by Commission de Surveillance du Secteur Financier (CSSF) and jointly supervised by the European Central Bank (ECB) and the CSSF. J.P. Morgan Bank Luxembourg S.A., Stockholm Bankfilial is also subject to the supervision of Finansinspektionen (Swedish FSA). Registered with Finansinspektionen as a branch of J.P. Morgan Bank Luxembourg S.A. In **France**, this material is distributed by **JPMorgan Chase Bank, N.A. (“JPMCB”), Paris branch**, which is regulated by the French banking authorities Autorité de Contrôle Prudentiel et de Résolution and Autorité des Marchés Financiers. In **Switzerland**, this material is distributed by **J.P. Morgan (Suisse) SA**, which is regulated in Switzerland by the Swiss Financial Market Supervisory Authority (FINMA).

In **Hong Kong**, this material is distributed by **JPMCB, Hong Kong branch**. JPMCB, Hong Kong branch is regulated by the Hong Kong Monetary Authority and the Securities and Futures Commission of Hong Kong. In Hong Kong, we will cease to use your personal data for our marketing purposes without charge if you so request. In **Singapore**, this material is distributed by **JPMCB, Singapore branch**. JPMCB, Singapore branch is regulated by the Monetary Authority of Singapore. Dealing and advisory services and discretionary investment management services are provided to you by JPMCB, Hong Kong/Singapore branch (as notified to you). Banking and custody services are provided to you by JPMCB Singapore Branch. The contents of this document have not been reviewed by any regulatory authority in Hong Kong, Singapore or any other jurisdictions. You are advised to exercise caution in relation to this document. If you are in any doubt about any of the contents of this document, you should obtain independent professional advice. For materials which constitute product advertisement under the Securities and Futures Act and the Financial Advisers Act, this advertisement has not been reviewed by the Monetary Authority of Singapore. JPMorgan Chase Bank, N.A. is a national banking association chartered under the laws of the United States, and as a body corporate, its shareholder’s liability is limited.

With respect to countries in **Latin America**, the distribution of this material may be restricted in certain jurisdictions. We may offer and/or sell to you securities or other financial instruments which may not be registered under, and are not the subject of a public offering under, the securities or other financial regulatory laws of your home country. Such securities or instruments are offered and/or sold to you on a private basis only. Any communication by us to you regarding such securities or instruments, including without limitation the delivery of a prospectus, term sheet or other offering document, is not intended by us as an offer to sell or a solicitation of an offer to buy any securities or instruments in any jurisdiction in which such an offer or a solicitation is unlawful. Furthermore, such securities or instruments may be subject to certain regulatory and/or contractual restrictions on subsequent transfer by you, and you are solely responsible for ascertaining and complying with such restrictions. To the extent this content makes reference to a fund, the Fund may not be publicly offered in any Latin American country, without previous registration of such fund’s securities in compliance with the laws of the corresponding jurisdiction. Public offering of any security, including the shares of the Fund, without previous registration at Brazilian Securities and Exchange Commission— CVM is completely prohibited. Some products or services contained in the materials might not be currently provided by the Brazilian and Mexican platforms.

JPMorgan Chase Bank, N.A. (JPMCBNA) (ABN 43 074 112 011/AFS Licence No: 238367) is regulated by the Australian Securities and Investment Commission and the Australian Prudential Regulation

Authority. Material provided by JPMCBNA in Australia is to “wholesale clients” only. For the purposes of this paragraph the term “wholesale client” has the meaning given in section 761G of the Corporations Act 2001 (Cth). Please inform us if you are not a Wholesale Client now or if you cease to be a Wholesale Client at any time in the future.

JPMorgan Chase Bank, N.A. (JPMCBNA) (ABN 43 074 112 011/AFS Licence No: 238367) is regulated by the Australian Securities and Investment Commission and the Australian Prudential Regulation Authority. Material provided by JPMCBNA in Australia is to “wholesale clients” only. For the purposes of this paragraph the term “wholesale client” has the meaning given in section 761G of the Corporations Act 2001 (Cth). Please inform us if you are not a Wholesale Client now or if you cease to be a Wholesale Client at any time in the future.

JPMS is a registered foreign company (overseas) (ARBN 109293610) incorporated in Delaware, U.S.A. Under Australian financial services licensing requirements, carrying on a financial services business in Australia requires a financial service provider, such as J.P. Morgan Securities LLC (JPMS), to hold an Australian Financial Services Licence (AFSL), unless an exemption applies. **JPMS is exempt from the requirement to hold an AFSL under the Corporations Act 2001 (Cth) (Act) in respect of financial services it provides to you, and is regulated by the SEC, FINRA and CFTC under U.S. laws, which differ from Australian laws.** Material provided by JPMS in Australia is to “wholesale clients” only. The information provided in this material is not intended to be, and must not be, distributed or passed on, directly or indirectly, to any other class of persons in Australia. For the purposes of this paragraph the term “wholesale client” has the meaning given in section 761G of the Act. Please inform us immediately if you are not a Wholesale Client now or if you cease to be a Wholesale Client at any time in the future.

This material has not been prepared specifically for Australian investors. It:

- May contain references to dollar amounts which are not Australian dollars;
- May contain financial information which is not prepared in accordance with Australian law or practices;
- May not address risks associated with investment in foreign currency denominated investments; and
- Does not address Australian tax issues.

J.P. Morgan