

Discussion note

Private Equity

In this note, we provide an overview of private equity. We review the growth of the market, the value creation process, and after cost performance. We also discuss important considerations for prospective investors such as investment costs, potential principal-agent conflicts, and Environmental, Social and Governance (ESG) issues.

Date 14/09/2023

The Discussion Note series provides analysis which may form relevant background for Norges Bank Investment Management's investment strategy and advice to the asset owner. Any views expressed in the Discussion Notes are not necessarily held by our organisation. The series is written by employees, and is informed by our investment research and our experience as a large, long-term asset manager.

dn@nbim.no
www.nbim.no

Summary

- Private equity refers to investments in the equity of companies that are not publicly traded. Most investors access private equity by committing capital to funds that invest in private companies or in public companies which they take private.
- Private equity funds typically have pre-defined investment strategies that target companies at different stages of their lifecycle. The most common strategies are leveraged buyouts (LBOs), venture capital, and growth equity. LBOs involve purchasing majority control of mature companies, partially funded with debt. Venture capital involves purchasing minority stakes in early-stage companies. Growth equity targets later-stage companies in their growth phase, and investments can be either minority or majority stakes.
- The market for private equity has grown rapidly. Assets under management have increased more than 12 percent annually since 2010. As a share of the public equity market, private equity has grown from 4 percent in 2010 to 9 percent in 2022.
- Private equity funds generate returns for investors by carefully selecting target companies and exercising active ownership to increase their value, with the aim of selling them for a profit at a later stage. In the past, the main way to create value was by managing a company's leverage and deleveraging. Recently, improving company governance and operations has been the main driver of value creation.
- Using performance measures which compare private equity fund cash flows to identically timed investments in public equities, we find buyouts have meaningfully outperformed public equities by 3-4 percentage points annually, on average. In contrast, we find venture capital and growth equity have underperformed by 1-2 percentage points, on average. Our findings on buyouts align with other studies in the literature that rely on different performance measures and datasets, and we continue to find excess return after accounting for market risk and other risk factors. Our results for venture capital contrast with some of the literature but likely depend on the sample period studied. Recent venture capital performance looks more positive.
- We find performance is highly dispersed and depends on strategy, timing, and manager selection. As a result, the implementation of private equity and selection of private equity funds requires careful consideration from investors.

1. Introduction

The market for private equity has grown significantly in recent times. Assets under management have increased more than 12 percent annually since 2010, reaching 7 trillion dollars.¹ At the same time, private equity has become a key part of institutional investors' portfolios. Private equity fundraising has risen in line with assets under management, and the share of investors' portfolios invested in private equity has increased steadily over time, reaching more than 7 percent on average. For the peer group of the Government Pension Fund Global (GPF), the average share is more than 9 percent (CEM Benchmarking, 2021).

In this note, we provide an overview of private equity. We begin by exploring the organisational structure of private equity funds. We then provide an overview of the current private equity landscape, including developments in both private and public markets. We show that the rapid growth in the market for private equity has coincided with a stagnation in the number of companies in public equity markets, and discuss how these trends have been interpreted in the academic literature.

We evaluate the methods used by private equity funds to increase the value of the companies they invest in. These methods can be broadly categorised into implementing change in companies' financing, governance, or operations. Historically, changes to companies' financing, or leverage, was the primary source of value creation. In recent times, changes to companies' governance and operations have been the primary source.

We examine the risk and return of private equity, focusing specifically on the after-cost performance relative to public markets. We consider buyout, venture capital, growth equity, and secondary strategies.² Standard asset pricing techniques used to evaluate public markets are not employable in private markets as returns are observed infrequently and fund valuations can be stale.³ We therefore review the various metrics used in the literature and calculate performance using measures that compare private and public equity cash flows. We find private equity performance varies significantly based on strategy. Buyouts have meaningfully outperformed public equity by 3 to 4 percentage points annually, while venture capital and growth equity have underperformed by 1 to 2 percentage points annually. For buyout funds, we continue to find excess return after accounting for market risk and other risk factors.

We compare our results with recent academic studies, which use a variety of different methods and datasets. On balance, our results for buyouts are consistent with the academic literature. However, the evidence on venture capital is mixed, and varies based on the sample period and dataset employed. In keeping with the literature, we find performance is highly dispersed and depends on strategy, timing, and manager selection. Consequently, the implementation of private equity and choice of private equity funds requires careful consideration from investors.

¹Estimated as at December 2022, including buyout, venture capital, and growth equity funds only.

²Secondary strategies involve acquiring existing stakes in private equity funds from investors wishing to exit their positions prior to the end of the fund's term.

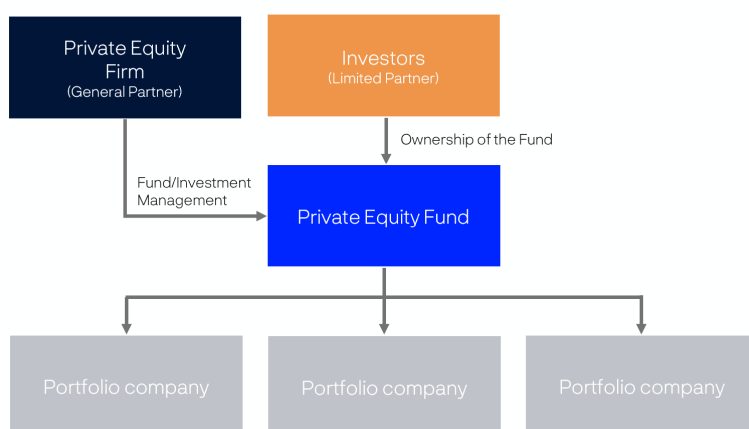
³See e.g. Korteweg (2023).

The note proceeds as follows. We start by outlining the structure and characteristics of private equity funds, and discuss the development of private and public equity markets. In section 2, we explain the methods used by private equity firms to increase the value of the companies in which they invest. In section 3, we estimate the after-cost performance of private equity and compare our results with the existing literature. In section 4, we review the literature on other relevant topics for investors considering private equity investments, and section 5 concludes.

Organisation and the fund lifecycle

Private equity refers to investments in the equity of companies that are not publicly traded. Most investors access private equity by committing capital to funds established by private equity firms. Private equity funds purchase shares in private companies or in public companies which they take private. They then aim to increase the value of these companies through active ownership and governance with the aim of selling them at a profit at a later stage.⁴ Figure 1 shows the most common fund structure used, and the key entities involved. In this structure the fund is organised as a limited partnership, with investors as limited partners (LPs) and the private equity firm as the general partner (GP).

FIGURE 1 Illustrative fund structure



The first entity in the private equity fund structure is the investors, who commit capital to the fund. As limited partners, investors are not involved in the investment decision-making of the fund and their liabilities are limited to the capital invested. However, capital committed by investors is locked in for the duration of the fund's life, resulting in less liquidity compared to investments in public markets. Funds are typically only open to accredited investors and qualified clients, including pension funds, fund managers, and sovereign wealth funds. These investor groups currently account for half of the total allocation to private equity investments today.⁵

⁴Investors can also access private equity through direct investments and fund-of-funds investments. In direct investments, investors purchase equity stakes in private companies directly. In fund-of-funds investments, capital is allocated to external managers who then invest across a selection of private equity funds.

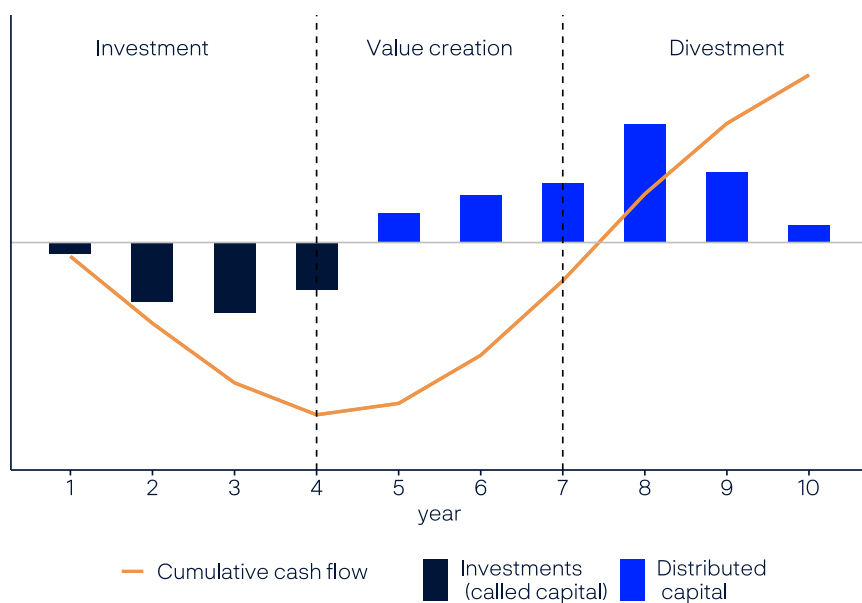
⁵Estimated using data from Preqin as at December 2022.

The funds to which investors commit capital are managed by a private equity firm. The firm is the general partner, and is responsible for implementing the fund strategy, sourcing and structuring deals, and making investment decisions. In exchange for these services, it earns management and performance fees. Section 4 outlines the fees and costs associated with investing in private equity in more detail.

Private equity firms typically raise a number of funds, each of which is structured as a separate limited partnership. In practice, the GP delegates investment decisions at each fund to their fund management division.⁶ The fund management division employs private equity professionals and provides services across the various funds raised. While certain individuals may focus on specific funds, it is common for them to provide input into investment decisions across multiple funds.

Private equity funds have a contractually fixed lifetime, typically seven to ten years. As we show in Figure 2, the lifecycle of a private equity fund can be split into three stages: the investment stage, the value creation stage, and the divestment stage.

FIGURE 2 Illustrative lifecycle of a fund



In the investment stage, the fund incrementally “calls” capital committed by investors during the fundraising period and invests in private companies. This phase may span the first few years of the fund, with the initial year known as the fund’s vintage year.⁷ Investors often receive negative returns during this stage, as management fees are charged on committed capital, and funds have limited opportunity to realise any improvement in the value of their investments when they are deploying capital.

⁶The term GP is often used interchangeably for both the private equity firm itself and the employees in the private equity firm acting as general partner in the fund structure.

⁷Funds typically have contractually defined investment periods, and follow-on investments are limited after the investment period ends.

In the value creation phase, the fund management arm of the private equity firm attempts to improve the value of the companies the fund invests in. This may involve changes to companies' financing, operations, and governance. Investments made early in the investment stage may start to be realised, and the value of companies in the fund may start to increase, leading to an improvement in cumulative cash flow.

The divestment stage is when most investments are realised. Fund managers can choose between a trade sale, a financial sale or an initial public offering (IPO) to realise the investment. In a trade sale, the portfolio company is merged with, or acquired by, another company. In a financial sale, the portfolio company is sold to another financial entity. When this entity is a private equity fund, this is called a secondary sale. If the value creation period has been successful, the total cash flow returned to investors will be higher than their invested capital.

The final entity in the private equity fund structure is the portfolio companies acquired by the fund. Each fund typically has a pre-defined investment strategy targeting companies at different stages of their lifecycle or different stages of financial health. The most common strategies are leveraged buyouts, venture capital, and growth equity. In leveraged buyouts (LBOs), a private equity firm buys majority control of mature existing companies. The target company can be public, private, or a division of another company. Buyouts are typically financed by equity capital from the private equity fund and debt (leverage) sourced from banks or, increasingly, private debt funds. Target companies for LBO strategies are generally sought out for identifiable opportunities for private equity investors to create value. In contrast, venture capital (VC) strategies invest in early-stage companies. Funds typically purchase a minority equity stake and provide access to capital, advice, and mentorship. Growth equity strategies invest in later-stage companies in their growth phase, and investments can be either minority or majority stakes.

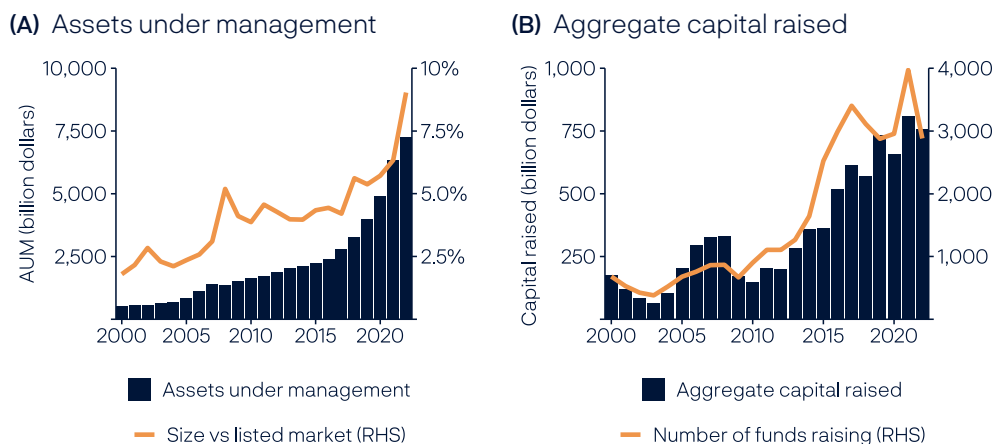
The market for private equity

To evaluate the market for private equity, we utilise fund- and deal-level data from Preqin, which includes historical fund-level data on more than 50,000 funds gathered from public sources and Freedom of Information (FOI) requests. Data is available from the mid-1980s. The market for private equity has grown significantly since then, and now represents more than 60 percent of the total market for alternative assets, including hedge funds, infrastructure, and private debt. As shown in Figure 3, assets under management (AUM) have increased more than 12 percent annually since 2010, reaching an estimated value of 7 trillion dollars.

As shown in Figure 4, the US has historically led the private equity market in terms of assets under management, followed by Europe and Asia. Among the various strategies, buyout and venture capital account for more than 65 percent of total AUM, with venture capital experiencing substantial growth in recent years, particularly across Asia (Preqin, 2022). From a sector perspective, the allocation of private equity is similar to that of public markets. However, private equity is more heavily weighted towards the information technology and consumer discretionary

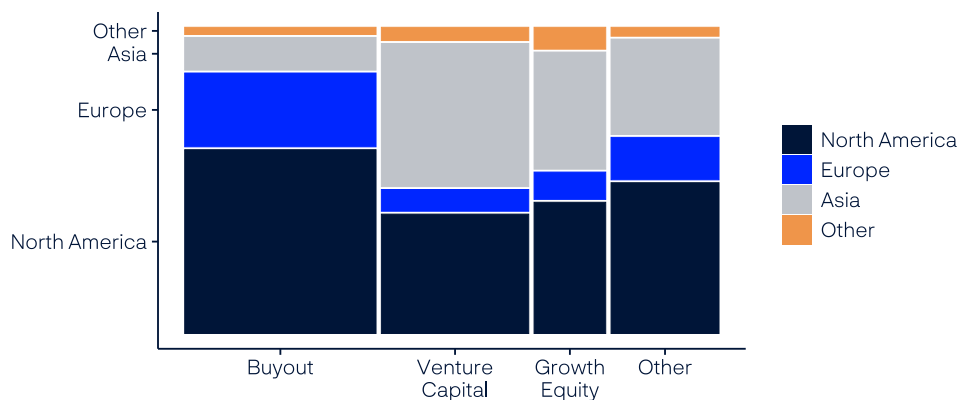
sectors, with reduced exposure to energy and financials.⁸ When differentiating between buyout and venture capital funds, buyouts align more with public markets, while venture capital is more concentrated in the information technology sector.

FIGURE 3 Growth of private equity



NOTE: Panel a) shows assets under management for all buyout, venture capital, and growth equity funds in the Preqin database. The listed market is proxied by the MSCI ACWI IMI index. Panel b) shows the aggregate capital raised each year by all buyout, venture capital, and growth equity funds in the Preqin database. Sample period is January 2000 to December 2022. Source: Preqin Inc., MSCI, NBIM calculations.

FIGURE 4 Assets under management (AUM) by strategy and region



NOTE: Figure shows the share of total assets under management by region and fund type, as reported by Preqin. “Other” includes co-investment, secondary, fund of funds, balanced, and turnaround funds. Estimation date is December 2022. Source: Preqin Inc.

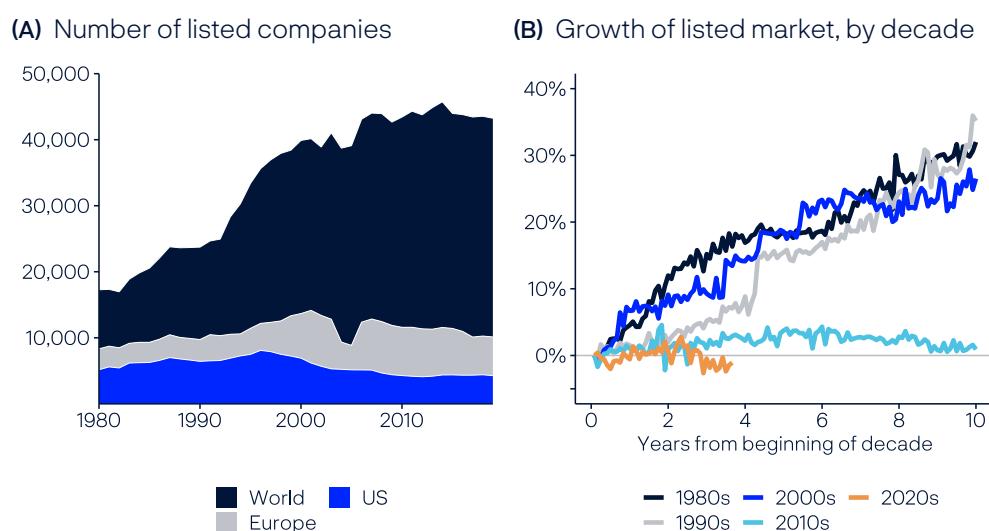
Consistent with the expansion of the overall market, deal activity has also experienced significant growth. In 2022, over 9,000 buyout deals, and 25,000 venture capital deals were completed globally. Private-to-private deals and secondary buyouts accounted for more than 70 percent of both the number and the aggregate value of the deals completed in 2021. Public-to-private deals have become less common but make up a disproportionately large share of total deal value due to their size.

⁸See Appendix A for more details.

The rising number of deals has also coincided with larger deal sizes. Since 1995, the median deal value for buyouts has doubled, reaching 100 million dollars in 2021. Despite this growth, private equity deals remain small relative to public markets. For instance, as at December 2021, the median market capitalisation of the MSCI World Microcap index was 75 million dollars, while the median market capitalisation of the MSCI ACWI IMI index was 1.3 billion dollars. However, large deals make up a significant share of total deal capital. In 2021, the ten largest deals made up more than 20 percent of aggregate deal value.

While the private equity market has experienced significant growth, the growth of the public equity market has stalled over the same period. As shown in Figure 5, the listed equity market has experienced modest growth in the past two decades, and the number of globally listed companies has levelled off. There has also been a decrease in the number of companies listing. In the US, the number of IPOs has decreased from an annual average of approximately 300 between 1980 and 2000, to around 120 since 2000. The contraction in the number of listings is particularly notable as valuations have been high over this period, and this is when companies typically go public (Lowry, 2003).

FIGURE 5 Public equity markets



NOTE: Panel a) shows the number of listed companies from the World Bank Development Indicators (WDI) database. The sample period ends in 2019. Panel b) shows the cumulative difference of growth in index market capitalisation and index price returns for the MSCI World index. Positive number indicates that the size of the listed market is growing faster than implied by returns. Data are monthly from January 1980 to January 2023. Source: World Bank, Factset Analytics, MSCI, NBIM calculations.

The divergent growth trends across these two markets have contributed to private equity firms' assets under management reaching 9 percent of the public market's size (Figure 3). While there is no consensus on the cause of these trends, the literature points to a variety of related factors, including changes in markets, companies, and investors' perception of the performance of private equity.

Firstly, Stulz (2020) suggests that structural changes in private equity markets may have reduced the constraints that previously forced companies to go public. In particular, the greater availability of private market capital has made it easier for private companies to raise funds without listing. Additionally, advances in trading platforms, as highlighted by Nadauld, Sensoy, Vorkink, and Weisbach (2019), have enhanced the liquidity of private equity by facilitating the trading of investments in private equity funds. Lastly, regulatory changes regarding shareholder limits have enabled private companies to expand their shareholder base without necessitating public listing.⁹

Second, companies have become increasingly dependent on intangible capital, which can increase the value of staying private.¹⁰ While public markets can value intangible assets, they are thought to do so more efficiently when the assets' productivity is observable, or the company has a successful investment track record (Stulz, 2020). Companies whose success depends mostly on intangible assets that have yet to demonstrate their productivity may struggle to maximise their value in public markets, as they must balance between disclosing enough information for accurate valuation and revealing too much to their competitors. In the private market, however, these firms can raise funds from investors with specialised knowledge, who are better positioned to value and monitor the management of intangible assets.

Lastly, investor perception of the performance of alternative investments has risen steadily since the 2000s. As shown by Begenau, Liang, and Siriwardane (2023), the magnitude of the increase in perceived performance is sufficient to generate the aggregate rise in alternatives that has been realised. Attributing the increased demand for private equity to perceived performance is further supported by the Preqin global investor survey, which cites higher absolute and relative returns as key motivations for investors to allocate to private equity (Preqin, 2022).

Drivers of private equity performance

The higher perceived performance of private equity relative to public equity can be understood by comparing the ownership models employed in both markets. As discussed by Brown, Dompé, and Kenyon (2022), both models carry distinct benefits and offer investors different ways to mitigate the risks associated with equity ownership.

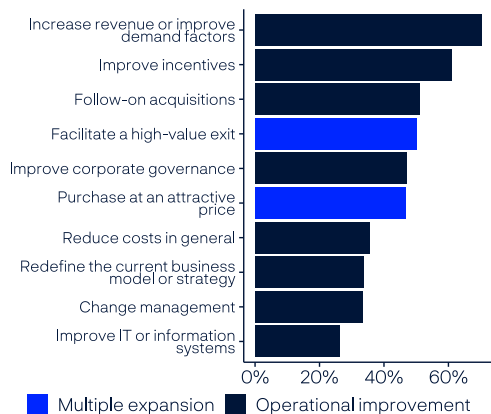
On one side of the spectrum, public companies typically have a highly diversified ownership structure, characterised by numerous shareholders each holding a minority stake. This structure allows investors to mitigate company-specific and liquidity risks, as they can diversify their portfolio across multiple listed companies. However, it also results in a separation of ownership and control. Investors are not directly involved in a company's day-to-day operations and decision-making processes, which are typically delegated to managers.

⁹In 1982, Regulation D permitted private companies to maintain up to 100 shareholders without the obligation to go public. This limit was subsequently relaxed in both 1996 and 2012, allowing private companies to accommodate up to 2,000 shareholders before facing the requirement to go public.

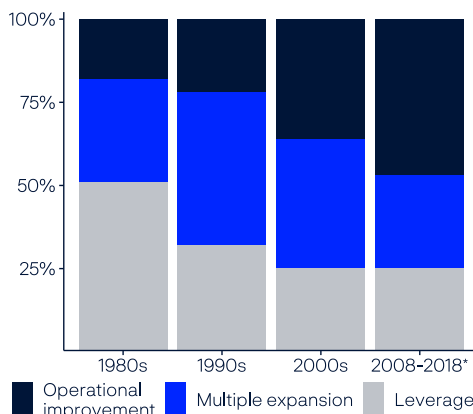
¹⁰Falato, Kadyrzhanova, Sim, and Steri (2022) show that the significance of intangible assets has grown markedly over recent decades, to the extent that the average company's ratio of intangible assets to book assets now exceeds 100 percent.

FIGURE 7 Private equity value creation

(A) Survey evidence on value creation drivers



(B) Breakdown of value creation drivers



NOTE: Panel a) shows the share of deals that private equity investors attribute to a given value creation strategy prior to investment, with a sample size of 74 investors. Panel b) shows private equity value creation decomposed into drivers following the methodology of Gottschalg, Loos, and Zollo (2004) from industry reports on value creation.¹² Sources: Institute for Private Capital, BCG, Gompers et al. (2016).

may look for companies in segments of the market that receive less coverage or segments where they believe other investors may underestimate future growth. In support of this, Jenkinson, Morkoetter, Schori, and Wetzler (2022) attribute 16 percent of total buyout fund performance to timing investments to capture valuation increases in sectors and regions.

In addition, fund managers may screen for companies with potential not yet obvious to other investors. Buyout and growth funds do this by carefully analysing the company’s business model and competitive position (Gompers et al., 2016). This is harder in venture capital, where target companies may not yet have stable earnings or a fully established operating model. However, the literature suggests early-stage investors focus instead on the characteristics of the existing management team, such as professional experience and education (Bernstein, Korteweg, and Laws, 2017; Gompers et al., 2020).

Value creation from operational improvement involves making changes to the portfolio company during the holding period, which is possible due to the private equity fund’s controlling ownership position. Using the survey of private equity professionals in Gompers et al. (2016), Panel a) of Figure 7 shows the most common changes made by buyout and growth funds. These changes are often categorised into governance, financial, and operational engineering (Kaplan and Strömberg, 2009). Funds’ overall value-creation plan will typically involve more than one type of engineering (Biesinger, Bircan, and Ljungqvist, 2020).

Governance engineering involves making changes to the corporate governance of the company. Fund managers meet with portfolio companies and often sit on

¹²The decomposition for 2008-2018 is sourced from the Institute for Private Capital 2022 report Performance Analysis and Attribution with Alternative Investments, and earlier figures are from the Boston Consulting Group 2016 publication How Private Equity Firms Fuel Next-Level Value Creation.

their boards, which also tend to be smaller than boards in listed companies (Amornsiripanitch, Gompers, and Xuan, 2019). They help recruit board members, make changes to senior management, and increase the incentives of management to act in the interest of the equity owner (Gompers, Kaplan, and Mukharlyamov, 2023). On balance, private equity ownership has been found to result in more professional governance in companies.¹³

Financial engineering often goes hand in hand with governance engineering and involves changes to the capital structure of the company. This includes the management of leverage used in the acquisition of the company, tax and financial structuring, and the design of financial contracts to balance incentives and control. Higher leverage and lower cash balances have historically been associated with more efficient investment decisions (Jensen, 1986; Kaplan and Strömberg, 2009).

Operational engineering refers to the use of industry and operating expertise to add value to companies. Private equity funds are most likely to identify opportunities for operational improvement in companies with economic inefficiencies. Strategies for eliminating operational inefficiencies include redefining the business model and strategy of the company, increasing demand, and executing strategic follow-on acquisitions.¹⁴ The exact form of operational improvement, however, depends on the type of inefficiencies present. For growing companies, value creation is more focused on growth. For mature companies, value creation is more focused on increasing efficiency (Fracassi, Previtro, and Sheen, 2022; Davis, Haltiwanger, Handley, Lipsius, Lerner, and Miranda, 2021). Most studies find evidence in favour of operational improvements, but some, particularly in the health sector, suggest that financial results can undermine the quality of service (Sorensen and Yasuda, 2023; Gupta, Howell, Yannelis, and Gupta, 2021; Eaton, Howell, and Yannelis, 2020).

To understand the relative importance of each type of engineering, Panel b) of Figure 7 breaks down total value created into components and shows that the focus of value creation has changed over time.¹⁵ Financial engineering (leverage) and multiple expansion were the dominant sources of value creation in the early buyout industry, as companies faced constraints accessing financing and funds faced less competition for deals. As the private equity industry has matured, the role of multiple expansion appears to have stayed relatively consistent, value created from leverage has fallen, and operational improvements have become more important. This trend has also coincided with large private equity fund managers dedicating more staff to operational engineering, often with sector expertise (Jenkinson et al., 2021).

¹³For example, Ewens and Marx (2018) find venture capital involvement speeds up the professionalisation of start-ups. Bloom, Sadun, and Van Reenen (2015) find the governance policies of smaller, particularly family-owned, companies improve under private equity ownership, and Bernstein and Sheen (2016) and Cohn, Nestoriak, and Wardlaw (2021) find better health and safety outcomes.

¹⁴Add-on acquisitions are associated with a buy-and-build strategy, where private equity firms combine companies in a fragmented sector to achieve economies of scale (Jenkinson, Kim, and Weisbach, 2021).

¹⁵The decomposition in Panel b) of Figure 7 differs from the sources of value creation outlined earlier due to limited access to deal-level data. However, leverage is closely associated with financial engineering, and governance and operational engineering are captured by operational improvement.

The shift in the relative importance of value creation drivers is also consistent with increased competition for private equity deals. As more private equity funds compete for the same investment opportunities, the price of target companies can rise, making it harder to create value over the purchase price. Moreover, value creation that takes less skill to execute, such as tax and financial structuring, has become less important, as these practices represent less of a competitive advantage than they did in the past. On the other hand, private equity firms may be able to minimise competition through industry knowledge, relationships with acquisition targets, and superior organisational and governance engineering capabilities (Gompers and Kaplan, 2022).

3. Assessing the performance of private equity

Evaluating private equity performance is challenging due to data limitations, as funds typically do not disclose information about their holdings and performance. For our analysis, we rely on performance data obtained through FOI requests from limited partners, such as public pension funds. The dataset is provided by Preqin, and includes net-of-fee fund cash flows and portfolio company valuations, reported at a quarterly frequency or lower. In our estimates, we filter our sample based on fund age, data quality, and the data source.¹⁶

Similar to other private assets such as unlisted real estate, measuring private equity performance is also complicated by the fact that portfolio company returns are observed infrequently, and valuations may be stale (Korteweg, 2023). This can lead to the net asset value of portfolio companies, which we denote as NAV_t , being reported with some delay.¹⁷ Periodic returns calculated from these values can be less precise and may smooth out the true performance of the fund.

Furthermore, given that private equity funds can call capital (I_t) and distribute capital (D_t) at any point throughout the life of the fund, time-weighted returns based on fund value may not be an appropriate measure of overall fund performance. For this reason, the main performance measures used in the private equity literature are value-weighted. Generally, private equity practitioners tend to focus on two value-weighted measures of total return, the *cash multiple* and the *internal rate of return*.

The cash multiple, also known as total value to paid-in capital (TVPI), is defined as the ratio between the total value created and the capital invested in the fund over P time periods:

$$TVPI_t = \frac{\sum_{l=0}^P (D_{t-l} + NAV_t)}{\sum_{l=0}^P I_{t-l}}. \quad (1)$$

¹⁶We require sufficient observations to model cash flows and net asset values over the life of the fund. We do not include funds that started investing later than 2016. For active funds, we do not include performance older than as at June 2022. We also do not include funds with performance reported by the fund manager directly, although we recognise that in some cases the data provider had access to public sources that would have been consistent with the self-reported data they chose to make available instead. Measured performance would be higher for most strategies if self-reported data was included, as reported in Appendix B.

¹⁷This delay reflects both the lower frequency of private transactions typically used as an input, and the discretion that fund managers have over the valuation process (Brown, Gredil, and Kaplan, 2019).

A multiple greater than 1 means the investment has returned more than the initial capital invested. The main limitation of this measure is that it does not take into account the timing of cash flows. However, this removes any incentive to manipulate the timing of investments.

The internal rate of return (IRR) is defined as the annualised gain in net cash flows (C_t). The IRR can be estimated by solving for the discount rate which sets the net present value of the cash flows equal to zero:

$$IRR_t = \arg \min_{IRR} \left| \sum_{l=0}^P \frac{C_{t-l}}{(1 + IRR)^l} \right|. \quad (2)$$

Unlike the cash multiple, the IRR takes into account the timing of cash flows. By presenting performance on an annualised basis, it also makes it easier to compare performance across different vintages. However, the IRR is particularly sensitive to the timing of cash flows. Early distributions result in high fund IRRs, which are insensitive to subsequent changes in overall returns. This raises the incentive to manipulate performance through the timing of cash flows.

While both of these measures offer insight into the absolute performance of private equity, they are not directly comparable with public market returns due to the timing of investments. The public market equivalent (PME) ratio defined by Kaplan and Schoar (2005) addresses this issue. In this measure, the cash multiple is discounted by the public equity market total return index S_t , which in our case is a broad index of global listed equities:¹⁸

$$PME_t = \frac{\sum_{l=0}^P (D_{t-l}/S_{t-l}) + NAV_t/S_t}{\sum_{l=0}^P I_{t-l}/S_{t-l}}. \quad (3)$$

The annualised version of this measure is the direct alpha (DA_t) introduced by Gredi, Griffiths, and Stucke (2023). Denoting the equity-discounted net cash flows as DC_t , direct alpha is defined as follows:

$$DA_t = \arg \min_{DA} \left| \sum_{l=0}^P \frac{DC_{t-l}}{(1 + DA)^l} \right|. \quad (4)$$

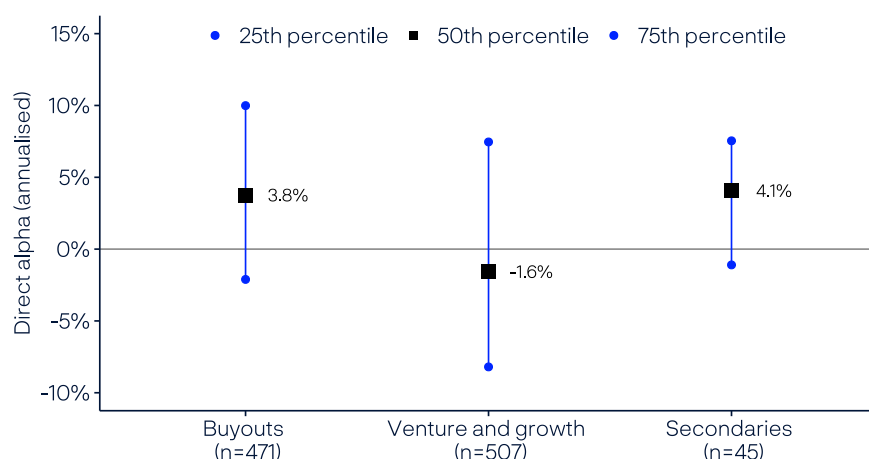
A PME ratio above one and a positive value of direct alpha indicate that a private equity fund has returned more cash flows to the limited partner than they would have earned by investing in the public markets with the same timing. Among the various measures considered, the advantage of direct alpha is that it can be directly interpreted as the relative annual portfolio contribution from investing in private equity.

To evaluate the performance of private equity, we estimate direct alpha for four main types of funds: buyout, venture capital, growth equity, and secondary funds. Our headline results are shown in Figure 8. On average, buyout and secondary

¹⁸If outperformance of funds is measured relative to listed equities in their own region, the direct alpha of funds investing in Europe and Asia increases and those investing in North America falls. We report these results in Appendix A.

funds have consistently earned a return that is higher than the return of an identically timed investment in global public equity markets. Aggregate performance is weaker for venture capital and growth equity, with only the best-performing funds having higher returns than identically timed investments in public equities.

FIGURE 8 Direct alpha percentiles of different categories of private equity



NOTE: The sample consists of funds with vintage years from 1985 to 2016 for which sufficient cash flow data is publicly available up to Q2 2023. The line ends indicate the 25th and 75th percentiles. Source: Preqin Inc.

Our estimates for buyouts align with numerous studies in the academic literature, despite the use of different methodologies and datasets. For example, Korteweg (2023) reports similar estimates for a selection of academic papers which use the Burgiss dataset. The Burgiss dataset sources data confidentially from a large group of limited partners, which increases accuracy and also reduces possible bias in the selection of funds. Across all the studies reported, the average PME ratio is 1.16 for buyouts. For our sample of funds, the average PME ratio is 1.21 with respect to a global listed equity index, and 1.16 with respect to a regional listed equity index.¹⁹

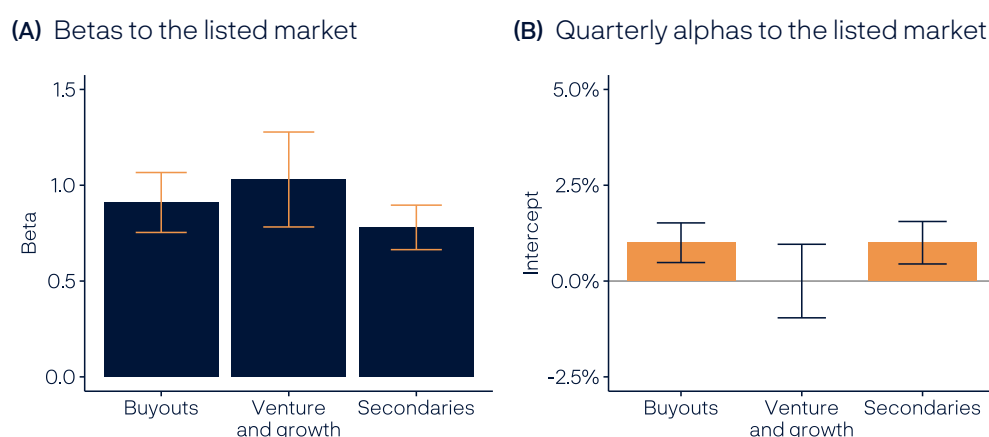
In contrast, our estimates for venture capital deviate from some of the literature, which finds positive performance, on average. We find an average PME ratio of 1.11 for venture capital, while the average PME ratio across the studies reported by Korteweg (2023) is 1.22.²⁰ However, these results appear to be sensitive to the sample of funds selected. The performance data from the data provider Burgiss captures more high-performing venture capital funds, particularly in the vintages preceding 2000 (Harris, Jenkinson, and Kaplan, 2014). In Appendix B, we show that this difference remains in up-to-date data. Data collection from public investors such as pension funds can contribute to the observed differences. For example, some high-performing venture capital firms will not accept capital from investors with strong reporting requirements (Abuzov, Gornall, and Strebulaev, 2023).

¹⁹Summary statistics are provided in Appendix B.

²⁰Due to compounding, average direct alpha can be negative while the average PME ratio is positive.

From a risk perspective, the public market equivalent assumes private equity shares the same characteristics as the listed market.²¹ To evaluate this assumption, we estimate the public equity market beta of private equity with quarterly returns derived from aggregated fund capital flows and net asset values. We correct for possible lags between public market returns and private valuations with the methodology proposed by Dimson (1979).²² As shown in Figure 9, we find the capital asset pricing model beta is slightly below one for buyouts, and higher for venture capital. For buyouts, which tend to raise a high share of their financing from debt, the relatively low beta suggests buyout funds invest in companies with low exposure to equity risk, which is discussed further in Section 4.

FIGURE 9 CAPM regressions with lag adjustment



NOTE: Calculated using the Preqin quarterly indices from March 2000 to March 2023. The listed equity index used presents global equities, and the betas are estimated using six lags. The error bars indicate the 95 percent confidence interval. More details are reported in Appendix C. Source: Preqin Inc., FTSE, NBIM calculations.

Our estimates are in line with the average findings from other studies summarised by Korteweg (2023), where the median CAPM beta estimate is found to be 1.4 for venture capital funds and 1.1 for buyout funds. However, they are lower than estimates based on deals data or secondary valuations, where estimated betas for both buyouts and venture capital are in the range of 1.5 to 3.²³ The inclusion of fees in the fund-level data can partially explain the gap between fund and deal betas, although the magnitude of the difference still needs to be better understood (Korteweg, 2023). For estimates based on secondaries, the higher beta may be driven by secondary seller liquidity needs, particularly during market downturns.

²¹It is however possible to adjust the listed benchmark used in the calculation to account for different characteristics. For instance, Appendix B also shows relative performance over a 50 percent leveraged benchmark index.

²²Our regression model with the Dimson (1979) adjustment is defined as:

$$R_t^F = \alpha + \sum_{l=0}^6 \beta_l (R_{t-l}^S) + \epsilon \quad \beta = \sum_{l=0}^6 \beta_l \quad (5)$$

In this specification, R_t^F is the excess return on private equity, and R_t^S is the excess return on listed equities. The reported betas are summed together over a number of lags, chosen to be the same as used in Korteweg (2023).

²³For deals data, Axelson, Sorensen, and Strömberg (2014) find buyout deal betas between 2.2 and 3.1 based on deals from funds of a single fund-of-funds limited partner. Buchner and Stucke (2014) find betas between 2.7 and 3.1 for buyouts and 2.5 and 2.9 for venture capital based on Centre of Private Equity Research data on 15,000 portfolio companies from fund vintages between 1980 and 2001. With a secondaries-adjusted buyout index, Boyer, Nadauld, Vorkink, and Weisbach (2023) find a beta of 1.79.

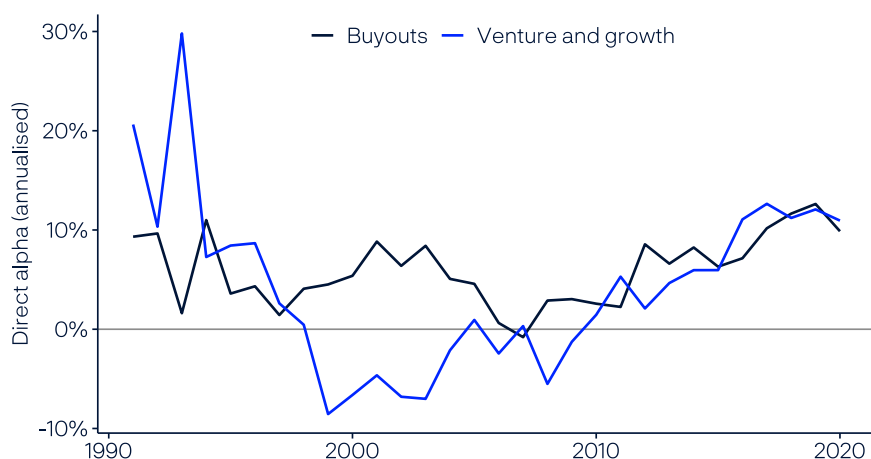
Private equity betas are focused on in the literature due to the implications for risk-adjusted relative returns. Risk adjustment has also been extended to broader factor models that also consider size, value, liquidity, or interest rates. Studies which examine private equity fund returns from this perspective typically find weaker relative performance (Ang, Chen, Goetzmann, and Phalippou, 2018; Stafford, 2022). For example, Gupta and Nieuwerburgh (2021) construct replicating private equity portfolios from strips of listed equity and fixed-income instruments, and find slightly negative risk-adjusted performance for both buyouts and venture capital. In Appendix C, we add lags of Fama and French (1992) size and value factors, and fixed-income returns, as additional factors in our CAPM regressions. While these additional factors better explain the performance of growth and venture capital funds, we continue to find significant alphas to buyout and secondary funds.

It has been documented that private equity fundraising and deal activity respond to economic conditions. Robinson and Sensoy (2016) find that fund capital calls and cash flows are, on average, pro-cyclical, increasing with equity valuations and decreasing when credit conditions tighten. Axelson, Jenkinson, Strömberg, and Weisbach (2013) suggest this variation in activity also affects fund returns, due to increased competition for investment opportunities in crowded vintage years. Brown, Harris, Hu, Jenkinson, Kaplan, and Robinson (2021) conclude that while these fundraising booms lead to lower returns, opportunities for market timing are likely limited.

To measure how much private equity performance varies over time, we calculate the average performance of funds by their vintage year. Figure 10 shows our results for the different types of funds considered. We find buyout funds have delivered a positive direct alpha in almost all vintages since 1990. By contrast, venture capital and growth equity funds fell significantly in the 2000s. This change in performance coincides with the run-up to the dot-com bubble, and its collapse in March 2000. We also find some evidence of cyclicity. As we show in Figure 11, boom years prior to the global financial crisis and the dot-com bubble are associated with lower relative returns. In more recent vintages, performance appears to be improving across all strategies. These results should be interpreted with caution, however, as recent funds have likely not realised all their investments, and returns have been generated in a period where interest rates have been extremely low.

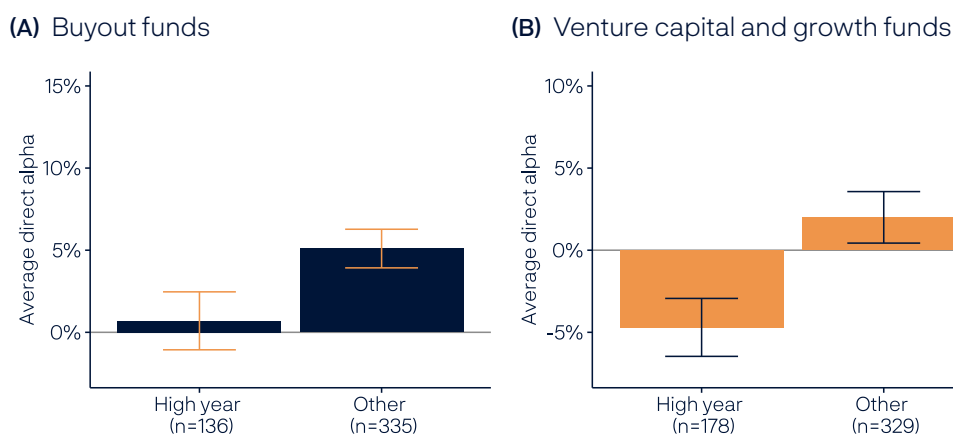
Performance variations exist not only across different strategies and time periods, but also within individual fund performances. This level of dispersion in fund performance is high even compared to listed active managers (Fama and French, 2010). As Figure 8 shows, the performance of top- and bottom-quartile funds deviates significantly from the average. For instance, the difference in direct alpha between the top- and bottom-quartile buyout funds exceeds 12 percentage points. Venture capital has the highest degree of dispersion, given the increased risk and high upside potential associated with high-growth companies. The dispersion of private equity fund returns means that the returns received by individual limited partners can significantly diverge from the aggregate returns of

FIGURE 10 Direct alpha by vintage year



NOTE: The sample includes funds with vintage years from 1991 to 2020 for which sufficient cash flow data is available, either from public sources or reported by the fund manager. The direct alpha is the mean for each vintage year. Source: Preqin Inc.

FIGURE 11 Direct alpha percentiles and fundraising activity

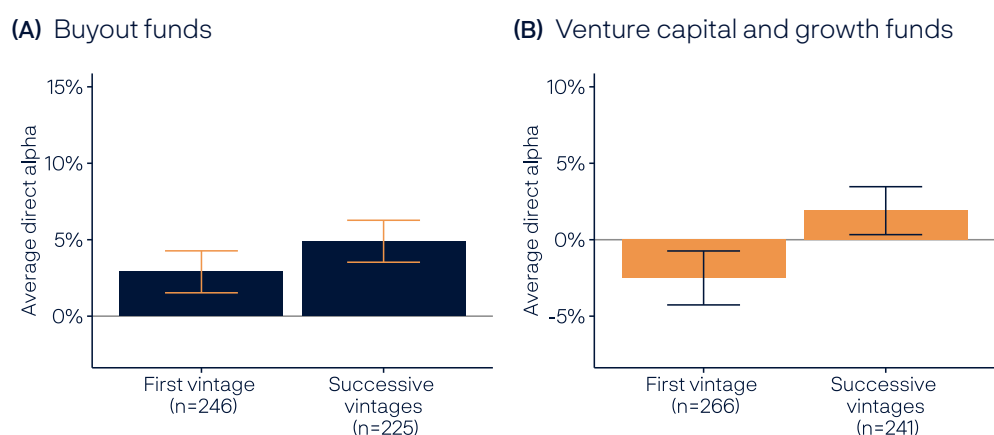


NOTE: The sample includes funds with vintage years from 1985 to 2016 for which sufficient cash flow data is publicly available. The high-activity vintage years are 1998, 1999, 2000, 2006, and 2007. Source: Preqin Inc.

private equity.

While identifying top-performing funds is difficult in real time, the performance of past funds can be informative of manager skill, and impacts the ability of fund managers to raise successive and larger funds. As we show in Figure 12, the direct alpha of successive vintages raised by the same fund are typically higher for buyouts. In support of this, Nanda, Samila, and Sorenson (2020) and Harris, Jenkinson, Kaplan, and Stucke (2023) find that past performance of fund managers predicts future performance, suggesting there is some persistence in the performance of private equity. However, recent literature suggests persistence has fallen over time, and is not always observable at the time investors would need to commit to the next fund (Braun, Jenkinson, and Stoff, 2017; Korteweg and Sorensen, 2017). As a result, it is important for investors to gather information beyond past fund returns to identify the best managers.

FIGURE 12 Fund manager track record



NOTE: The sample includes funds with vintage years from 1985 to 2016 for which sufficient cash flow data is publicly available. The first vintage is identified within each investment category. As such, fund managers may have managed a different fund type prior to the first vintage identified. Source: Preqin Inc., NBIM calculations.

4. Investment considerations

While the relative performance of private equity is an important factor for prospective investors, there are several other factors that investors should consider. In this section, we review the literature on some commonly cited considerations. We discuss the high costs and leverage associated with private equity, the potential principal-agent conflicts that can arise, and the level of environmental, social and governance (ESG) disclosure within private equity.

Costs

While numerous studies find private equity outperforms public equity net of costs (Korteweg, 2023), the costs of investing in private equity are considerably higher than for public equity and other unlisted assets. Panel a) of Figure 13 shows the average annual investment costs across asset classes for a sample of US pension funds estimated by CEM Benchmarking (2018). It finds the cost of private equity to be more than four times that of US listed small-cap stocks, and almost twice that of unlisted real estate.

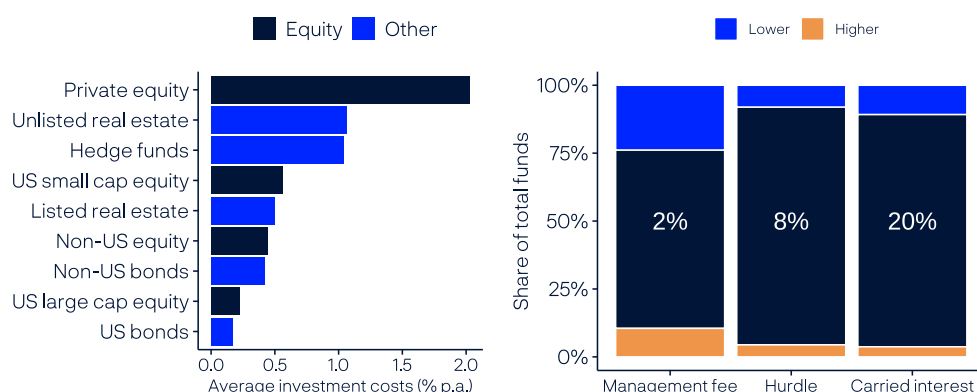
The largest costs in private equity are management fees and the performance-related carried interest payments paid to GPs. As we show in Panel b) of Figure 13, similar fee structures are offered across funds, at least at their inception.

Management fees are usually a fixed percentage of funds' assets under management. The most common rate is 2 percent (Figure 13), but the largest funds often charge slightly lower fees. Management fees are intended to cover the day-to-day expenses from running the fund, including salaries, due diligence, and on-going engagements with portfolio companies. Management fees are typically paid as a percentage of committed capital at the headline rate during the investment period, and reduced afterwards. Additionally, portfolio companies can

FIGURE 13 Annual investment costs and reported fund fees

(A) Annual investment costs by asset class

(B) Reported fund fees



NOTE: Panel a) shows the average annual investment costs by asset class for a sample of US defined-benefit pension funds estimated by CEM Benchmarking (2018). The sample period is January 1998 through December 2016. Panel b) shows the fees charged by all funds in the Preqin database for which data is available. Percentages in white show the most commonly reported values, and are represented by the dark blue bar. For example, of the funds with available data in Preqin, 65 percent charge a management fee of 2 percent. Sources: CEM Benchmarking, Preqin Inc., NBIM calculations.

be directly charged for more specific services that fund managers provide them, for instance advisory work for transactions. These are usually partially offset by management fees.²⁴

Carried interest is the share of fund profits that the general partner receives, provided it exceeds any contractual hurdle rates.²⁵ Carried interest can be calculated on a deal or fund basis, and the most common rate is 20 percent. Performance fees are structured to incentivise the general partner. In practice, according to Metrick and Yasuda (2010), performance-contingent fees make up approximately one third of expected fund manager revenue.

Although the stated fees tend to be consistent across investors, evidence shows limited partners with negotiating power can achieve lower costs. Begenau and Siriwardane (2022) find that based on clustering in reported net performance, some US pension funds pay significantly lower fees than their peers for investing in the same private equity funds. The scope for fund managers to offer such fee discounts is limited by non-discrimination clauses commonly included in limited partnership agreements (Braun, Jenkinson, and Schemmerl, 2019). However, investors can still lower the cost of investing in private equity, and improve after-cost performance, by participating in co-investments.

Co-investments provide investors with the opportunity to invest in the equity of specific portfolio companies in a fund, separate from their commitments within the standard fund structure shown in Figure 1. The decision to offer co-investments is made by the GP, and they are usually only available to investors already invested in

²⁴Phalippou, Rauch, and Ueber (2018) estimate portfolio company fees amount to 6 percent of invested capital in a sample of 454 US companies involved in a buyout. Likely motivation for this type of fee arrangement is their tax treatment, and it can be perceived as legitimate especially if the same services would otherwise have been bought from external providers (Jenkinson et al., 2021).

²⁵The most common hurdle rate is 8 percent.

the fund.²⁶ For investors, the main advantage of co-investments is that they often require substantially lower or no management and carried interest payments.²⁷ As a result, demand for co-investments typically exceeds supply.

Given the cost advantages of co-investments for LPs, there is potential for adverse selection. If GPs believe a deal will perform well, and generate carried interest payments, the incentive to offer co-investments will be low. At the same time, poorly performing co-investments are likely to damage their relationships with limited partners. The evidence of adverse selection in the literature is mixed. Using a small sample of co-investments from seven LPs, Fang, Ivashina, and Lerner (2015) find co-investments underperform primary fund commitments. Using a more comprehensive dataset, Braun et al. (2019) find no evidence of negative selection.

Leverage

A significant part of the capital for buyout deals comes from debt, mostly issued in the name of the individual target company. In this structure, financial liability does not extend to other assets in the buyout fund, but the private equity fund manager acts as a sponsor for the transaction.²⁸ The funds are lent by banks and institutional investors, either directly or through a syndication.²⁹ In recent years banks have played a smaller role, and more private debt funds have been raised to fill this gap with direct lending (McKinsey, 2023).

As seen in Figure 14, the average buyout in 2018 had an entry net debt to EBITDA ratio of 5.0x and a net debt to enterprise value ratio of 42 percent. The ratio of debt to earnings is not consistently higher than for the listed market, likely as a result of buyout fund focus on value companies (Stafford, 2022). However, relative to the listed equity market, the share of debt funding has been consistently higher for buyouts. This does not necessarily mean overall risk is higher. If buyout funds invest in less risky, mature companies, this can help reconcile the higher leverage with the listed market betas we estimate in Section 3.

At the same time, the leverage of target companies in the buyout deal typically increases significantly, even though it is paid down over the life of the investment (Brown et al., 2021). With efficient markets, additional leverage does not increase excess return, but it does increase risk. For a buyout fund, this means more asymmetrical payoffs. The gains from successful value creation will be higher, while losses are limited by the liability structure and the compensation terms of fund managers. When credit markets are overheated, this can distort incentives towards over-leveraging portfolio companies (Axelson et al., 2013). On the other hand, the increase in debt is also supported by the advantages private equity funds have in obtaining and managing high leverage, for instance by avoiding and

²⁶While GPs may offer co-investment opportunities to outside investors, this is often in the hope that they will become LPs in future funds.

²⁷Co-investments also provide opportunities for LPs to adjust their exposure to particular companies or sectors, or to deepen their relationship with GPs. GPs may offer co-investments to earn goodwill with investors, or for diversification purposes, as funds have limitations on the proportion of the fund that can be invested in any individual deal (Braun et al., 2019).

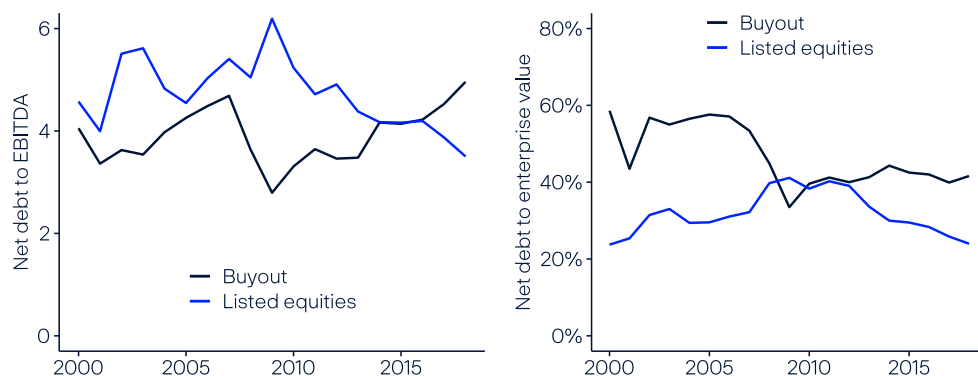
²⁸The main exception to this is subscription credit lines, which are collateralised short-term fund-level borrowing to delay calling capital commitments from limited partners.

²⁹Syndicated debt refers to high-yield bond issuance and leveraged loan arrangements where a group of underwriters, usually banks, is acting as an intermediary.

resolving financial distress (Malenko and Malenko, 2015; Bernstein, Lerner, and Mezzanotti, 2019; Hotchkiss, Smith, and Strömberg, 2021).

FIGURE 14 Leverage

(A) Net debt to earnings before interest, **(B)** Net debt to enterprise value tax, depreciation and amortisation (EBITDA)



NOTE: Buyout fund leverage statistics are deal-year medians calculated by Brown et al. (2021) with proprietary data sourced from an investor in private equity funds. Public market levels are totals for a broad developed-markets equity index. Source: Brown et al. (2021), MSCI, NBIM calculations.

Principal-agent conflicts

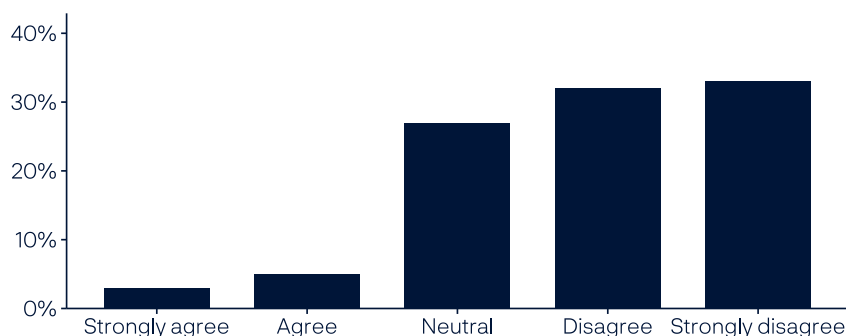
As discussed in Section 1, the public equity ownership model can create agency conflicts between investors and management. Whilst the active ownership model used in private equity can overcome many of these issues, delegating the management of capital to private equity firms can create new agency conflicts for investors.

Many of the potential agency conflicts relate to performance measurement. General partners may attempt to maximise management fees rather than performance by focusing on increasing assets under management instead of returns. They may also attempt to inflate the unrealised value of portfolio companies to support future fundraising efforts (Brown et al., 2019; Metrick and Yasuda, 2010). Funds can also attempt to improve internal rates of return by using subscription credit lines to delay calling investor capital (Jenkinson et al., 2021). Innovation in private equity has also created more potential for misalignment, for instance when rolling over portfolio companies into continuation funds. In some cases, issues arising from agency conflicts have been severe enough to attract the attention of regulators.³⁰

In theory, the terms of the limited partnership agreement (LPA), which governs the relationship between the investor and the GP, can be used to minimise the potential for agency conflicts. In practice, however, completely investor-friendly agreements are difficult to achieve when access to top private equity funds is constrained. When investor demand for private equity is high, funds can to a

³⁰For instance, fee policies and disclosure are discussed in US SEC proposed rule documentation for Private Fund Advisers; Documentation of Registered Investment Adviser Compliance Reviews (2022). The final version of the proposal was adopted on 23 August 2023.

FIGURE 15 Limited partners' belief in more favourable contractual terms from investor expertise and negotiating leverage



NOTE: The chart shows the percentage of investors that agree with the statement: "The Private Equity industry has been characterized in recent years by the investors' ability to use their expertise and negotiating leverage to achieve favourable changes in common contractual terms." Source: ILPA SEC Survey 2022.

certain extent choose their investors, and will use this bargaining power to ensure the partnership is profitable for them. Survey data shown in Figure 15 suggests this aligns with investor experience. One response to this issue has been limited partner co-operation in setting standards for the industry. For example, the Institutional Limited Partners Association (ILPA) connects limited partners with a focus on increasing the alignment of interests, governance, and transparency in LPAs.

At the same time, the demand for private equity depends on the expectation of satisfactory outcomes, and there is evidence that investors are indeed responsive to fund managers going against their interest. Brown et al. (2019) find investors penalise funds that manipulate returns, making the firms behind them less likely to raise capital in the future. Investors that participate in private equity at scale can dedicate significant resources to due diligence (Rin and Phalippou, 2017). This minimises informational asymmetries between the principal and the agent, and likely reduces conflicting practices in the industry as a whole.

ESG and climate

In recent years, investors have increasingly been seeking more transparency on ESG issues, and exposure to green assets. As private markets disclose less than public markets in general, it is important that prospective investors examine whether disclosures are sufficient to manage their ESG objectives and reporting requirements. Investors should also examine the impact of private equity ownership on portfolio company ESG outcomes, and the exposure to green assets that is achievable.

ESG disclosures from private equity firms appear to have increased considerably over time. Using a measure of voluntary ESG disclosures from historical website information, Abraham, Olbert, and Vasvari (2022) find the growth in private equity ESG disclosure has mirrored the trend in public markets, even though the level of disclosure remains considerably below publicly listed companies. Böni, Hendrikse, and Joos (2022) also find the median GP discloses only 8 percent of the available ESG indicators collected by Preqin, on average.

Both studies find that larger, older, listed GPs, as well as those that have recently raised funds or are headquartered in Europe, are more transparent. In addition, Abraham et al. (2022) observe that an increase in ESG disclosure requirements in public markets typically prompts private equity firms to disclose more. This trend is likely a response to capital competition, given that investors have the option to invest in local public markets. They also find disclosures appear to be related to the fundraising cycle. Disclosures usually increase in the period leading up to fundraising events, peak in the year of fundraising, and then decrease thereafter. This suggests that private equity firms adjust their disclosure practices to accommodate the requirements of LPs, especially during fundraising periods.

In theory, the alignment of ownership and control in private equity provides more scope for GPs to influence change in portfolio companies, including ESG-related issues. While very few studies directly examine the ESG outcomes of private equity portfolio companies, Eccles, Serafeim, and Clay (2012) find private equity funds are increasingly investing resources into ESG practices. Funds dedicated to impact investing and climate technology have also become more commonplace. Since 2019, climate-related private equity investments have increased by 38 percent annually, reaching 196 billion dollars in 2022 (McKinsey, 2023). Should the availability of capital in private markets persist, alongside the trend of companies choosing to stay private for longer, private markets will likely be an important source of emerging climate technology going forward.

5. Summary

In this note, we provide an overview of private equity. We outline the organisation and lifecycle of private equity funds, and discuss the rapid growth of the market for private equity. We show that the growth of private equity has coincided with a slowdown in the growth of the number of public companies, and we outline the prevailing explanations for these trends in the literature.

Using performance measures which compare private equity fund cash flows to identically timed investments in public equities, we find private equity buyouts have meaningfully outperformed public equities by 3 to 4 percentage points annually, on average. Our results align with other studies in the literature that rely on different performance measures and datasets. We find venture capital and growth equity have underperformed public equities by 1 to 2 percentage points, on average. Our results for venture capital contrast with some of the literature, but are sensitive to the sample period and funds considered. Recent performance for venture capital looks more positive. For private equity as a whole, we continue to find excess return after accounting for market risk and other risk factor exposures.

In keeping with the literature, we also find performance is highly dispersed and depends on strategy, timing, and manager selection. While large and experienced investors generally have better outcomes, it is important that investors carefully evaluate the implementation of private equity, and also consider practical aspects such as fees, transparency, and responsible investment.

References

- Abraham, J., M. Olbert, and F. Vasvari (2022). ESG disclosures in the private equity industry. Working paper.
- Abuzov, R., W. Gornall, and I. A. Strebulaev (2023). The value of privacy and the choice of limited partners by venture capitalists. Working paper.
- Amornsiripanitch, N., P. A. Gompers, and Y. Xuan (2019). More than money: Venture capitalists on boards. *The Journal of Law, Economics, and Organization* 35(3), 513–543.
- Ang, A., B. Chen, W. N. Goetzmann, and L. Phalippou (2018). Estimating private equity returns from limited partner cash flows. *The Journal of Finance* 73(4), 1751–1783.
- Axelson, U., T. Jenkinson, P. Strömberg, and M. S. Weisbach (2013). Borrow cheap, buy high? The determinants of leverage and pricing in buyouts. *The Journal of Finance* 68(6), 2223–2267.
- Axelson, U., M. Sorensen, and P. Strömberg (2014). Alpha and beta of buyout deals: A jump CAPM for long-term illiquid investments. Working paper. London School of Economics (LSE).
- Begenau, J., P. Liang, and E. Siriwardane (2023). The rise in alternatives. Working paper.
- Begenau, J. and E. Siriwardane (2022). How do private equity fees vary across public pensions? Working paper, National Bureau of Economic Research.
- Bernstein, S., A. Korteweg, and K. Laws (2017). Attracting early-stage investors: Evidence from a randomized field experiment. *The Journal of Finance* 72(2), 509–538.
- Bernstein, S., J. Lerner, and F. Mezzanotti (2019). Private equity and financial fragility during the crisis. *The Review of Financial Studies* 32(4), 1309–1373.
- Bernstein, S. and A. Sheen (2016). The operational consequences of private equity buyouts: Evidence from the restaurant industry. *The Review of Financial Studies* 29(9), 2387–2418.
- Biesinger, M., C. Bircan, and A. Ljungqvist (2020). Value creation in private equity. Working paper, European Bank for Reconstruction and Development.
- Bloom, N., R. Sadun, and J. Van Reenen (2015). Do private equity owned firms have better management practices? *American Economic Review* 105(5), 442–46.
- Boyer, B., T. Nadauld, K. Vorkink, and M. Weisbach (2023). Discount-rate risk in private equity: Evidence from secondary market transactions. *Journal of Finance* 78(2), 835–885.
- Braun, R., T. Jenkinson, and C. Schemmerl (2019). Adverse selection and the performance of private equity co-investments. *Journal of Financial Economics* 136(1).
- Braun, R., T. Jenkinson, and I. Stoff (2017). How persistent is private equity performance? Evidence from deal-level data. *Journal of Financial Economics* 123(2), 273–291.
- Brown, G. et al. (2021). Debt and leverage in private equity: A survey of existing results and new findings. Working paper, Institute for Private Capital.
- Brown, G., A. C. Dompé, and S. Kenyon (2022). Public or private? Determining the optimal ownership structure. *The Journal of Portfolio Management* 48(9).
- Brown, G., R. Harris, W. Hu, T. Jenkinson, S. N. Kaplan, and D. T. Robinson (2021). Can investors time their exposure to private equity? *Journal of Financial Economics* 139(2), 561–577.

- Brown, G. W., O. R. Gredil, and S. N. Kaplan (2019). Do private equity funds manipulate reported returns? *Journal of Financial Economics* 132(2), 267–297.
- Buchner, A. and R. Stucke (2014). The systematic risk of private equity. Working paper.
- Böni, P., J. Hendrikse, and P. Joos (2022). ESG transparency of private equity and debt firms. *Working paper*.
- CEM Benchmarking (2018). Asset allocation and fund performance of defined benefit pension funds in the United States, 1998–2016. Technical report, CEM Benchmarking.
- CEM Benchmarking (2021). Investment benchmarking analysis: Norwegian Government Pension Fund Global. Technical report, CEM Benchmarking.
- Cohn, J., N. Nestoriak, and M. Wardlaw (2021). Private equity buyouts and workplace safety. *The Review of Financial Studies* 34(10), 4832–4875.
- Davis, S. J., J. Haltiwanger, K. Handley, B. Lipsius, J. Lerner, and J. Miranda (2021). The economic effects of private equity buyouts. Working paper, Friedrich Schiller University Jena.
- Dimson, E. (1979). Risk measurement when shares are subject to infrequent trading. *Journal of Financial Economics* 7(2), 197–226.
- Eaton, C., S. T. Howell, and C. Yannelis (2020). When investor incentives and consumer interests diverge: Private equity in higher education. *The Review of Financial Studies* 33(9), 4024–4060.
- Eccles, R. G., G. Serafeim, and T. A. Clay (2012). KKR: Leveraging sustainability. *Harvard Business School Entrepreneurial Management Case No. 112-032*.
- Ewens, M. and M. Marx (2018). Founder replacement and startup performance. *The Review of Financial Studies* 31(4), 1532–1565.
- Falato, A., D. Kadyrzhanova, J. Sim, and R. Steri (2022). Rising intangible capital, shrinking debt capacity, and the US corporate savings glut. *Journal of Finance* 77(5), 2799–2852.
- Fama, E. F. and K. R. French (1992). The cross-section of expected stock returns. *Journal of Finance* 47(2), 429–465.
- Fama, E. F. and K. R. French (2010, October). Luck versus skill in the cross-section of mutual fund returns. *Journal of Finance* 65(5), 1915–1947.
- Fang, L., V. Ivashina, and J. Lerner (2015). The disintermediation of financial markets: Direct investing in private equity. *Journal of Financial Economics* 116(1), 160–178.
- Fracassi, C., A. Previtro, and A. Sheen (2022). Barbarians at the store? Private equity, products, and consumers. *The Journal of Finance* 77(3), 1439–1488.
- Gompers, P., S. N. Kaplan, and V. Mukharlyamov (2016). What do private equity firms say they do? *Journal of Financial Economics* 121(3), 449–476.
- Gompers, P. A., W. Gornall, S. N. Kaplan, and I. A. Strebulaev (2020). How do venture capitalists make decisions? *Journal of Financial Economics* 135(1), 169–190.
- Gompers, P. A. and S. N. Kaplan (2022). *Advanced Introduction to Private Equity*. Edward Elgar Publishing.
- Gompers, P. A., S. N. Kaplan, and V. Mukharlyamov (2023). The market for CEOs: Evidence from private equity. Technical report, National Bureau of Economic Research.

- Gottschalg, O., N. Loos, and M. Zollo (2004). Working out where the value lies. *European Venture Capital Journal* 113, 36–39.
- Gredi, O. R., B. Griffiths, and R. Stucke (2023). Benchmarking private equity: The direct alpha method. *Journal of Corporate Finance* 81, 102360.
- Gupta, A., S. T. Howell, C. Yannelis, and A. Gupta (2021). Does private equity investment in healthcare benefit patients? Evidence from nursing homes. Working paper, National Bureau of Economic Research.
- Gupta, A. and S. V. Nieuwerburgh (2021). Valuing private equity investments strip by strip. *The Journal of Finance* 76(6), 3255–3307.
- Harris, R. S., T. Jenkinson, and S. N. Kaplan (2014). Private equity performance: What do we know? *The Journal of Finance* 69(5), 1851–1882.
- Harris, R. S., T. Jenkinson, S. N. Kaplan, and R. Stucke (2023). Has persistence persisted in private equity? Evidence from buyout and venture capital funds. *Journal of Corporate Finance* 81, 102361.
- Hotchkiss, E. S., D. C. Smith, and P. Strömberg (2021). Private equity and the resolution of financial distress. *The Review of Corporate Finance Studies* 10(4), 694–747.
- Jenkinson, T., H. Kim, and M. S. Weisbach (2021). Buyouts: A primer. Working paper, National Bureau of Economic Research.
- Jenkinson, T., S. Morkoetter, T. Schori, and T. Wetzler (2022). Buy low, sell high? Do private equity fund managers have market timing abilities? *Journal of Banking & Finance* 138, 106424.
- Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review* 2, *Papers and Proceedings of the Ninety-Eighth Annual Meeting of the American Economic Association*, 323–329.
- Jensen, M. C. (1989). Eclipse of the public corporation. *Harvard Business Review* 67(5), 61–74.
- Kaplan, S. N. and A. Schoar (2005). Private equity performance: Returns, persistence, and capital flows. *The Journal of Finance* 60(4), 1791–1823.
- Kaplan, S. N. and P. Strömberg (2009). Leveraged buyouts and private equity. *Journal of Economic Perspectives* 23(1), 121–146.
- Korteweg, A. and M. Sorensen (2017). Skill and luck in private equity performance. *Journal of Financial Economics* 124(3), 535–562.
- Korteweg, A. G. (2023). Risk and return in private equity. In *Handbook of the Economics of Corporate Finance Vol 1: Private Equity and Entrepreneurial Finance*. Elsevier.
- Lowry, M. (2003). Why does IPO volume fluctuate so much? *Journal of Financial Economics* 67(1).
- Malenko, A. and N. Malenko (2015). A theory of LBO activity based on repeated debt-equity conflicts. *Journal of Financial Economics* 117(3), 607–627.
- McKinsey (2023). McKinsey Global Private Markets Review 2023 - Private markets turn down the volume.
- Metrick, A. and A. Yasuda (2010). The economics of private equity funds. *The Review of Financial Studies* 23(6), 2303–2341.

- Nadauld, T. D., B. A. Sensoy, K. Vorkink, and M. S. Weisbach (2019). The liquidity cost of private equity investments: Evidence from secondary market transactions. *Journal of Financial Economics* 132(3), 158–181.
- Nanda, R., S. Samila, and O. Sorenson (2020). The persistent effect of initial success: Evidence from venture capital. *Journal of Financial Economics* 137(1), 231–248.
- Phalippou, L., C. Rauch, and M. Ueber (2018). Private equity portfolio company fees. *Journal of Financial Economics* 129(3), 559–585.
- Preqin (2022). Preqin global private equity report. Technical report, Preqin Inc.
- Rin, M. D. and L. Phalippou (2017). The importance of size in private equity: Evidence from a survey of limited partners. *Journal of Financial Intermediation* 31, 64–76.
- Robinson, D. T. and B. A. Sensoy (2016). Cyclical, performance measurement, and cash flow liquidity in private equity. *Journal of Financial Economics* 122(3), 521–543.
- Sorensen, M. and A. Yasuda (2023). Stakeholder impact of private equity investments. In *Handbook of the Economics of Corporate Finance Vol 1: Private Equity and Entrepreneurial Finance*. Elsevier.
- Stafford, E. (2022). Replicating private equity with value investing, homemade leverage, and hold-to-maturity accounting. *The Review of Financial Studies* 35(1), 299–342.
- Stulz, R. M. (2020). Public versus private equity. *Oxford Review of Economic Policy* 36(2), 275–290.

Appendix A: Private and public markets

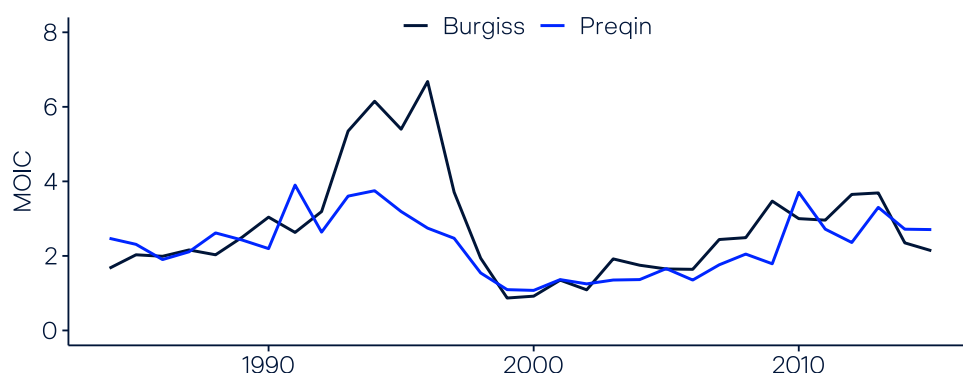
TABLE 1 Estimated sector allocation of PE-backed companies and public equity markets

	Public Markets	Private Markets	Buyout Funds	VC Funds
Information Technology	19.0	27.9	23.7	35.7
Financials	15.0	12.4	11.4	14.1
Health Care	13.0	14.5	14.2	15.1
Industrials	11.2	10.7	9.8	12.4
Consumer Discretionary	10.7	15.0	18.4	8.8
Energy & Utilities	8.7	3.6	3.7	3.3
Other	7.4	4.4	4.9	3.5
Telecommunication Services	6.3	5.4	7.3	1.8
Materials	5.4	5.5	6.1	4.4
Real Estate	3.3	0.6	0.5	0.9

NOTE: Table shows the sector share of private and public markets as at December 2022. Sector weights are estimated using the market value of constituents from the MSCI ACWI IMI index for public markets, and the Preqin deals database for private markets. GICS market classifications are renamed or combined to align with Preqin industry classifications. Consumer Staples (GICS) and Business Services (Preqin) are not mapped. Source: MSCI, Preqin Inc., NBIM calculations.

Appendix B: Performance

FIGURE 16 Performance over vintages in Harris et al. (2023) and Preqin for VC funds



NOTE: The figure shows the average multiple on invested capital (MOIC) of venture capital funds of different vintages, including funds with self-reported data and without full cash flows. Performance is as at December 2020 or earlier to align with Harris et al. (2023). Source: Harris et al. (2023), Preqin Inc.

TABLE 2 Direct alpha on global equities for vintages up to 2016

	Venture Capital	Buyout	Growth	Secondaries
Descriptive statistics				
Number of funds	418	471	89	45
Fund size (USDm)	391	1747	1027	1515
Unrealised percent	15.4%	14.9%	25.9%	11.8%
IRR	6.9%	12.0%	9.7%	12.5%
MOIC	1.76	1.72	1.64	1.56
PME	1.12	1.21	1.12	1.15
Direct alpha				
10th percentile	-17.1%	-7.4%	-10.3%	-3.8%
25th percentile	-8.8%	-2.1%	-6.1%	-1.1%
50th percentile	-1.9%	3.8%	0.6%	4.1%
75th percentile	7.0%	10%	8.6%	7.5%
90th percentile	17.1%	16.4%	16.4%	13.8%
Weighted average	-0.6%	5.2%	-1.3%	5%
Mean	-0.8%	3.9%	1.3%	4.2%
Standard error	0.7%	0.5%	1.3%	1.3%
Direct alpha - 1.5x leverage				
50th percentile	-4.6%	1.3%	-2.3%	0.7%
Weighted average	-3.3%	2.4%	-4.3%	1.6%
Mean	-3.4%	1%	-1.7%	1.2%
Direct alpha - All data sources				
Number of funds	525	762	151	95
50th percentile	-1.8%	4.4%	1.8%	2.9%
Weighted average	-0.2%	5.3%	0.4%	3.9%
Mean	-0.3%	4.5%	2.2%	3.7%

NOTE: Table shows a comparison of statistics for different sub samples of private equity funds for all vintages up to 2016. The data for NBIM calculations was collected from Preqin in August 2023. Performance is as at June 2023 or earlier. For funds with active holdings, performance is at least as recent as June 2022, depending on data availability. Direct alpha and the PME ratio are calculated with respect to the FTSE Global All Cap total return index from 2002 onwards, and MSCI World total return index prior to that. Unrealised percent represents the ratio of the fund net asset value to called capital, and weighted average is weighted by fund size. Source: Preqin Inc., FTSE, MSCI, NBIM calculations.

TABLE 3 The effect of regional benchmarks

	All		Europe		North America		Other	
	Global	Regional	Global	Regional	Global	Regional	Global	Regional
VC funds								
Number of funds	418	418	8	8	376	376	34	34
PME	1.12	1.05	0.9	0.92	1.12	1.02	1.17	1.41
Mean direct alpha	-0.8%	-1.8%	-0.8%	-0.4%	-0.9%	-2.3%	0.8%	3.4%
Median direct alpha	-1.9%	-3.0%	-2.8%	-1.3%	-1.9%	-3.5%	-0.3%	1.8%
Buyout funds								
Number of funds	471	471	63	63	367	367	41	41
PME	1.21	1.16	1.15	1.25	1.24	1.15	1.06	1.14
Mean direct alpha	3.9%	2.9%	2.9%	4.9%	4.3%	2.6%	1.2%	2.7%
Median direct alpha	3.8%	3.1%	1.5%	4.2%	4.5%	2.9%	2.6%	3.1%

NOTE: Table shows the comparison of relative returns for vintages up to 2016, with performance as at June 2023 or earlier. The data was collected from Preqin in August 2023. Listed global returns are measured by the FTSE Global All Cap total return index, and regional returns with FTSE regional total return indices. Source: Preqin Inc., FTSE, NBIM calculations.

TABLE 4 Private equity fund performance data - Comparison to Harris et al. (2023)

	Harris et al. (2023) Burgiss	NBIM calculations Preqin - FOI and public sources	Preqin - All sources
VC funds - All			
Fund size (USDm)	251	246	170
Number of funds	1408	1072	2322
IRR	15.9%	9.9%	13.6%
MOIC	2.36	1.82	1.91
PME	1.29		
Unrealised percent	24.7%	21.1%	28.3%
VC funds - Consistent cash flows			
Fund size (USDm)	-	325	317
Number of funds	765	490	621
IRR	19.1%	6%	6.5%
MOIC	2.56	1.59	1.59
PME	1.42	1.03	1.03
Unrealised percent	-	23.9%	25.5%
Buyout funds - All			
Fund size (USDm)	1141	1339	998
Number of funds	929	832	1949
IRR	14.2%	10.8%	15.7%
MOIC	1.81	1.61	1.84
PME	1.18		
Unrealised percent	17.4%	18.6%	19%
Buyout funds - Consistent cash flows			
Fund size (USDm)	-	1573	1442
Number of funds	507	553	816
IRR	14.2%	10.5%	11.9%
MOIC	1.8	1.54	1.65
PME	1.16	1.13	1.19
Unrealised percent	-	23.5%	21.2%

NOTE: Table shows a comparison of statistics for different sub samples of private equity funds as at December 2020 or earlier, and including all vintages up to 2015. While a longer sample is used in other results, the sample period and vintages in this table are chosen to align with Harris et al. (2023). The data for NBIM calculations was collected from Preqin in August 2023. Unrealised percent represents the ratio of the fund net asset value to called capital. Source: Harris et al. (2023), Preqin Inc., NBIM calculations.

Appendix C: Risk

TABLE 5 CAPM regressions on quarterly index returns (2001-2023)

	CAPM	FF3	FI-EQ
VC funds			
Constant	-0.01 (0.005)	-0.02* (0.005)	0 (0.002)
Equity market	1.06* (0.137)	1.17* (0.144)	1.03* (0.074)
Fixed income market		1.08* (0.444)	
Value			-0.75* (0.068)
Size			-0.14 (0.199)
N	89	89	89
R2	0.59	0.63	0.85
Growth funds			
Constant	0.01 (0.004)	0.01 (0.004)	0.01* (0.003)
Equity market	0.94* (0.127)	0.98* (0.143)	0.95* (0.104)
Fixed income market		0.13 (0.371)	
Value			-0.35* (0.072)
Size			-0.03 (0.225)
N	89	89	89
R2	0.64	0.66	0.76
Buyout funds			
Constant	0.01* (0.003)	0.01* (0.003)	0.01* (0.003)
Equity market	0.91* (0.079)	0.92* (0.073)	0.91* (0.08)
Fixed income market		0.2 (0.305)	
Value			-0.07 (0.102)
Size			0.16 (0.156)
N	89	89	89
R2	0.83	0.84	0.84

(continued)	CAPM	FF3	FI-EQ
	Secondary funds		
Constant	0.01* (0.003)	0.01* (0.004)	0.01* (0.002)
Equity market	0.78* (0.058)	0.81* (0.073)	0.79* (0.056)
Fixed income market		0.33 (0.268)	
Value			0.06 (0.091)
Size			0.4* (0.163)
N	89	89	89
R2	0.64	0.67	0.72

NOTE: Table shows the sensitivity of quarterly index returns to different drivers, using a Dimson beta adjustment with 6 lags. The data for NBIM calculations was collected from Preqin in August 2023. Standard errors are adjusted for heteroscedasticity and autocorrelation. The * indicates significance at the 0.05 level. Source: Preqin Inc., Kenneth French's website, FTSE, NBIM calculations.