

Right-sizing private equity in a portfolio: It depends on more than you think

- Private equity offers investors the potential to increase portfolio returns through liquidity risk premia and manager alpha. In addition, private equity can expand a portfolio's breadth of equity market coverage, which can offer modest diversification benefits. These potential benefits, however, come at the price of accepting significant liquidity and active risk.
- We demonstrate that private equity can be a valuable component of a diversified portfolio for investors who (1) have a long time horizon; (2) can identify and access highly skilled private equity managers at a reasonable cost; (3) accept the active and liquidity risks inherent in private equity; and (4) diversify across managers and investment styles.
- When fully accounting for the key attributes of private equity, which some investors overlook, we find that an appropriate weight ranges from 0% to 40% of a portfolio's total equity allocation, depending on an investor's specific risk preferences and the quality of the private equity investments they can identify and access. This wide range underscores that any decision to allocate to private equity must reflect an investor's unique circumstances, as many private equity investments do not deliver returns sufficient to compensate investors for the associated risks and are not appropriate for all eligible investors.

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The private equity market has grown in a variety of ways since the turn of the century. Private equity's proportion of the total investable equity market increased from 1% at the start of the century to 8% in 2024.¹ The number of U.S. companies backed by private equity grew over fivefold in that time, according to Pitchbook data, rising from about 2,000 to over 11,000. Additionally, Preqin Ltd. data indicate a jump in the number of private equity drawdown funds raised, from about 2,000 in the three years ended December 31, 2002, to over 13,000 in the three years ended December 31, 2024. (For a primer on private equity, including its primary fund styles and value-creation methods, see Rabinovich and Schweitzer, 2025).

A maturing of the industry, expanded investor access, the potential to increase long-term portfolio wealth, and a perceived diversification benefit have led to growing interest in private equity.^{2,3} While large institutions have been common investors in the category historically, a 2024 survey of financial advisors found that 17% of respondents were currently using or recommending private equity to their individual investor clients (Financial Planning Association, 2024). For those advisors and investors, private equity's potential benefits justify its higher fees and unique challenges.

We find the main challenges of private equity investing include:

- Lower liquidity.
- Appraisal-based valuations.
- Inherent and high manager-specific active risk.
- Uncertain cash flows, depending on access method.
- Lack of portfolio construction frameworks that appropriately account for key attributes of private equity investing.

Given the risks inherent in private equity, investors increasingly expect a transparent, practical, and robust approach to instill confidence in their allocation decision. Such an approach can also provide peace of mind for financial advisors and fiduciaries, who must assess the suitability of any potential investment so that they can advocate for their recommendations with conviction. This paper introduces a comprehensive framework designed to help investors and their advisors assess the appropriateness of private equity investments and then estimate a reasonable weight for private equity in a portfolio.

1 Private equity's share of global equity assets is based on reported year-end unrealized values for buyout and venture capital drawdown funds and coinvestments from Preqin Ltd. from 2000 to 2024; fund-of-funds data are excluded to avoid double counting. The size of the public equity market is proxied using the total market capitalization of the MSCI ACWI IMI Index. The funds or securities referred to herein are not sponsored, endorsed, or promoted by MSCI, and MSCI bears no liability with respect to any such funds or securities.

2 For more information on changes in U.S. investor access standards, see Brown, Hu, and Kuhn (2021) and U.S. Securities and Exchange Commission (2025).

3 A recent survey of investment advisory firms found that private equity has the highest expected return of all asset categories over the next 10- and 20-year periods (Horizon Actuarial Services, 2025).

In addition to drawdown funds, our framework also considers semiliquid private equity funds (also known as evergreen funds; see Section I below) and, to our knowledge, is the first in the literature to explicitly incorporate the unique attributes of these funds' structures in a multiasset portfolio approach. We demonstrate that right-sizing an allocation to private equity, regardless of fund structure, requires incorporating more factors than many investors may realize. Our framework addresses potential blind spots that can result in misaligned portfolios that fail to deliver an appropriate risk/return profile.

The paper is organized into three sections, each of which is designed to stand alone. The first section explains the practical investment mechanics of private equity. The second section explores key drivers of risk and return. The third presents a methodology that incorporates explicit assumptions to more accurately assess the key attributes of private equity investing. We demonstrate how investor- and investment-specific inputs can impact private equity's appropriate weight in a portfolio, using the proprietary Vanguard Asset Allocation Model (VAAM) for our analysis.⁴

I. Private equity investing mechanics

Investors can access private equity, an inherently illiquid asset, by buying company shares directly or through professionally managed funds. The most common access method has been traditional closed-ended, finite-life, **drawdown funds**. A newer method is **semiliquid**, or evergreen, funds, which are perpetual-life vehicles that invest directly in private companies or drawdown funds, offering investors access to private equity with more liquidity, transparency, and purchase-

timing flexibility compared with drawdown funds. These structures also simplify performance evaluation, cash-flow management, and tax reporting, while often providing lower minimum investment requirements and immediate and more stable exposure.⁵

Figure 1, on the next page, summarizes some key differences among the various methods of private and public equity investing.

Fund access requires clearing multiple hurdles

Certain private equity funds, especially drawdown funds, are limited to institutional and ultra-high-net-worth investors in some jurisdictions due to eligibility laws like "accredited investor" or "qualified purchaser" standards. These laws often include criteria like assets, income, or professional experience. Beyond legal hurdles, some funds are closed to new investors, and some brokerage platforms may require a minimum overall account balance or impose restrictions on fund access.

- ⁴ The framework described in this paper is flexible, customizable, and independent of the specific choice of model used to generate asset return forecasts or optimize an asset allocation, so it could be applied in other models. For more information on the VAAM, see Aliaga-Díaz et al. (2024). Regardless, to treat the future with the deference it deserves, Vanguard has long believed that forecasting asset returns are best viewed in a probabilistic framework, not as a "point forecast." VAAM operationalizes this philosophy by embedding uncertainty directly into the asset allocation process.
- ⁵ Only a small number of semiliquid private equity funds have a lengthy history, so data coverage is inherently limited. As a result, unless specified otherwise, the fund analysis in this paper is based on a sample of drawdown funds. See Appendix A on page 19 for a formal comparison between semiliquid and drawdown fund structures. Beyond the limited set of available fund options, a potential drawback of semiliquid funds compared with drawdown funds is their structural tendency to hold a portion of assets in conservative public investments to help manage fund-level cash flows (Hadas, 2025). This can reduce the likelihood of forced sales of illiquid private equity during periods of stress. A byproduct of this is that it may introduce a modest drag on long-term returns. This is discussed in more detail in Section II.

FIGURE 1

Mechanics of private equity investing are fundamentally different regardless of access method

Access method	Investment aspect	Public equity	Private equity
Direct	Buying and selling	Trades are placed on an exchange via a brokerage account during regular trading hours.	Transactions are sourced and negotiated privately and require considerable time, expertise, and capital.
	Trade pricing	Pricing is determined by the market and publicly available (i.e., transparent).	Pricing is determined through private negotiations and not publicly available (i.e., not transparent).
	Diversification	Diversification is achieved through investing in multiple stocks with a much smaller capital requirement.	Diversification is achieved through buying shares of multiple companies through individual negotiation with counterparties, which requires resources and capital typically available to only the largest investors.
Individual funds	Buying and selling	Conventional mutual funds are bought and sold directly with the fund provider or in a brokerage account. Exchange-traded fund (ETF) shares are bought and sold on an exchange during market hours through a brokerage account.	<i>Drawdown funds:</i> Investors typically must use an advisor, consultant, or placement agent to locate potential fund options. They must pledge a total purchase amount at fund inception.* The timing and size of purchases and distributions are determined by the manager (i.e., the general partner) and are not known in advance. Managers must distribute all assets before the end of the fund's contractual life. If an investor cannot wait for a fund's distributions, they can attempt to sell fund shares in the secondary market.** <i>Semiliquid funds:</i> Purchases can be made directly with the fund sponsor or through a brokerage account on a monthly or more frequent basis. Sales can be made directly with the fund manager or through a brokerage account, but the frequency of opportunities and maximum amount depend on the fund's policies and other investors' trading activity. (See Appendix A on page 19 for more details.)
	Trade pricing	For conventional funds, pricing is based on net asset value (NAV) as of the next market close. For ETFs, pricing is determined by the market at the time the trade is made. Pricing is publicly available in both cases.	<i>Drawdown funds:</i> Pricing is determined through negotiations, frequently differs from NAV, and is not publicized. <i>Semiliquid funds:</i> Pricing is determined at NAV and typically publicized.
	Diversification	A typical fund invests in hundreds of stocks.	<i>Drawdown funds:</i> A typical buyout fund invests in about 30–80 companies, while a typical venture capital fund invests in about 8–20 companies; investing in a group of funds would be necessary to achieve broad diversification. <i>Semiliquid funds:</i> The median fund invests in about 70 holdings.
Funds of funds	Buying and selling	Same as individual funds.	Same as individual funds.
	Trade pricing	Same as individual funds.	Same as individual funds.
	Diversification	Public funds of funds tend to be highly diversified.	<i>Drawdown funds:</i> Funds of funds typically invest in over 20 individual funds. <i>Semiliquid funds:</i> Funds of funds typically invest in hundreds of underlying portfolio companies.

* The minimum pledge (i.e., committed capital) amount for drawdown funds is typically high, often \$1 million or more (Balloch et al., 2025).

** Drawdown fund investors typically have no option to sell shares back to the fund manager, and the secondary market for fund shares, while growing, remains limited and opaque. As a result, investors must typically accept a material discount to fund NAV on the sale, particularly during periods of market stress (Nadauld et al., 2019). Unlike the situation for an ETF holding public equity, finding a counterparty and completing the selling process can take months, and often the fund manager must approve the transfer.

Note: The attributes described may not be applicable to all investments within a given category, as exceptions can occur.

Sources: Vanguard, using data from Morningstar and Harris et al. (2018).

II. Private equity risk and return breakdown

Drivers of return

A crucial step in determining whether private equity belongs in an investor's portfolio is assessing its key risk and return drivers. This section explains these factors and offers guidance on how to estimate them.

Equity risk premium

Investments in private and public equity represent ownership stakes in companies, which means they are subject to systematic equity market risk. Over the long term, both should earn the equity risk premium, which is the compensation investors expect for bearing the undiversifiable risk inherent in equity investing.

Common equity risk factors

Because the set of companies in private equity do not have identical characteristics to public equity in the aggregate, their exposure to common equity risk factors, such as valuation and size, may differ.

Liquidity risk

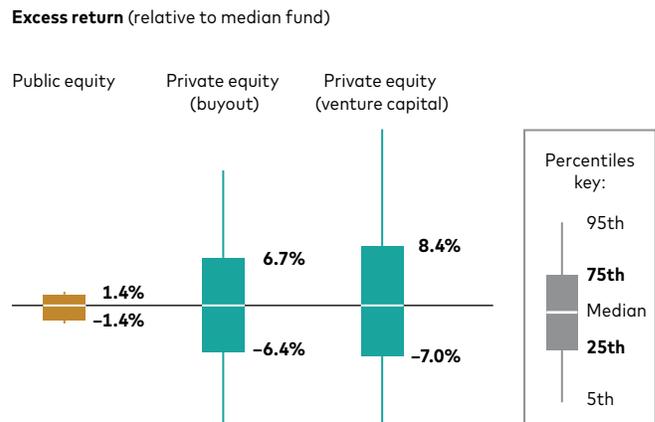
Investors desire a premium return for private equity compared to public equity because buying and selling the underlying asset is significantly more difficult.⁶ A liquidity risk premium can be an attractive source of return for those willing to assume liquidity risk. In practice, many long-term investors may not need a fully liquid portfolio and therefore may be able to tolerate some exposure to less liquid investments.⁷

Manager-specific alpha

Because there is no investable index vehicle for the private equity market, investing in private equity requires selecting active managers. Skillful manager selection is essential considering the mixed performance record and significant dispersion of excess returns among private equity funds relative to a public equity benchmark (Aliaga-Díaz et al., 2020). As shown in **Figure 2**,

the annual excess return difference between the 75th and 25th percentiles is more than four times greater for buyout funds, and five times greater for venture capital funds, compared to public equity funds. Although this risk has been recognized in the literature for a considerable period (Wallick et al., 2015), some portfolio construction frameworks still overlook it (Gredil, Liu, and Sensoy, 2021).

FIGURE 2
Differences in private equity fund excess returns are much larger than those of public equity funds



Notes: The public equity results reflect the 10-year annualized net-of-fee excess return relative to each fund's prospectus benchmark, based on a sample of global public equity active funds in Morningstar with 10 years of performance history as of December 31, 2024. The private equity results reflect annualized net-of-fee excess returns since inception for drawdown funds with a North America focus and vintage years between 2010 and 2014. Excess returns are measured using direct alpha, an annualized performance metric that compares the performance of a private investment with the hypothetical return of a public market index assuming an identical cash-flow pattern. Direct alpha is computed against the Russell 3000 Index for buyout funds and against the Russell Microcap Index for venture capital funds. For details on the methodology used to calculate direct alpha, see Gredil, Griffiths, and Stucke (2014). The median excess return is subtracted from each sample, isolating deviations from the group median.

Sources: Vanguard calculations, using data from Morningstar and MSCI.

Past performance is not a guarantee of future results. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

⁶ For more information on the liquidity risk premium, see Franzoni, Nowak, and Phalippou (2012), who estimated the premium to be about 3 percentage points per year.

⁷ Liquidity risk with drawdown funds is high, but sometimes overstated. While some funds may take 12 years or more to fully liquidate, this does not imply that 100% of investor capital and accrued gains remain in the fund for the entire period. The average fund begins returning capital to investors by year three (Kucec, 2023) and distributes an amount at least equal to the original committed capital by year eight, though this timing varies widely (Hendrix and Medhat, 2024).

Manager selection demands far more than a backward glance

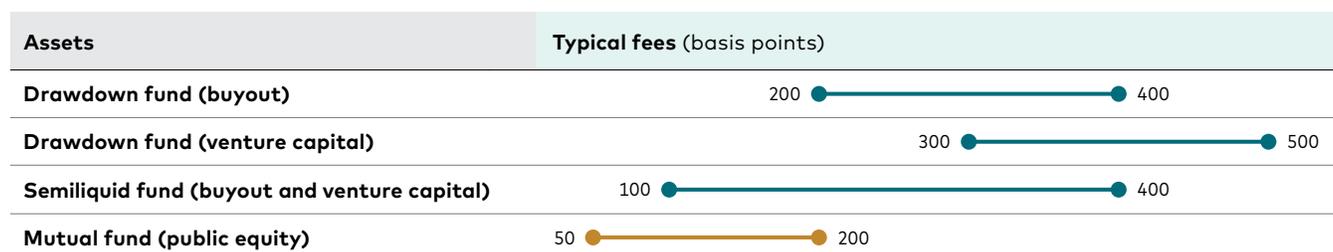
Although best practices for manager selection are outside the scope of this paper, it is important to note that this process, much like selecting a public equity manager, involves far more than just checking a performance track record.⁸ The conventional wisdom that there is widespread fund performance persistence in private equity is not supported by the data. Harris et al. (2023) and Korteweg and Sørensen (2017) found that performance persistence among buyout funds is limited based on the track record available at the time an investor has to decide on whether to commit to a new drawdown fund.⁹ There is more evidence of performance persistence with venture capital funds, but accessibility for new investors is more challenging as these funds are often more capacity-constrained and can be selective in who they allow to invest.

All-in costs

What ultimately matters for investors is what returns they keep after costs.¹⁰ Morningstar survey data have shown that financial advisors view fees and fee transparency as top concerns when assessing private equity funds (Kephart, 2025). **Figure 3** illustrates that private equity fund fees, regardless of structure, tend to be more expensive compared with investing in a public equity active fund and can vary considerably.¹¹

Some investors who rely on external providers—for investment-related services such as fund access, manager selection, or portfolio construction, or operational functions such as reporting or commitment pacing for drawdown funds—may pay additional fees for these services, so investors should also account for any material nonfund costs when evaluating return expectations.

FIGURE 3
Private equity funds typically have much higher costs than public equity active funds



Notes: Drawdown fund (buyout and venture capital) fees are estimated based on management and carry fee rates and an assumed rate of return. Semiliquid fund (buyout and venture capital) fees are based on annual report net expense ratios, including acquired fund expenses, as of December 31, 2025; these semiliquid fund fees may be considered conservative, as Shannon (2026) observed that certain semiliquid funds employ differing methodologies in calculating acquired fund expenses and there is not a consistent treatment of incentive fees in acquired fund fees. Mutual fund (public equity) fees are based on annual report net expense ratios for active open-end mutual funds as of December 31, 2025. The fee ranges shown for mutual funds and semiliquid funds reflect the 10th to 90th percentiles of U.S.-domiciled funds. All fee ranges shown are rounded to the nearest 50 basis points; a basis point is one-hundredth of a percentage point.

Sources: Vanguard calculations, using data from Kahn (2024), Huber (2024), and Morningstar.

- 8 For more on Vanguard's approach to public equity manager selection, see Piro and Shuman (2025). For an example of private equity manager due diligence, see Greenwich Roundtable (2010). There is mixed evidence of a positive relationship between a fund's assets under management and fund performance (Brown et al., 2024; Brown and Volckmann, 2024). Robinson and Sensoy (2013) found little evidence that either management or performance fees were associated with net-of-fee fund performance. They also found no association between the percentage of manager ownership in the fund and net-of-fee performance. However, more recent research using a larger sample suggests a possible inverted U-shaped relationship (Brown and Volckmann, 2024). Additionally, a study examining whether growth in asset size from one drawdown fund to the next at the manager level found no evidence of a performance association (Brown et al., 2024).
- 9 Using gross deal-level data on buyout funds, Braun, Jenkinson, and Stoff (2017) found limited evidence of performance persistence. Limited evidence in these studies does not necessarily imply that no funds have exhibited or will exhibit performance persistence, only that such persistence has not been widely observed in historical data.
- 10 Bogle (2005) demonstrated the extent to which investment-related costs can materially impact investor wealth outcomes.
- 11 Private equity funds do not all charge the same set of fees, and the way these fees are assessed can vary. It is therefore important for investors to understand both which fees apply and how they are calculated. Fee types can include management fees, performance-based incentives (carried interest), acquired fund fees and expenses (for funds of funds), 12b-1 fees, sales loads, operating expenses, monitoring fees, and portfolio-company-level transaction fees.

When private equity funds are held in non-tax-sheltered accounts, taxes should also be carefully considered since they are a type of cost. The impact of taxes on returns can vary by fund structure, investor type, and jurisdiction. Drawdown funds are typically structured as limited partnerships, passing through income, gains, and losses to investors, making tax documentation and impact assessment more complex compared with public equity funds.¹² Semiliquid funds, on the other hand, generally follow tax-reporting practices like public equity funds do.¹³

Sum of parts

At the highest level, return expectations for a private equity fund can be summarized as the combination of five components, as shown in **Figure 4**. The main difference when forecasting a private equity fund compared to a public equity active fund is the unique exposure to each of these underlying risks, as well as the possibility of varying expectations for manager alpha and risk (tracking error).

FIGURE 4
Private equity returns are driven by a core set of factors



Notes: In this illustration, we present the framework as a simple additive decomposition. More robust mathematical treatments would instead incorporate the fund's level of exposure to each risk factor. For a diversified group of private equity funds, both risk exposures and alpha would reflect the weighted average across the underlying investments. If a liquidity sleeve is used, the return should be reduced. For more details, see "Accounting for Potential Liquidity Sleeves in Return Forecasting" on page 9.

Source: Vanguard.

Estimating private equity returns

Having identified the primary drivers of private equity returns, we now share a methodology for constructing return forecasts that explicitly incorporates each component.

Systematic risk estimation

Historical data are frequently used to infer, or at least to educate investors on, what the future might look like for returns of both public and private equity. However, historical private equity valuations typically rely on infrequent, subjective appraisals that can make valuations appear artificially stable, resulting in biased risk estimation. Therefore, applying standard

statistical techniques designed for assets with high-frequency, market-priced valuations, like public equity, can produce results that do not reflect private equity's true risks. In an asset allocation setting, underestimating risk can lead to an overallocation to private equity.

To address this issue, an adjustment procedure inspired by Mladina and Moore (2020) can be applied to an asset-weighted sample of buyout and venture capital fund net-of-fee returns sourced from the MSCI Private Capital Universe dataset. This approach produces an unbiased, marketwide yet noninvestable benchmark for private equity returns.¹⁴

12 Drawdown fund tax documents are often delivered well after the standard filing deadline. As a result, investors must be prepared to file an extension. Some drawdown fund managers offer the same strategy across different limited partnership structures to accommodate varying tax profiles.

13 A detailed discussion of taxation is beyond the scope of this paper. Investors should consult a tax professional to ensure proper understanding and accounting of potential tax impacts, including both direct tax costs from fund investments and indirect costs such as potential increased tax advisory fees, so these can be appropriately factored into the portfolio optimization process if material.

14 For perspectives on performance benchmarking for private equity funds, a frequently debated topic, see Appendix B on page 20.

Figure 5a illustrates that, based on reported returns, private equity exhibits materially lower volatility compared to public equity. However, after adjusting for potential biases, the volatility of private equity becomes more aligned with that of public equity (**Figure 5b**), with annualized volatility for buyout and venture capital funds of 15% and 23% after adjustment, respectively, compared to only 10% and 12% based on reported returns.

Using a linear regression model, we decompose the adjusted returns shown in Figure 5b and find that the pooled buyout fund universe exhibits a market beta slightly below 1.0, generally in line with recent research (Anson, 2024; Brown, Lundblad, and Volckmann, 2025; Brown, Gonçalves, and Hu, 2024), and a value tilt consistent with studies that consider other common systematic risks (Korteweg, 2019). Venture capital exhibited a high market beta of around 1.6 with a growth tilt, also consistent with other studies (Korteweg, 2019).¹⁵ If an investor uses a fund or combination of funds that in

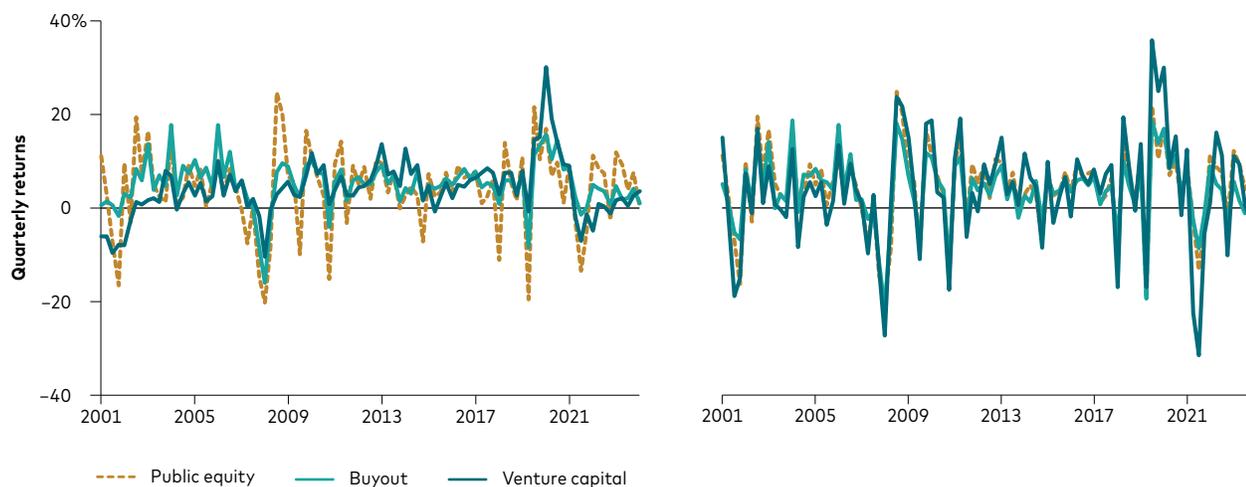
aggregate exhibit a different risk profile, the investor should adjust their risk-exposure inputs accordingly. Lastly, because we are pooling together hundreds of funds each quarter, we can interpret the regression constant as the average historical net liquidity risk premium (Aliaga-Díaz et al., 2022).

Some investors may question whether the rapid growth of private equity assets has altered supply-demand dynamics enough to reduce—or even eliminate—the liquidity risk premium. Using a global sample of private equity funds, Brown et al. (2024) found no evidence that performance relative to public equity has deteriorated. Moreover, median valuation multiples on buyout transactions continue to be at a discount to public equity valuations, suggesting no unusual compression in spreads. Nonetheless, given the lack of high-quality, marketwide data on private-equity-backed companies, it is reasonable to consider a forward-looking liquidity risk premium assumption that is lower than the historical average.

FIGURE 5
Adjusted performance results in a more realistic return profile

a. As-reported returns, 2002–2024

b. Adjusted returns, 2002–2024



Notes: The time series of private equity returns is based on global, pooled quarterly net-of-fee returns to limited partners for venture capital and buyout funds from the MSCI Private Capital Universe for the period from December 31, 2001, to December 31, 2024. The public equity returns are based on the MSCI ACWI Index.

Sources: Vanguard calculations, based on data from MSCI and Morningstar.

Past performance is not a guarantee of future results. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

¹⁵ A subset of studies report a small-cap tilt, but our evidence using a global sample indicates that this tilt is not consistently statistically significant using adjusted fund returns.

Alpha estimation

As noted earlier, private equity investors must accept manager-specific active risk in exchange for the potential to generate alpha. To estimate a reasonable net-of-fee alpha assumption for a private equity allocation, a historical excess return distribution can be calculated across a broad set of funds. From this distribution, investors may then select a percentile that reflects their manager selection skill, or the skill of a hired third party, and adjust this figure by the previously derived liquidity risk premium.

It is important to recognize that, by definition, not all private equity funds can achieve top-quartile or top-tercile performance. Therefore, investors should conduct an objective evaluation of their manager selection and access capabilities and carefully consider the potential impact of an overly optimistic alpha assumption.

Active risk (tracking error) estimation

While the volatility of alpha relative to a benchmark, or tracking error, is often considered in the context of public equity active funds, some portfolio construction approaches overlook it when evaluating private equity even though alpha is inherently uncertain and exhibits a wide range of potential outcomes, as illustrated earlier in Figure 2.¹⁶ Diversifying across multiple funds or using funds of funds can reduce this risk (Vanguard, 2025; Brown, Hu, and Kuhn, 2021). A tracking error estimate can be calibrated to a level that would produce outcome patterns similar to those seen in a sample of diversified private equity funds of funds.

Accounting for potential liquidity sleeves in return forecasting

The analysis in this section focuses on a sample of drawdown funds, due to the availability of the necessary data. These funds do not have to maintain a separate reserve of liquid assets—a liquidity sleeve—because their investors cannot buy into or sell out of these funds on demand. However, because investors in drawdown funds face uncertainty about the timing and size of capital calls, some investors maintain a liquidity sleeve elsewhere in their portfolio to ensure they can meet a fund's capital calls on time (Hadas, 2025).

Semiliquid funds, by contrast, maintain a liquidity sleeve, typically 10% to 20% of assets (Wood, Roberts, and Park, 2024), because the manager—rather than the investor—manages the cash-flow uncertainty and must prepare for potential investor redemption demand. The size and composition of this sleeve are at the manager's discretion and may include a range of liquid investments.

Because liquid securities are expected to have lower returns compared to private equity, the inclusion of a liquidity sleeve, whether in a fund or elsewhere in a portfolio, may result in diminished returns. Therefore, investors should consider adjusting their return expectations accordingly.

¹⁶ See Aliaga-Díaz et al. (2024) for more details on active risk in portfolio construction.

III. Portfolio construction with private equity

Considering the unique attributes of private equity, how should investors decide whether and how much to invest in it? In this section, we provide a portfolio construction framework that incorporates private equity's specific considerations and builds multiasset portfolios with private and publicly traded assets that conform to investor preferences and beliefs.

To set the stage for the investor profiles shown on page 14, we first highlight several considerations that require adjustments in the analysis.

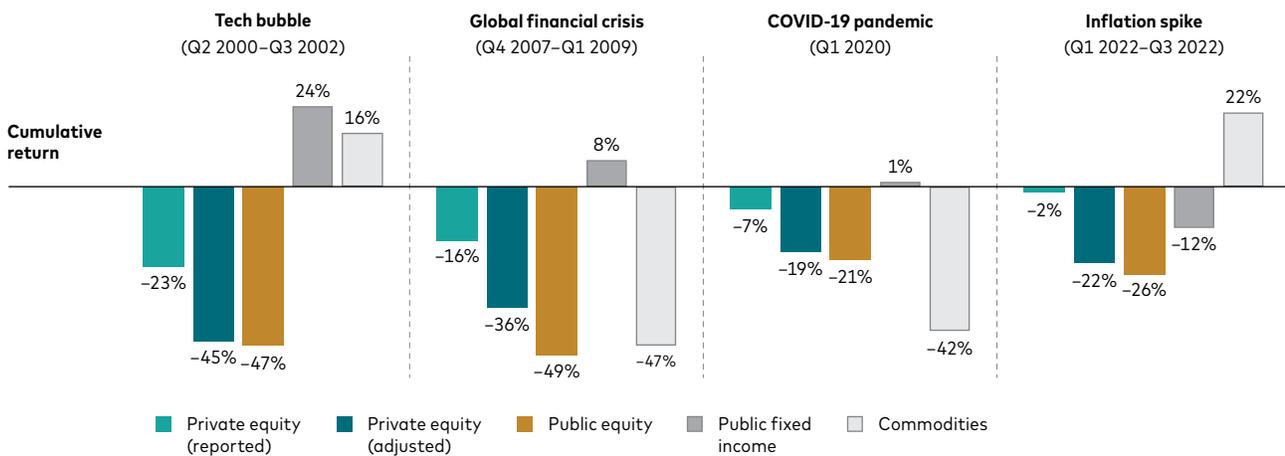
Adjusting private equity returns changes the level of diversification benefit

Private equity can improve portfolio diversification by expanding coverage of the equity market. Some claims about the level of

diversification benefit are overstated, however, because they rely on appraisal-based valuations. **Figure 6** illustrates the performance of different asset categories during notable periods of market stress when public equity performed poorly. We show private equity returns based on appraisal-based valuations as well as adjusted valuations using the methodology used in Figure 5b.

As expected, public fixed income consistently acted like ballast, generating positive (or substantially less negative) returns, while adjusted private equity performance fell significantly alongside public equity. This is consistent with Swensen (2009), who noted that "illiquidity masks the relationship between fundamental drivers of company value and changes in market price, causing private equity's diversifying power to be artificially high."

FIGURE 6
Adjusted private equity returns have not acted as ballast during stress periods



Notes: Proxies for asset category returns are as follows: private equity: Pooled buyout and venture capital fund net-of-fee returns from the MSCI Private Capital Universe, weighted in proportion to their relative market capitalizations as of December 31, 2024; public equity: MSCI ACWI Gross Return USD through December 31, 2000, and MSCI ACWI Net Return USD thereafter through December 31, 2024; public fixed income: Bloomberg Global Aggregate Total Return Index Hedged USD; and commodities: S&P GSCI Total Return USD.

Sources: Vanguard calculations, using data from Morningstar and MSCI.

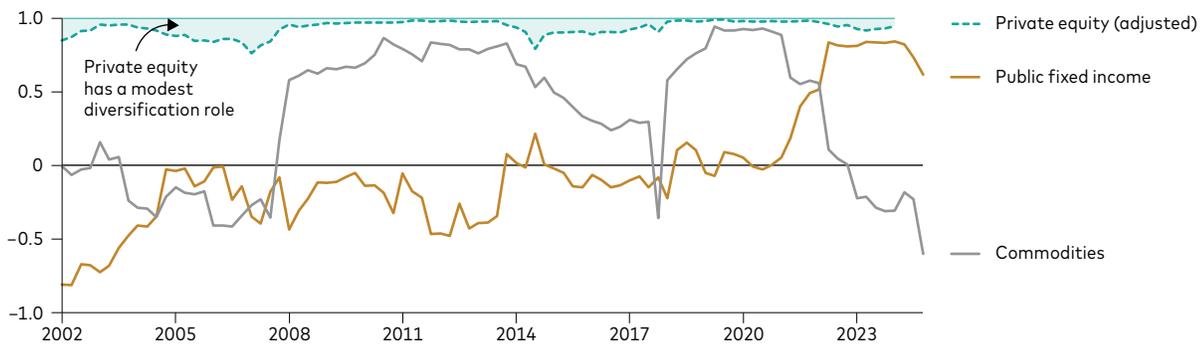
Past performance is not a guarantee of future results. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

While ballast during stress periods is for many investors the most attractive form of diversification, it is not the only type. In **Figure 7**, we show the rolling correlation of public equity with other assets over longer time horizons which include a variety of market environments. Public and private equity are positively correlated,

meaning they tend to move in the same direction, but the correlation is less than 1.0. This indicates that private equity offers some modest long-term diversification benefits, which is consistent with an investment that expands equity coverage while sharing many of the same underlying risk characteristics as public equity.

FIGURE 7
Private equity's consistently high correlation with public equity suggests modest diversification potential

Correlation with public equity (12-quarter rolling)



Notes: Proxies for asset category returns are as follows: public equity: MSCI ACWI Gross Return USD through December 31, 2000, and MSCI ACWI Net Return USD thereafter through December 31, 2024; private equity: Pooled buyout and venture capital fund net-of-fee returns from the MSCI-Burgiss Private Capital Universe, weighted in proportion to their relative market capitalizations as of December 31, 2024; public fixed income: Bloomberg Global Aggregate Total Return Index Hedged USD; and commodities: S&P GSCI Total Return USD.

Sources: Vanguard calculations, using data from Morningstar and MSCI.

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Illiquidity and cash-flow uncertainty

Drawdown funds

The speed at which drawdown funds collect and distribute investor capital can differ significantly (Korteweg and Westerfield, 2022). If an investor wants to sell their shares early, whether due to a major health event, change in personal business situation, spending needs, portfolio rebalancing, or another reason, the transaction could take considerable time to execute, and the sale price is often at a significant discount to NAV (Nadauld et al., 2019). Therefore, in practice, the limited liquidity of drawdown fund shares and the uncertainty surrounding contributions and distributions require expertise to maintain the desired portfolio risk profile and widen potential long-term portfolio return outcomes.¹⁷

Semiliquid funds

Investors typically have the flexibility to contribute capital to a semiliquid fund on an ongoing basis. However, liquidity is often constrained, with redemption opportunities generally offered quarterly or less frequently, and even then, full liquidity is not guaranteed. In some funds, an independent board retains discretion over the timing and size of redemption opportunities. In others, redemption window times are fixed and the total outflow amount is subject to a fund-level cap (for example, 5% of assets every six months). An investor may be able to fully rebalance or redeem during the window if the aggregate redemption amount across investors is below the cap, but they may need to accept a pro rata portion if the cap is exceeded.

Practical ways to address private equity's illiquidity and cash-flow uncertainty include:

- **Buying and holding.** An investor can allow the private equity allocation to drift until the end of the investment horizon, following a buy-and-hold strategy. The consequence is that the weight of the private equity portion can go up or down depending on the price movements of other portfolio assets, potentially deviating from a set target.
- **Rebalancing with withdrawal "penalty" (drawdown funds).** For an investor who can tolerate only a certain level of drift above their target private equity weight, a threshold can be set that forces a portfolio to rebalance back to target. A discount, which in this case functions as a withdrawal penalty, can be applied to the estimated value of the private equity shares sold to account for the secondary market price.¹⁸
- **Setting cash-flow uncertainty (drawdown funds).** There are numerous methods for modeling cash flows. One simple generalized approach is to define a stream of expected net cash flows (capital calls minus distributions) based on empirical evidence and embed a reasonable degree of uncertainty into those projections.¹⁹ This methodology could accommodate an investor starting with their target private equity allocation or one who wants to build an allocation from scratch.
- **Setting probabilistic redemption limits (semiliquid funds).** If fund-level redemption activity is high enough, an investor may not be able to sell the amount of shares they want when they want. An investor can factor in the possibility of not being able to redeem their desired amount of shares, depending on the specific fund.²⁰

¹⁷ See Oberli (2015) for more details about liquidity and cash flow with drawdown funds.

¹⁸ Secondary market advisors, such as Evercore and Jefferies, publish data on transaction pricing that can help investors assess average discounts to NAV in secondary fund sales.

¹⁹ For technical details on this approach, see Aliaga-Díaz et al. (2022).

²⁰ We summarize an approach to redemption risk in Appendix C on page 21. Although semiliquid funds are generally more liquid than drawdown funds, redemption limits can, in very extreme cases, result in longer exit timelines, as gated fund shares cannot be sold in the secondary market.

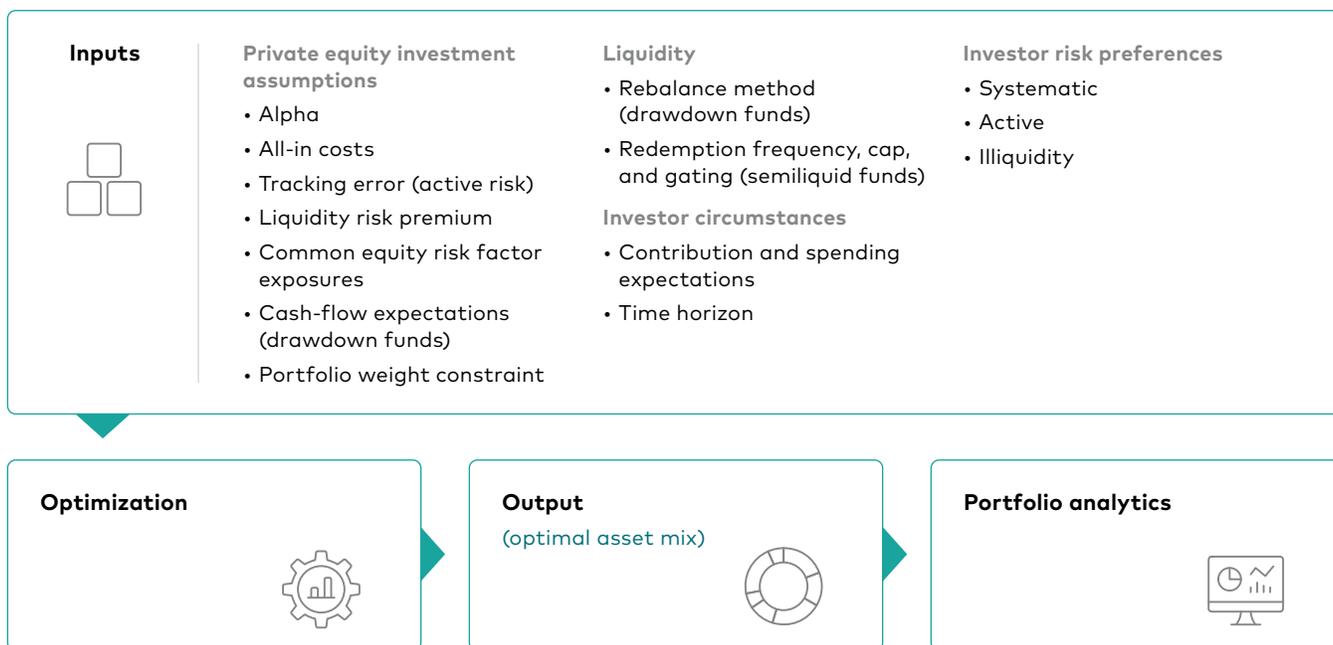
Optimal asset allocation with private equity

Having discussed some important attributes of investing in private equity funds, we now turn our attention to determining their appropriate weight in a multiasset portfolio. How much capital, if any, should an investor allocate to private equity? How sensitive is the allocation to different assumptions? We can explore these questions by providing the results of a few case studies using our framework.

We find that determining an investor's appropriate private equity allocation is best approached by specifying a set of inputs tailored to their situation, which includes the investments under consideration and the investor's risk preferences. **Figure 8** outlines a core set of inputs that inform this process.

FIGURE 8

Key inputs when considering whether and how much to invest in private equity



Notes: The inputs noted above are based on a hypothetical portfolio and are for illustrative purposes only. This list is not necessarily exhaustive, and it assumes the investor satisfies all regulatory, fund, and platform minimum requirements for access. For information on public asset assumptions, which are also necessary inputs but are not shown here in the interest of brevity, see Aliaga-Díaz et al. (2024).

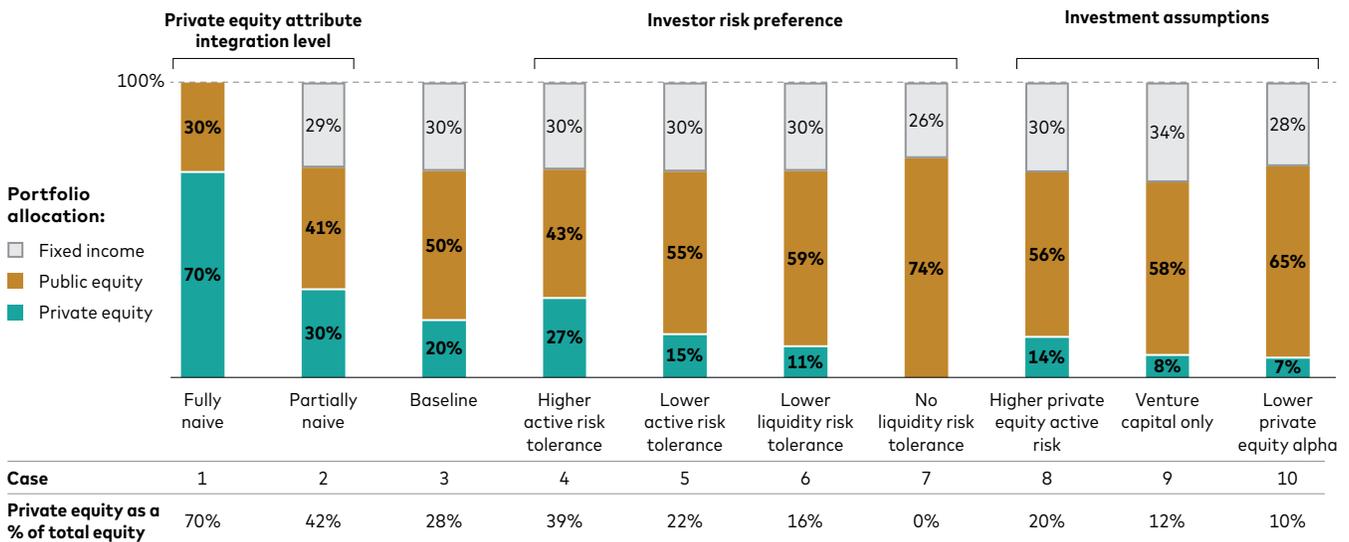
Source: Vanguard.

We use the VAAM for this analysis, though our framework is independent of any specific model. Unlike many asset allocation analyses involving private assets, we make explicit assumptions to enable a more informed decision-making process:

- The universe of assets for our portfolios consists of public index and active U.S. equities, global ex-U.S. equities, U.S. aggregate bonds, global ex-U.S. aggregate bonds (hedged to the U.S. dollar), and a market-cap-weighted mix of buyout and venture capital funds to represent our private equity allocation, in all but one investor profile shown in **Figure 9**.

- For simplicity purposes, we assume the investor has a systematic risk profile typical of an individual investor who includes private equity in their portfolio, has moderate tolerance for liquidity and active risk, and can identify and access both active and index funds managed by highly skilled managers charging a reasonable cost.
- We assume the investor is ineligible for drawdown private equity funds and is considering a semiliquid fund with diversified, high-quality managers and investment styles at a reasonable cost.²¹

FIGURE 9
An appropriate private equity weight depends on an investor's risk preferences and investment assumptions



Notes: Portfolio allocations were determined by the VAAM. Asset categories included were U.S. public equity, global ex-U.S. public equity, U.S. bonds, global ex-U.S. bonds, and global private equity. Global ex-U.S. bonds are hedged to U.S. dollars. Constraints applied: global ex-U.S. public equity and global private equity combined, up to 70% of the total equity allocation; and global ex-U.S. bonds, 30%–50% of total bonds. Private equity returns used in the modeling process are net of fees. See Appendix D on page 22 for a list of inputs used for the baseline portfolio. Percentages for each portfolio may not add up to 100% due to rounding.

Sources: Vanguard calculations, as of October 31, 2025.

²¹ For examples of cases assuming the investor is considering a diversified portfolio of drawdown funds, see Aliaga-Díaz et al. (2022).

We have provided a list of investor profiles to show what can happen when an investor is naive to all the key attributes of private equity investing and to demonstrate the effects of different risk preferences and investment capabilities.

- 1. Fully naive.** The investor considers private equity but does not address three key attributes: (1) artificially low reported return volatility, (2) liquidity risk, and (3) active risk. Without considering these risks, the investor finds private equity so attractive that they allocate 100% of their portfolio to equities with private equity filling all available portfolio capacity permitted by the public U.S. equity constraint.
- 2. Partially naive.** The investor disregards liquidity risk and active risk. The total equity weight drops to a more reasonable 71%, with private equity representing 42% of total equity.
- 3. Baseline.** The investor accounts fully for the key attributes of private equity. By adjusting return volatility and accounting for liquidity and active risk, the private equity share of total equity drops to 28%.
- 4. Higher active risk tolerance.** The investor is more comfortable taking on active risk than the baseline investor, and their private equity share of total equity rises to 39%.²²
- 5. Lower active risk tolerance.** The investor is less comfortable taking on active risk than the baseline investor, and the private equity share of total equity decreases to 22%.

- 6. Lower liquidity risk tolerance.** The investor has less desire for liquidity risk than the baseline investor, and the private equity share of total equity drops to 16%.
- 7. No liquidity risk tolerance.** The investor has no tolerance for liquidity risk, and the private equity weight drops to 0%.
- 8. Higher private equity active risk.** The investor does not diversify active risk as much as our baseline investor and expects a higher level of active risk (tracking error), and the private equity share of total equity falls to 20%.
- 9. Venture capital only.** The investor believes they have very skilled manager selection and access capabilities in venture capital only, rather than a more diversified combination of buyout and venture capital funds like the baseline investor has, and the private equity share of total equity falls to only 12%.

This profile demonstrates the importance of having manager selection and access capabilities across fund styles in order to take advantage of the style diversification benefit.

- 10. Lower private equity alpha.** The investor has materially lower manager selection and access capabilities than the baseline investor and expects lower alpha, and the resulting private equity share of total equity is reduced to 10%.

This profile illustrates the importance of manager selection and access capabilities as critical inputs, and shows that generating excess return over public equity is not enough. In this case, the excess return must be high enough to compensate the investor for the risks associated with private equity (Aliaga-Díaz et al., 2022).

²² See Harvey, Renzi-Ricci, and Aliaga-Díaz (2024) for more information on the importance of active risk tolerance.

These examples highlight that determining the appropriateness and size of a private equity allocation involves many considerations, extending beyond those typically addressed by standard portfolio construction methods, and that the appropriate weight can span a wide range, from 0% to 40% of a total equity allocation.²³ We adjust a single input at a time to best isolate the impact. However, in the real world, multiple inputs may need to be adjusted for an investor's situation, which can result in offsetting effects or more significant shifts in appropriate private equity weighting.

For investors with limited tolerance for active or liquidity risk, or those with lower confidence in their ability to identify and access highly skilled private equity managers at a reasonable cost, a reduced allocation or potentially zero allocation to private equity may be appropriate.

Conclusion

Private equity is an important and growing component of the investing landscape, providing eligible investors with the potential for enhanced returns while offering modest diversification benefits. However, this potential comes with high active risk and low liquidity. We believe our practitioner-focused framework, which comprehensively addresses key aspects of private equity investing, can help investors build prudent portfolios that incorporate private equity as an investment option.

We demonstrate that private equity can be a valuable component of a diversified portfolio for investors who (1) have a long time horizon; (2) are able to identify and access highly skilled private equity managers at a reasonable cost; (3) accept the inherent active and liquidity risks; and (4) diversify their exposure across managers and investment styles. Overall, we find that the appropriate private equity allocation ranges from 0% to 40% of a portfolio's total equity exposure, depending on where investors fall along these dimensions. This reinforces that private equity is not appropriate for all eligible investors and right-sizing depends on individual inputs that are sometimes overlooked.

Manager selection requires far more than a simple scan of historical performance, and many private equity funds do not generate returns sufficient to properly compensate investors for the risks they must accept. For those wishing to gain exposure to private equity, comfort with active risk, diversifying manager risk, flexibility with liquidity, and rigorous manager selection remain critical.

²³ Although not included in these cases, other factors that may influence weighting include an investor's spending needs and tax situation and the degree to which they allocate to other types of private assets. The VAAM, the model we chose to use for this analysis, is designed to optimize portfolios by maximizing expected utility of wealth at the end of the investor's time horizon, which incorporates risk tolerance. Results could differ if a model is calibrated to a different investor success objective.

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Appendix A

FIGURE 10

Key attributes of drawdown funds versus semiliquid funds

Attribute	Traditional	Semiliquid	
	Drawdown fund	Interval fund	Tender offer funds
Term	Typically 10–12 years	No set term	No set term
Minimum investment amount	Often \$1 million or more	Can be less than \$25,000	Can be less than \$25,000
Eligibility requirements	Yes	Depends	Depends
Purchasing shares	The investor commits to a specific total purchase amount for the life of fund at inception. The investor sends portions of the committed amount to the fund when the manager asks (“calls”) for it, with the timing and magnitude of the purchase not known in advance.	Can be done monthly or more frequently	Can be done monthly or more frequently
Redeeming shares	Investors cannot sell shares back to the fund. Rather, the investor must find a counterparty in the secondary market, which is limited and may result in a sale price that is at a significant discount to NAV.	Fund providers are required to let investors sell shares back at NAV during redemption windows offered at fixed intervals (for example, quarterly or semiannually)	Timing of redemption opportunities is determined by a fund’s board and may change.
Redemption limits	Not applicable	Redemptions are capped at a percentage of fund assets and must be between 5% and 25% of outstanding shares, with 5% common.	The redemption limit is determined by a fund’s board and may change.
Distributions	Distributions are paid to investors if any holdings pay dividends and as holdings are sold by the manager, with timing and magnitude not known in advance.	Varies	Varies
Initial private equity exposure	Low	High, unless the fund is newly launched and has not yet built a fully invested portfolio	High, unless the fund is newly launched and has not yet built a fully invested portfolio
Liquid assets in fund	No	A portion of liquid assets is held in publicly traded securities as the manager searches for opportunities and budgets for possible redemption requests.	A portion of liquid assets is held in publicly traded securities as the manager searches for opportunities and budgets for possible redemption requests.
Leverage limit	Varies	A maximum of 33% of the total fund assets can come from leverage.	A maximum of 33% of the total fund assets can come from leverage.
NAV calculation	Quarterly	Daily or weekly	Monthly, quarterly, or less frequently

(Continued on page 20)

FIGURE 10 (CONTINUED)

Attribute	Traditional	Semiliquid	
	Drawdown fund	Interval fund	Tender offer funds
Investor protections	Protections are negotiated with the manager and typically include conflict oversight, reporting, and limited voting rights.	Protections are per the Investment Company Act of 1940.	Protections are per the Investment Company Act of 1940.
Breadth of fund options	High	Extremely low	Very low
Transparency	Low	Moderate	Moderate
Fees	High	High	High
Tax filing (for U.S. individual investors)	Schedule K-1 form, which may require tax deadline extension, since drawdown funds are structured as limited partnerships; may require filings in multiple states	Standard 1099 form	Standard 1099 form

Notes: These are typical attributes, so there may be exceptions. See "All-In Costs" on page 6 for more information on fees.

Source: Vanguard.

Appendix B

Performance benchmarking

There has long been industry debate about the most appropriate way to benchmark the performance of private equity funds, particularly drawdown funds, given that managers of such funds have discretion over the timing and size of cash flows. This issue leads to problems with traditional, time-weighted performance measurement, which is the standard method for public equity fund benchmarking and also suitable for semiliquid funds. There is no benchmarking approach for drawdown funds without shortcomings.

The Kaplan and Schoar public market equivalent (KS-PME), introduced in Kaplan and Schoar (2005), is a reasonable starting point for benchmarking individual funds, or a group of funds. It compares the amount of wealth the private equity fund or funds generated relative to the hypothetical amount of wealth that would have been generated in a public equity investment had investors bought and sold a

public benchmark at the same times and in the same amounts as the private equity fund cash flows. KS-PME is intuitive, specified in advance, investable (depending on the benchmark chosen), transparent, dollar-weighted, and less prone to manager manipulation than some other fund performance metrics. Since it is a benchmark-relative wealth ratio, if the KS-PME is higher than 1.0, it means the private equity fund or funds performed better than the public market benchmark, and if the KS-PME is lower than 1.0, it means they performed worse. For example, a KS-PME of 1.2 indicates that a fund's final wealth is 1.2 times higher than what would have been achieved by investing in the chosen public equity benchmark (that is, 20% additional wealth). Due to the well-known J-curve dynamics associated with drawdown funds, performance assessment in an investment's early years requires heightened caution as even the most highly skilled managers may exhibit low performance given that fees are charged on committed capital while returns are generated on invested capital, which starts out much smaller.

Not all private equity funds are the same, so to help with risk alignment, investors using the KS-PME method can choose a single public equity index, a weighted combination of indexes, or an investable index fund or bundle of funds that they believe best approximates the risk profile of the private equity allocation. However, they should understand that the public equity benchmark will not capture the private liquidity risk premium component of private equity returns. As a result, investors can add a liquidity risk premium amount they believe is appropriate.²⁴ In addition, when comparing funds with net-of-fee private equity fund returns, investors should consider the impact of any investment-related costs if those costs are not included in the chosen public benchmark.

Lastly, while KS-PME is useful for assessing cumulative excess return versus a benchmark, comparing performance across individual funds warrants a measure that accounts for differences in fund lifespans. The direct alpha measure introduced by Gredil, Griffiths, and Stucke (2014) is commonly used to approximate KS-PME in the form of an annualized excess return, facilitating more meaningful comparisons across funds launched at different times. Because of the J-curve life-cycle pattern of drawdown funds, comparing only funds within the same vintage year can help.

Appendix C

Semiliquid fund liquidity penalty method

We capture the dual sources of redemption risk—those based on the investor’s trading activity and fund-level aggregate shareholder redemption pressure—by creating fixed conditional and probabilistic liquidity penalties that can be applied directly to portfolio returns. Rather than assuming frictionless rebalancing, we can model liquidity costs that arise only when liquidity constraints bind, such as during rebalancing under stress or when redemptions are delayed or prorated. Using simulated portfolio paths, we can measure instances where desired trades or cash needs exceed liquidity provisions and apply an execution-cost haircut calibrated to observed secondary-market discounts in the drawdown fund market as a proxy for liquidity risk tolerance given redemption terms and opportunity costs of delayed cash flows. The penalty is path-dependent, reflecting both the probability and severity of liquidity events. Importantly, the haircut scales with investor context so that liquidity is penalized when it is economically most valuable. This approach preserves usability within standard portfolio construction frameworks while embedding realistic, state-dependent liquidity frictions consistent with historical stress behavior. The probabilistic penalty accounts for the risk that significant negative cash flows at the fund level, occurring at any time, may reduce or postpone the investor’s redemption request.

²⁴ If an investor is considering a noninvestable benchmark that would incorporate the liquidity risk premium, the aggregate private equity benchmarks discussed in Section II, starting on page 5, could be a good starting point.

Appendix D

FIGURE 11
Baseline inputs for investor profiles

Input type	Parameters	Baseline
Forecast period	Initial or equilibrium conditions	Equilibrium
	Time horizon (years)	10
Investor risk tolerance	Tracking error (active risk) tolerance	Medium
	Systematic risk tolerance	Medium
Active asset return	Alpha (public equity)	0.75%
	Alpha (public fixed income)	0.15%
	Alpha (buyout)	0.90%
	Alpha (venture capital)	4.06%
	Tracking error (public equity)	2.5%
	Tracking error (public fixed income)	0.5%
	Tracking error (buyout)	6.0%
	Tracking error (venture capital)	10.0%
	Buyout global market beta	0.9
	Venture capital global market beta	1.6
	Buyout common equity risk factor style tilt	Value
	Venture capital common equity risk factor style tilt	Growth
	Liquidity risk premium	2.6%
	Private equity composition (buyout/venture capital)	77%/23%
Liquidity	Semiliquid fund liquidity sleeve weight	10%
	Semiliquid fund liquidity sleeve investment	Cash
	Semiliquid fund exposure stage	Fully invested*
	Liquidity penalty	15%
Extra costs	Redemption cap (% of assets under management)	3%
	Redemption window frequency	Quarterly
	Operational support	0%
	Probability of fund liquidity gate being triggered in a given year	10%
Extra costs	Sales load/placement fee	0%
	Investment consulting	0%
	Shareholder servicing	0%
	Taxes	0%

* Newly launched semiliquid funds typically experience an initial ramp-up period during which capital is progressively deployed until the portfolio is fully invested. These cases assume that the semiliquid fund remains fully invested throughout the period, aside from its standard liquidity sleeve allocation.

Notes: These inputs are intended to be reasonable and illustrative. They are not meant to constitute investment advice or recommendations. Alternative inputs are equally plausible and could be adopted without altering the qualitative insights of the analysis. For example, an investor may be considering a private equity portfolio with a different systematic risk posture. In addition, any assumptions related to private assets are inherently difficult to make. Nevertheless, such assumptions are important to generate to ensure portfolio decisions are fully informed. Alpha and tracking error inputs are net of fees.

Source: Vanguard.

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