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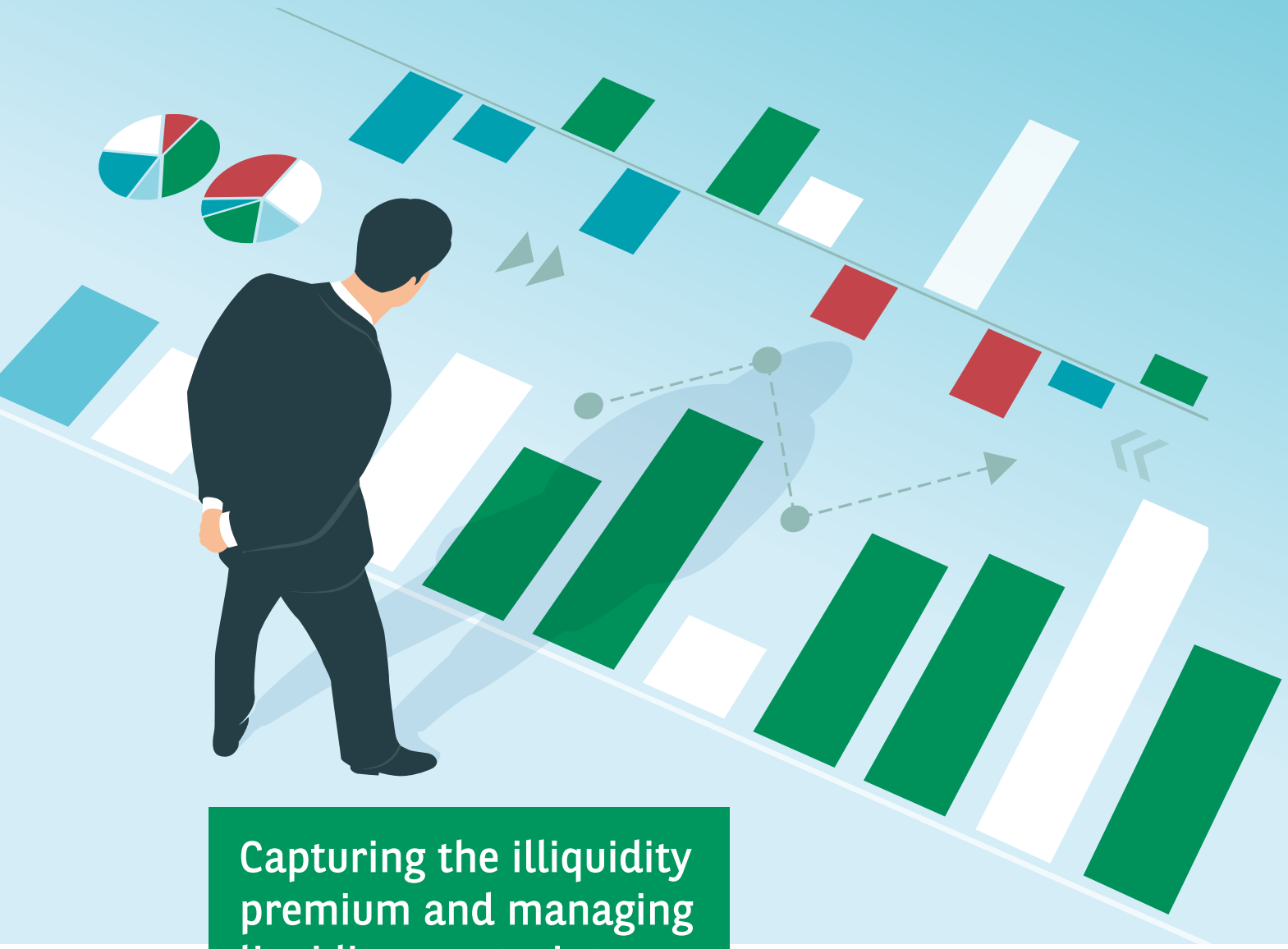
ALLOCATION TO PRIVATE ASSETS IN OPEN-ENDED FUNDS



Capturing the illiquidity premium and managing liquidity constraints

BNP PARIBAS
ASSET MANAGEMENT

The sustainable investor for a changing world

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ABSTRACT

Investment portfolios that include private assets can gain a number of potential advantages, including diversification, enhanced returns and less risk. Moreover, there is evidence of a growing number of private asset investment opportunities that can have a positive sustainable impact.

However, such advantages also bring challenges.

- One is the illiquid nature of private assets which require locking up capital for several years.
- Another is that the capital allocated to a private asset fund is neither put to work immediately nor fully returned to the investor on a single future date. The cash flows associated with the capital calls and distributions from the allocation to a private asset fund that typically span numerous years thus need to be well managed.
- A further challenge is the minimum investment size often being too large for most investors, limiting either diversification or even any access to private asset funds at all.

For these reasons, many investors would benefit from being able to invest in open-ended funds with a diversified and adequately managed allocation to private assets.

In this paper, we propose a strategy for doing exactly that. The strategy is designed to create a fully invested target allocation of the portfolio to private assets which is kept constant over time by efficiently managing the associated cash flows of the underlying funds. We also investigate stress test scenarios that illustrate the impact of market shocks and redemption shocks on the size of the allocation to private assets in such portfolios, while assuming that no capital allocated to private asset funds can be redeemed. We show how the strategy needs to adapt during such events to bring the allocation to private assets back to target.

1.INTRODUCTION

According to a report by McKinsey & Company (McLaughlin (2022)), assets under management in private assets grew to EUR 8.6 trillion (USD 9.8 trillion) by July 2021, an all-time high, as investors such as private equity fund of funds managers, pension funds, endowment plans and family offices continue to commit capital. Such investors are attracted to private assets by the potential to enhance returns by earning an illiquidity premium, and to reduce risk through diversification and less exposure to the short-term volatility found in public markets. Moreover, private assets are expected to play an increasingly important role in sustainable investing.

However, investing in private assets comes with challenges. The first is that private asset funds tend to have minimum investment limits that are prohibitive for smaller investors. However, even if such investors had the means to invest in such funds, funds, doing so is not as simple as investing in public asset classes. First, because of the illiquid nature of private assets, investors are required to commit capital for several years.[1] Second, not all committed capital is put to work immediately, as managers of private asset funds tend to make capital calls during the first years of the fund's lifecycle as and when they find suitable investments to put the capital to work. Investors thus need to manage the cash flows associated with the capital calls and distributions from the allocation to a private asset fund over time. Similarly, fund managers tend to distribute capital as investments mature and are disposed of. Private asset funds distribute capital back to investors throughout the lifecycle of the fund.

1. For example, 12 years is a typical lifespan of a private equity fund.

An additional difficulty is that while the internal rates of return (IRR) reported by private asset managers tend to look attractive, because not all committed capital is put to work immediately or for the entire lifecycle of the fund, the returns realised on the total capital committed to one single private asset fund can be lower than the IRRs. An adequate strategy to manage cash flows and investing in multiple private asset funds with maturities spread over time is required to be able to realise attractive returns on the capital committed to these investments. This explains why many investors, particularly smaller ones, would benefit from being able to invest in open-ended funds with a diversified and adequately managed allocation to private asset funds.

In this paper, we propose a dynamic recommitment strategy designed to be managed in an open-ended fund which invests in private asset funds and public asset classes. To realise returns close to the IRRs reported by private asset funds, the strategy commits new capital every year to the newest vintages of private asset funds and manages the calls and distributions adequately over time. The strategy calculates the optimal amount of capital that should be committed every year to the new vintages so that the portfolio allocation to capital at work in all private asset funds, i.e. deployed by the private asset managers, is constant over time and at the pre-determined target strategic allocation. To estimate how much capital should be committed every year, the strategy uses the expected calls and distributions from the different vintages of private asset funds in the portfolio as well as the expected IRR of the funds and the expected returns for public asset classes.

Because it is impossible to precisely synchronise distributions and calls from private asset funds, it is useful to use public equities or fixed income as buffers to manage the cash flows more efficiently. For this reason, it is important that the open-ended fund includes an allocation to public asset classes. As we shall see, the strategy also needs to adapt dynamically to changes in the asset allocation arising from market fluctuations without selling existing locked positions in private asset funds.

To be able to offer a level of liquidity acceptable for an open-ended fund, e.g. allowing investors to buy or redeem the fund once every two weeks, the portfolio should have the right allocation balance between private and public assets so that redemptions can be managed efficiently by selling public assets only. A sufficiently large capital allocation to public assets can offer the necessary buffer to deal with inflows and outflows at shorter-term horizons while making sure that the allocation to private assets can be allowed to relax back to the strategic target allocation, in particular after larger redemptions.

We also investigate stress test scenarios and illustrate the impact of market shocks and redemption shocks on the size of the allocation to private assets in an open-ended fund. In doing so, we assume that no capital allocated to private asset funds can be redeemed and show how the strategy needs to adapt during such events to bring the allocation to private assets back to target.

The paper is organised as follows. In section 2, we summarise the basic concepts of private assets which are referred to in the subsequent sections. We discuss how private assets are playing an increasingly important role in sustainable investing and how this is expected to drive significant growth in assets under management. The section includes an illustration of how the Internal Rate of Returns (IRR) are calculated and examples of the pace of calls and distributions typical of private equity and private debt funds. In section 3, we review the literature for evidence of an illiquidity premium for both private equities and private debt. We use benchmark indices, mainly from Preqin, a data provider, to investigate the evidence of an illiquidity premium and of risk reduction in private equity and private debt. In section 4, we describe the dynamic recommitment strategy which allows an open-ended fund to invest in multiple private equity and private debt funds and manage the cash flows efficiently to make sure the allocation to the capital at work in these funds remains at the targeted strategic allocation levels. We investigate the behaviour of the strategy during the Global Financial Crisis of 2008 as a test case in stressed market conditions, and in the case of a large redemption, as a test case of the ability of the fund to provide adequate liquidity in line with the expectations for an open-ended fund.

2.INTRODUCTION TO PRIVATE ASSETS

IN THIS SECTION WE SUMMARISE THE PRINCIPAL CONCEPTS RELATED TO PRIVATE ASSETS THAT WILL BE RELEVANT FOR THE REMAINDER OF THE PAPER.

2.1 PRIVATE EQUITY

Private equity is an alternative investment asset class where capital is used to invest in or acquire private companies unlisted on a public stock exchange, or to engage in buyouts of public companies. Private equity uses a model of active ownership: The managers of private equity funds use capital to invest in private companies in exchange for equity or ownership and often gain influence or control over a company's operations. The main purpose of private equity is to increase the value of companies over time before eventually selling the company at a profit.

Private equity firms are financial intermediaries that invest in illiquid assets on behalf of outside investors. They commonly raise capital through fixed-life, closed-end funds organised as limited partnerships, in which the General Partners (GPs), i.e. the employees of the private equity firm itself, receive capital commitments from Limited Partners (LPs), i.e. the investors[2]. GPs also invest in the funds, traditionally as much as 1% of total fund commitments. This skin in the game is seen as an important feature of this type of structure when it comes to aligning the economic interest of the fund manager with that of the fund investors. GPs' participation has been increasing since 2018, with one third of GPs committing 2% to 3%.

The capital commitments are not put to work at the inception of the partnership, but called for over time by GPs as investment opportunities are identified. The capital is returned when investments are exited and GPs typically receive a portion of the net return as a performance fee if the fund's return on investment exceeds a pre-defined hurdle rate.

2. The GP/LP structure, though being used commonly to describe private equity firms and their investors, is actually a type of Anglo-Saxon business structure known as limited partnership. This has been the common vehicle for closed-ended private fund structures for many years because of its advantages when it comes to investor familiarity, being flexible vehicles free from corporate law overrides, maintaining limited liability for investors and being treated as tax transparent so there is no tax leakage at the level of the fund. Nevertheless, while being perhaps the most commonly used, there are also many other types of structures used in private equity.

Private equity fund managers raise capital primarily from institutional and accredited investors. Such investors are usually fund of funds, pension funds, endowment plans, foundations, family offices, corporate investors, sovereign wealth funds, government agencies and other asset managers. The absence of retail investors from this list arises from the fact that the minimum investment in private equity funds is relatively high, typically starting at EUR 200 000 and sometimes reaching several tens of millions of euros.

Exhibit 1: Characteristics of the main types of private equity
Net IRR and standard deviation of Net IRR is based on vintages from 2011 through 2017, in US dollar terms.

	Objective	How	Stake	Risk	Median Net IRR	Standard Deviation of Net IRR
Venture Capital	Sourcing, funding and building young, innovative companies that focus on industries such as technology and healthcare.	Invest in equity at the launch (seed capital), early development (start-up), or expansion (later stage) of businesses, i.e. through successive rounds of capital increase.	Get equity in the company and, thus, a say in company decisions.	High risk since new companies often don't make it and early investors can lose all of their investment.	excluding earlier stage	
					15.4%	17.5%
					earlier stage only	
					17.1%	21.0%
Growth Equity	Finance acquisitions or the organic growth of a company, launching or ramping up new products and services.	Increasing capital of profitable companies with revenues growing at a double-digit rate in exchange for significant minority stake in the firm.	Gain specific governance and shareholder rights	Less risky than other private equity strategies with funds investment in profitable and growing companies without using leverage	13.6%	14.0%
Buyouts	Implementation new strategy to reap reward with new owners actively guiding, monitoring and controlling the management	Transfer of ownership of a company by the acquisition of the majority of a company to gain control, often using equity and debt	Change of ownership leading to new strategy, regardless of the size of the company	Conservative risk in terms of capital-at-risk, measured by fund distributions, and selection risk, measured through the dispersion of quartile performances	14.5%	12.5%

Data as at 31 October; Source: Preqin[3]

3. https://www.preqin.com/academy/lesson-4-asset-class-101s/private-equity-venture-capital

When compared to public equity investments, which trade daily, private equity assets are long-term investments and illiquid. Unlike public companies, private companies are not publicly traded or listed on a stock exchange. Public companies can be acquired by a private investor and become private. When this happens, the public company is de-listed.

In exhibit 1, we show the main features of the three major types of private equity investments. Venture capital and buyouts make the most significant contribution towards the assets tracked by specialised index providers such as Preqin and Burgiss.

2.2 PRIVATE DEBT

Private debt is an alternative investment asset class in which capital raised from investors is lent directly to both listed and unlisted companies, as well to real assets such as infrastructure and real estate. Private debt funds represent an alternative to bank lending and provide investors with exposure to returns which are more bond-like. Private debt provides access to markets that are otherwise completely inaccessible to investors.

Private debt lending can include both peer-to-peer lending and lending by more specialised entities and companies that focus on particular segments of the economy. Private debt also covers loan finance, e.g., when capital is lent to a company to fund ongoing operations or the improvement of infrastructure. Frequently, the loan is secured against an existing asset such as property, but private debt funds do not seek to own companies. Private equity funds, by contrast, will typically own some or all of a company.

Private debt remains relationship-driven, with debt privately originated or negotiated. Also, such deals tend to be less complex as fewer lenders are involved in any given transaction and borrowers work more closely with lenders. This typically results in faster deal execution and greater pricing certainty than can be the case with a large syndicates of lenders. The process of working out a debt structure in the event of a default also tends to be faster and the cost for the private borrower lower because fewer lenders are involved. Simpler debt structures remove the complexity of competing debt classes, which can slow a restructuring. Altogether, these factors contribute to higher recovery rates for private debt on average than those on more common syndicated loans.

Firms that manage private debt funds require individual investors to provide a minimum amount of capital before they can invest. The minimum investment amount used to start at EUR 100 000, as defined by the European Long Term Investment Fund (ELTIF) regulations and can reach tens of millions of euros. A recent amendment to the regulations proposes reducing this minimum investment to EUR 10 000 (Delivorias (2022)).

Exhibit 2: Characteristics of the main types of private debt
Net IRR and standard deviation of Net IRR is based on vintages from 2011 through 2017, in US dollar terms.

	Objective	How	Risk	Median Net IRR	Standard Deviation of Net IRR
Direct Lending	Non-bank lenders extending loans to small and medium enterprises (SMEs)	The fund issues loans directly to companies	Senior or subordinated loans depending on the strategy of the fund	8.3%	4.0%
Distressed Debt	Buying debt of companies that are in bankruptcy or likely to enter bankruptcy at significant discount	Similar to direct lending. but only targets distressed opportunities	Mainly senior debt due to the substantial threat of liquidation	8.5%	10.0%
Mezzanine	A hybrid of equity and debt finance	The fund issues mezzanine debt to companies only	Debt comes with conversion rights to equity. with embedded equity options if the borrower defaults	10.0%	4.5%
Special Situation	A loan based on a 'special situation.' referring to something other than underlying company fundamentals	Funds focus on companies whose value may be impacted by an event. including company spin-offs. mergers & acquisitions. or tender offers	Can include both debt and equity investments	9.0%	9.9%
Venture Debt	A loan provided to a start-up or early-stage company	The fund issues loans to act as growth capital for equipment financing. or as accounts receivable finance	Loans issued via warrants in either common or preferred stock to help reduce risk while charging lower rates	n/a	n/a

Data as at 31 October; Source: Preqin[4]
4. https://www.preqin.com/academy/lesson-4-asset-class-101s/private-debt

Unlike public debt, private debt is not traded on the public markets. Indeed, the key risk of private debt is illiquidity, since these instruments are not often traded in a secondary market. As a result, private debt comprises potentially higher yielding, illiquid opportunities across a range of risk and return profiles.

Compared to traditional asset classes and most other fixed-income categories, the private debt implementation process looks different and operates more in line with the implementation of private equity allocations. Private debt funds are typically less diversified (by number of positions) than senior bank loan funds. It is up to investors to ensure adequate portfolio diversification.

Private debt managers tend to raise new capital during fundraising periods. Much as with private equity, the committed capital is not put to work immediately. Instead, the committed capital is called and invested over the following years as suitable investment opportunities arise. Thus, not only can it take time to allocate capital to a set of high-quality managers, it also takes additional time until they manage to invest the committed capital, putting it to work.

Private debt loans are typically floating rate. They therefore offer investors some protection against inflation eroding returns, in contrast to fixed-rate bonds which lose value in a higher inflation or rising interest rate environment. Private debt can be issued with different levels of seniority. A senior loan is repaid first should the borrower default. After that, subordinated, or junior, loans are repaid in the event of bankruptcy. Mezzanine debt is senior only to equity, contains embedded equity options, is usually issued with rights to convert to equity in the case of default and is unsecured. It demands high interest rates.

There are several types of private debt, the main features of which are shown in exhibit 2. Mezzanine debt and distress debt make the most significant contribution towards the assets tracked by Preqin and Burgiss.

2.3 ROLE OF PRIVATE ASSETS IN SUSTAINABLE FINANCE

There is growing evidence of not only an increasing number of opportunities in private assets with a sustainable impact, but also of the importance that private assets can play in impact investing, e.g. by funding projects with a positive net environmental impact.

Private equity is particularly well adapted for impact investing. Its longer investment horizons make it ideally suited to creating positive social and environmental impact. Investors can also more easily exert a stronger influence on targeted companies than is possible for shareholders of listed companies, and they can more easily access information and the data needed to steer a company and its activities. Private debt is also well adapted for impact investing. It has a similarly long investment horizon and can fund infrastructure and community development projects; provide working capital for grassroots impact organisations; fund microfinance institutions that cater to underbanked communities; and merge multiple impact focused assets, structuring them as senior or subordinated notes.

Indeed, it is easier for private asset fund managers to decide a priori that capital will be invested with the goal of helping to overcome a societal challenge (intentionality), to show how they expect to drive the companies in the fund to achieve a positive impact throughout the holding period, and to set realistic, measurable evidence-based goals for what the investments can achieve (measurement).

According to Firzli, Sherry and Khoo (2022), large institutional asset owners are likely to double their allocation to private assets in the next four years, which implies shifting hundreds of billions of euros in capital annually towards private assets, in particular infrastructure, accelerating the investment flows. The driver here is that G20 governments are relying increasingly on private investments to deliver infrastructure and institutional investors are taking notice. The adoption of the European Union Green Deal 'Fit for 55' legal and regulatory package and the passage of the bipartisan 'Infrastructure Investment and Jobs Act' in the United States are examples of this trend. Significant investment is expected from private assets into renewable energy and clean tech, digital infrastructure, artificial intelligence and biotechnology, as well as social infrastructure, including hospitals and student housing, waste management, ports and other infrastructure.

In turn, Indahl and Jacobsen (2019) claim that private equity firms are increasingly taking into account environmental, social, and governance (ESG) factors in their investments as GPs pay heed to the positive correlation between effective management of externalities and companies' profitability and market values.

They also see significant growth opportunities in fields such as healthcare, education, renewable energy and waste management, where investments are expected to have positive social and environmental impacts on top of the profits and returns they are expected to generate. Successfully managing ESG risks and opportunities is expected to be part of the investment strategy and value creation approaches likely to improve returns while at the same time reducing vulnerability to risk.

Indahl and Jacobsen (2019) also highlight the importance of the UN Sustainable Development Goals (SDGs) as a framework for assessing the relative size and importance of the social costs and benefits associated with positive and negative externalities when evaluating investments. They note that regulation is encouraging the private sector to respond to ESG concerns, but add that another force is also driving the increasing correlation between business opportunities and the externalities targeted by the SDGs: corporate stakeholder influence. This includes customer demand for more positive social impact, employees' desire to work for purpose-driven organisations, and a growing number of investors' preference for funding such companies. Such factors are likely to be increasingly important in the decisions taken by the GPs of private equity firms.

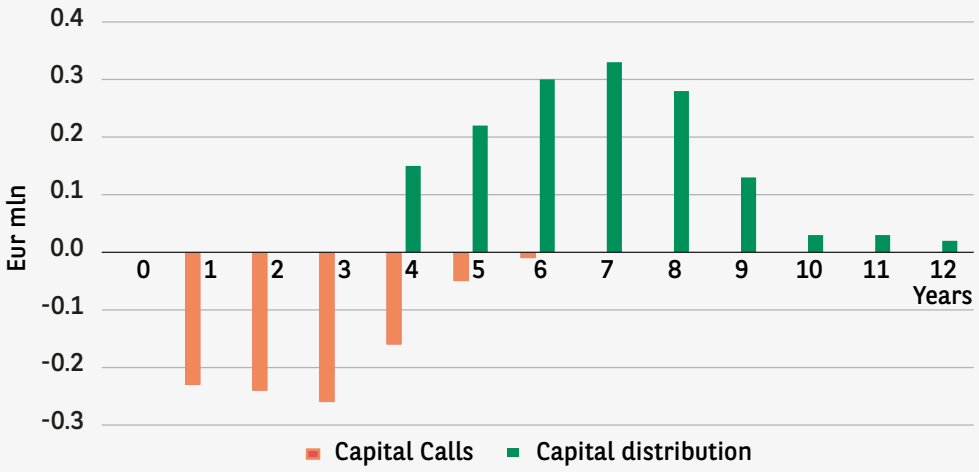
In a recent study on impact investing, which has the dual objective of delivering social and environmental benefits as well as financial returns, Cojoianu, Hoepner and Lin (2021) used a dataset of over 8 000 private investment firms around the world to analyse this fast-growing asset class, highlighting the differences among impact investors, ESG and conventional private management firms. In particular, they discuss the differences in ownership structure, asset class preferences, sectoral focus and how those differences vary across the world. According to Cojoianu, Hoepner and Lin (2021), impact investing firms are more likely to be owned by governments, particularly in Europe, and to invest over-proportionally in the agriculture, clean tech and education sectors and under-proportionally in such 'sin' industries as gambling or tobacco. In Africa, impact investors invest over-proportionally in food & nutrition solutions, whereas in Asia, Australasia, Europe and North America, agriculture and forestry are more prevalent as an investment theme. On the other hand, in North America, impact investors tend to focus most on clean tech and education.

2.4. ILLUSTRATION OF THE CALCULATION OF IRRS

It is important to note that the IRR cannot be directly compared with the returns on public equities and fixed income. As seen from equation (5), the IRR uses a built-in *reinvestment assumption* that capital distributed to investors early on will be reinvested over the life of the private asset fund at the same IRR as generated at the initial exit. The main problem is that the capital committed to a private asset fund is neither all put to work at the same time nor for the entire period of the investment. Here we will illustrate this issue using two examples, one with a private equity fund and the other with a private debt fund.

Private equity funds tend to have a three to five-year investment period followed by a five-year harvest period, with maybe one to two year-long extensions after that. That means that private equity funds typical last for 12 years and sometimes longer. The lifecycle is different in private debt because of the quicker turnaround and reduced complexity of the underlying transactions. Private debt both tends to generate smaller returns than private equity and to have a shorter investment cycle and fund term. Private debt funds can have investment periods as short as three years and fund terms of only six years (Norton (2020) although this has recently increased with unitranche funds[5], which tend to have longer lifespans, now representing the bulk of the private debt markets.

Exhibit 3: Cash flows based on example of private equity fund
Example of typical calls and distributions based on the commitment of EUR 1 million to a buyout private equity fund with a lifecycle of 12 years.



Data as at 31 October 2022. Source: BNP Paribas Asset Management.

5. A unitranche facility is a single tranche term loan with a combination of senior and subordinated debt in one instrument. It is usually documented in a single loan agreement. Unitranche facilities are generally provided by non-traditional lending entities, i.e., private debt funds and other alternate credit providers. Such financing originally became popular in the US mid-market in 2005 and since 2012 its share has increased in the European mid-market. Unitranche facilities are issued by one debt provider and usually used to facilitate a leveraged buyout. Their popularity is based on the fact that they simplify the debt structure, as one lender can satisfy the whole debt requirement. The interest rate charged often falls between the corresponding senior and subordinated debt.

In exhibits 3 and 4, we show an example of private equity cash flows based on the allocation of EUR 1 million to a buyout fund. Exhibit 3 shows a typical profile of calls and distributions spanning the life of the fund. The total amount committed to the investment is not put to work straight away. Most calls take place in the first four years and most distributions start from the fourth year. The orange bars represent the amounts called each year and the gray bars represent the amounts distributed each year. In this example, in the first year, only EUR 230 000 is called. In the second year, an additional EUR 240 000 is called. It is only in the sixth year that the final capital call occurs. The orange bars add up to EUR 950 000.

In exhibit 4, the gray bars show the evolution of the total investor wealth over the 12 years of the investment. At each point in time, these gray bars represent the sum of the capital not yet called by the fund (orange bars), the capital already called and invested (blue bars) and the capital already distributed (not shown). We assumed both the capital not yet invested and the capital already distributed will be invested at cash rates. The capital put to work increases until the fourth year and then declines. By the ninth year, there is almost no capital at work in the fund.

Exhibit 4: Cash allocation to one fund with cash flows based on example of private equity fund

Changes in the allocation between unused cash and capital put to work for a commitment of EUR 1 million to a buyout private equity fund with calls and distributions scheduled as in exhibit 3 over the 12 years of the investment. Unused cash accrues at 0.5% p.a.

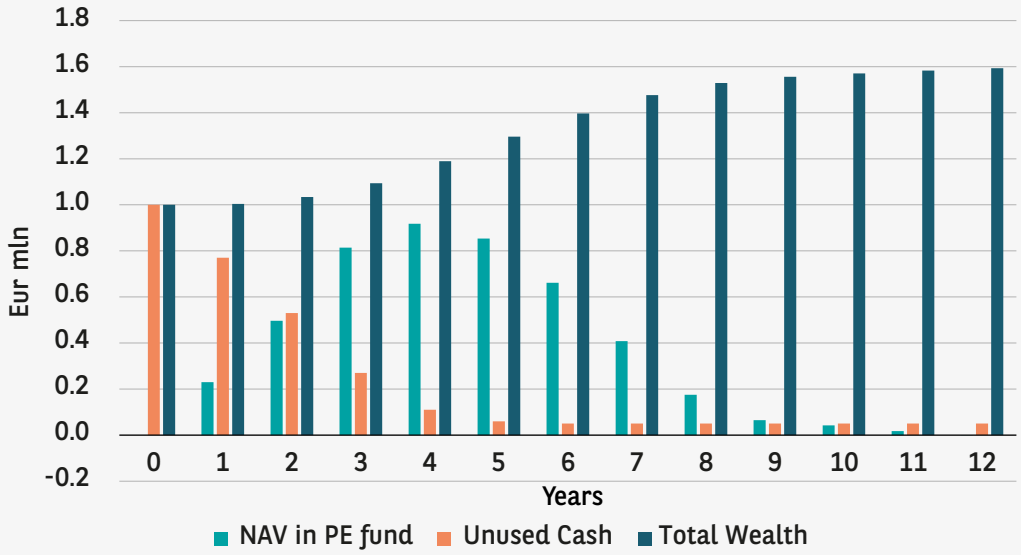


Exhibit 5: Assumptions used in the examples of cash flows from an investment into private equity or private debt fund

The examples were chosen so that the IRRs are more conservative than those provided by Preqin, summarised in exhibits 1 and 2.

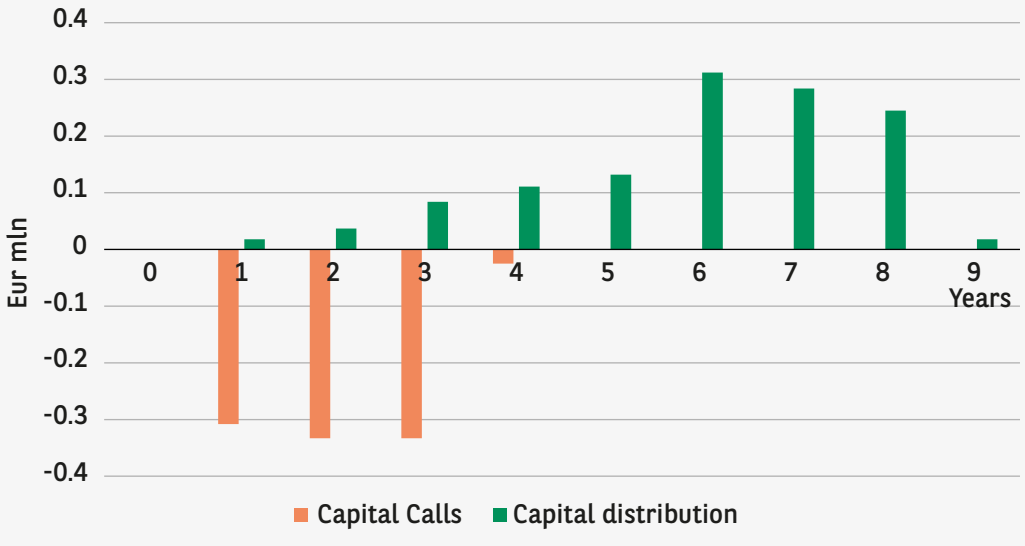
	Initial investement (EUR millions)	Life of funds (Years)	Cash Rates	Management fees and carried interest paymens (p.a.)	Effective return on capital (p.a.)	IRR
Private Equity	1	12	0.5%	1.2%	4.0%	11.5%
Private Debt	1	9	0.5%	1.2%	1.9%	5.3%

Data as at 31 October 2022. Source: BNP Paribas Asset Management

In exhibit 5, we provide more detail of the assumptions behind this example, in particular the annual management fees and carried interest, and the cash rates which were assumed to be constant throughout the 12 years. With these assumptions, the capital calls and capital distributions of the example in exhibit 3, and ignoring taxes, the IRR calculated using equation 5 is 11.5%. However, since the committed capital is not all put to work immediately and 5% of it is never called, the effective return on the total capital committed to this 12-year period is only 4.2% a year, calculated by comparing the total wealth plus unused cash in year 12, EUR 1.64 million, in exhibit 2 with the initial commitment of EUR 1 million, i.e., $(1.64/1.00)^{1/12}$-1.

Exhibit 6: Cash flows based on example of private debt fund

Example of typical calls and distributions based on the commitment of EUR 1 million to a junior commercial real estate debt private fund with a lifecycle of nine years.



Data as at 31 October 2022. Source: BNP Paribas Asset Management

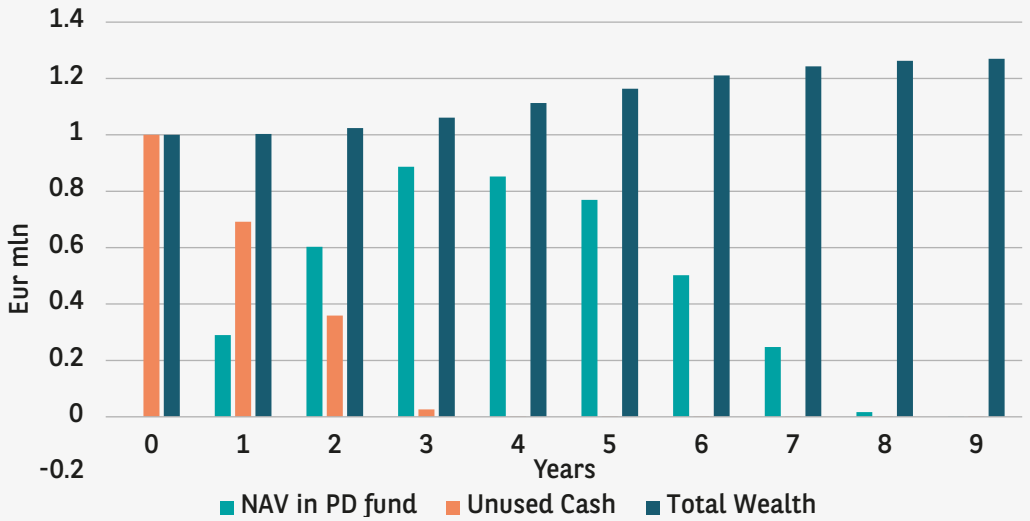
In exhibits 6 and 7, we repeat the example, but now applied to private debt. The cash flows are based on a junior commercial real estate fund. In the example, EUR 1 million is allocated to the fund and locked up for nine years. This private debt fund has a typical profile of cash flows in private debt with most capital calls taking place in the first three years, with some anticipated reimbursement in years three through five, and with most capital distributions starting in the sixth year. The junior commercial real estate fund in the example invests in debt with an average B+ rating, a recovery rate of 50%, a prepayment rate of 10%, a gross yield of 6.5% and an average maturity of six years.

With the assumptions in exhibit 5 and with the cash flow in exhibit 6, the IRR of the fund is 5.3% (solving for equation (5)). The final effective return on the capital invested over the nine years is 2.0% per annum, calculated by comparing the total wealth plus unused cash in year nine in exhibit 7 with the initial investment of EUR 1 million.

In both examples discussed above, the effective annual return on the total capital committed to the private asset funds is much lower than the IRR of the funds because not all the committed capital is put to work from day one nor is all the committed capital at work for the entire lifecycle of the fund. To be able to earn the IRR as the actual return on the capital committed, it is important to have all the capital permanently at work. This requires investing in more than just one private asset fund. Capital kept on the side waiting to be called or just invested at cash rates after being distributed will dilute returns. In section 4, we propose a strategy to invest adequately with the aim of avoiding dilution and efficiently capturing the funds' IRRs as the actual returns.

Exhibit 7: Cash allocation to one fund with cash flows based on example of private debt fund

Changes in the allocation between unused cash and capital put to work for a commitment of EUR 1 million to a junior commercial real estate private debt fund with calls and distributions scheduled as in exhibit 6 over the nine years of the investment. Unused cash accrues at 0.5% p.a.



3.EVIDENCE OF AN ILLIQUIDITY PREMIUM

IN PRINCIPLE, LOCKING UP CAPITAL FOR FIVE TO 15-YEAR PERIODS IN INVESTMENTS SUCH AS PRIVATE EQUITY AND PRIVATE DEBT SHOULD WARRANT A SIGNIFICANT ILLIQUIDITY PREMIUM.

In this section, we focus on the evidence of such a premium. The returns of public and private assets are directly compared, which can be justified in particular by taking into account the description in section 3.3 of the methodology used by index providers to calculate the returns of the private asset indices, and in section 4.2 of the strategies to invest in private assets designed to earn those streams of returns.

3.1. FROM OUR LITERATURE REVIEW ON PRIVATE EQUITY

According to academic literature, private equity firms, in particular buyouts, have delivered persistently higher returns than the US S&P 500 equity index over the past 30 years, net of fees. As discussed below, the evidence of outperformance persists even when the public equity benchmarks are adjusted to better reflect the nature of the companies targeted by private equity, e.g., using small capitalisation benchmarks.

Indeed, when it comes to private equity, there is a consensus that it has outperformed traditional market capitalisation-weighted public equity indices. In a recent study, Ilmanen, Chandra McQuinn (2020) show that US private equity buyouts represented by the Cambridge Associates return benchmark index, which includes management fees, outperformed the S&P 500 by 2.3% per annum in the period 1986 to 2017 based on arithmetic mean returns, and by 3.4% p.a. when using geometric returns.

Despite such results, the question of whether private equity outperforms public equity remains a hotly debated issue in investment finance. One criticism is based on the idea that private equity firms are better compared with smaller cap stocks, i) because buyout targets tend to have smaller capitalisations, and ii) because small-cap stocks are also illiquid and can be expected to generate an illiquidity premium.

Thus, such critics propose that small-cap public indices should be used instead of large-cap ones. However, according to Ilmanen, Chandra McQuinn (2020), over the 1986 to 2017 period, US private equity buyouts outperformed the Russell 2000 index, a market cap index comprising 2 000 small-cap US companies, by 2.3% per annum when using arithmetic returns and by 4.3% p.a. when using geometric returns. This is remarkable if we take into account that the small-cap public indices used do not even include management fees.

Another criticism claims that the benchmark should be a leveraged small-cap index of public stocks. The rationale is that private equity firms take 100% to 200% debt for every dollar of equity, whereas publicly listed firms add only 50% of debt for every dollar of equity, on average, which suggests that private equity should have a beta of well above 1. However, Ilmanen, Chandra McQuinn (2020) show that when comparing the performance of US buyouts to the leveraged Russell 2000 at 1.2, the excess returns are still positive. Moreover, since most investors cannot use leverage, we could argue that the leveraged index should be replaced by a benchmark invested in high-beta stocks instead, with a beta similar to that of private equity, e.g., 1.2. However, as pointed out by Brown and Kaplan (2019), such an approach faces headwinds from the fact that empirically, beta does not do a good job in explaining realised returns, i.e., a portfolio of higher-beta public stocks does not perform much differently from a portfolio of low-beta stocks, which is known as the low volatility anomaly.

While the studies above compare cash flow-weighted private equity performance directly with public equity market returns, a number of studies use PME instead. One study, Harris et al. (2020), based on the most recent data from Burgiss, finds that, based on PME, all US buyouts vintages for the years between 1994 and 2014 outperformed the S&P 500. According to the same study, the results are qualitatively similar when using the Russell 2000 instead. When it comes to global private equity, Hamilton Lane (2021) reaches a similar conclusion, reporting that buyout pooled returns outperformed the MSCI World index on a PME basis for all but one vintage year, 2010, over the last 20 measured vintage years (1999–2018). More recently, Brown and Kaplan (2019) use PME by vintage year of global private equity funds against the contemporaneous total returns of the MSCI ACWI index and show that private equity returns were higher than the MSCI in every vintage year from 1988 through 2014. The results include the categories of buyout, venture, growth, and generalist private equity funds and use data from Burgiss.

Finally, one last criticism by Ilmanen, Chandra McQuinn (2020) proposes that private equity buyout benchmarks should include a tilt towards value stocks because buyout targets tend to trade at lower valuation multiples than the market (this is not the

case for venture capital targets, which are more likely to be growth companies). However, Brown and Kaplan (2019) show that US buyout funds have historically outperformed public market indices even after introducing adjustments for leverage (beta), small-cap and value exposures.

From a theoretical point of view, Maurin, Robinson and Stromberg (2020) constructed a model of delegated investment in private equity funds, wherein investors are subject to liquidity risk. Their analysis rests solely on two factors: i) investors can default on their capital commitments, in particular those more sensitive to liquidity risk; and ii) GPs may inefficiently accelerate capital calls to avoid default from investors on capital commitments. Using this model, they derive the optimal partnership between GPs and investors with a fund structure and a compensation contract that resemble actual partnership agreements. Because investors themselves face liquidity risk, GPs prefer to raise capital from investors less sensitive to liquidity risk. Such investors, less likely to default on their commitments, supply capital at a lower cost. This last feature implies that when high-quality capital is scarce, GPs pay an illiquidity premium to investors with a lower sensitivity to liquidity shocks. GPs thus cherry-pick their investors for their ability to provide long-term capital and investors with a higher tolerance to illiquidity realise higher returns.

3.2. FROM OUR LITERATURE REVIEW ON PRIVATE DEBT

For private debt, academic literature is still scarce, but what is available tends to show evidence of an illiquidity premium in private debt relative to other forms of debt.

In a recent study, Bönia and Manigart (2021) investigated the performance of private debt funds by collecting timed cash flow data on 448 funds listed in Preqin with vintage years from 1986 to 2018. They found that the average of those vintages of private debt funds realised a 9.2% net of fees IRR for investors between 1996 and 2020. They also compared the performance of the private debt funds with that of public investment-grade (IG) and high-yield (HY) bond benchmark indices using the public market equivalent (PME) method of Kaplan and Schoar (2005). They found that private debt outperformed the IG and HY benchmarks by a non-annualised 8% and 6%, respectively, over the period of retention of the fund, i.e., about 0.9% and 0.7% annualised, respectively, assuming an average life of nine years for each vintage.

The results cited by Bönia and Manigart (2021) are in line with those from previous research by Munday et al. (2018). Using 476 private credit funds from the Burgiss

database with vintage years between 2004 and 2016, Munday et al. (2018) found an average pooled IRR of 8.1% for all funds, ranging from 7.7% for mezzanine funds to 11.8% for direct lending (excluding mezzanine) funds. When using PME, they found that, on average, private debt funds outperformed the leveraged loan index by 14% over the period of retention on the fund. Other benchmarks, e.g., high-yield, suggest average or slightly below-average performance on a PME basis. Direct lending funds had the lowest beta and most significant and positive alpha against benchmarks, including high-yield.

3.3. FROM BENCHMARK INDICES

In this section, we look for evidence of an illiquidity premium in private asset classes by using a number of indices from Preqin. Our analysis is line with academic evidence as we also detect an illiquidity premium of private equity relative to traditional benchmarks of public equity and of private debt relative to traditional benchmarks of publicly traded corporate debt.

The Preqin Private Capital Quarterly indices capture the return earned by investors on average in their private asset portfolios, based on the actual amount of capital invested in private capital partnerships. These Preqin quarterly indices are money-weighted indices that use fund-level cash flow transactions and net asset values from private asset funds. The indices are based on the following calculation:

$$\%\ \text{change in quarter} = [(\text{NAV at end of quarter} + \text{distributions during quarter}) / (\text{NAV at start of quarter} + \text{call-ups during quarter})] - 1 \quad (6)$$

In this calculation, 'call-ups during quarter' refers to total capital drawn by the fund managers during the quarter, i.e., the cumulative capital called to date as at the end of the quarter minus the cumulative capital called to date as at the start of the quarter. 'Distributions during quarter' refers to the total capital distributed to the LPs during the quarter, i.e., the cumulative capital distributed to date as at the end of the quarter minus the cumulative capital distributed to date as at the start of the quarter. These returns are combined to form an index.

Preqin reduces the risk of survivorship bias in their indices by using performance data provided by the LPs or by both the LPs and the GPs for at least 80% of the funds in their database. Additionally, Preqin has an average of four data reports for each fund. This range of available data enables Preqin to compare data contributions from

GPs against other sources reporting for the same fund, ensuring the validity and consistency of the performance data received. In this paper, we will mainly use data from Preqin.

While these indices attempt to be representative of the market by including a large number of funds, they are not investable. Nevertheless, the returns of these indices can be compared to the weighted average IRR of the individual funds because the index is constructed almost as though capital distributions from older vintages were invested in capital calls from younger vintages, with only a residual amount of capital not allocated at any point in time.

For private equity, we calculated the annualised returns of the Preqin benchmark index for all private equity funds, for the global venture capital fund index and for the global buyout fund index using the quarterly return time series provided by Preqin, going back to 1995.

The results in exhibit 8 are based on these benchmark indices and show that private equity in general, and both venture capital and buyout funds more specifically, have outperformed public equities since 1995. Relative to the MSCI World index, the outperformance was 6.2%, 6.0% and 6.4% per annum for private equity in general and for venture capital and buyouts, respectively. Relative to the MSCI World SC index (small cap equities), the outperformance was 5.4%, 5.2% and 5.6% p.a., respectively.

Exhibit 8: Performance and risk calculated from private equity benchmark indices.
Based on regression models
Performance and risk calculated from private equity benchmark indices from Preqin since Q1-2001 and based on regression models using Cambridge Associates indices prior to that date. The public equity indices are from MSCI. Results are all based on quarterly data and geometric returns. Net returns in EUR, except for the MSCI World SC index prior to Q1-2001 where total returns in EUR were used instead. The calculations are based on data from Q2-1995 through Q4-2021. The Values at Risk (VaR) are empirical and based on quarterly data.

		Private Equity			World Equities	
EUR	**Cash**	**Private Equity All**	**Venture Capital**	**Buyouts**	**MSCI World Small Cap**	**MSCI World**
Annualized Net Returns	1.8%	15.1%	14.9%	15.3%	9.6%	8.8%
Annualized Excess Return Over Cash		13.2%	13.0%	13.4%	7.8%	7.0%
Sharpe ratio		0.98	0.57	1.09	0.38	0.40
Annualized Volatility		13.5%	23.0%	12.3%	20.5%	17.6%
VaR @ 99%		-14.1%	-18.5%	-14.2%	-26.3%	-20.2%
VaR @ 95%		-8.2%	-9.6%	-7.7%	-16.4%	-17.4%
Maximum Drawdown		-45.2%	-74.9%	-36.0%	-51.5%	-52.8%

Data as at 31 October, 2022. Sources: Preqin, Cambridge Associates.

The volatility of the buyout fund index is lower than that of both the MSCI World and MSCI World SC public market indices. However, the volatility of venture capital funds is even higher than that of the small cap equity index. When it comes to extreme risk, private equity appears less risky based on the comparison of Value at Risk (VaR) measures. However, when it comes to drawdown, although buyout funds have shown the smallest drawdown of all and it is significantly lower than for public equities, venture capital shows the largest drawdown during 2000 to 2004. However, it is important to note that this drawdown arose from the poor performance of venture capital during the bear market that followed the tech bubble peak in 2000, immediately after the bubble formed in the late 1990s, a period during which venture capital had significantly outperformed.

We conducted a similar analysis for private debt. The history of the Preqin private debt indices starts in 2001. In our analysis, we used the benchmark index for all private debt as well as the indices for its two largest contributors: Mezzanine funds and distress debt funds. We compare the private debt performance and risk with those from global aggregate corporate bonds and global high-yield bonds. We also compare them with the liquidity performance and risk of leveraged loans, which are originated by banks on behalf of large corporate borrowers, rated by the credit rating agencies, syndicated to institutional investors, and subsequently traded in the secondary (over-the-counter) market. Leveraged loans are often compared with private credit because this market has many similar characteristics to private credit funds, including structure, tenor, spread, less regulatory oversight, fewer reporting requirements, and trading in a smaller and less liquid market.

The results in exhibit 9 based on these benchmark indices show that private debt in aggregate outperformed the global aggregate corporate debt benchmark index by 4.3% per annum. Mezzanine outperformed by 4.3% p.a. and distressed debt by 5.3% p.a., respectively. When compared to the high-yield index, private debt in aggregate and mezzanine outperformed with excess returns of 1.6% p.a. and distressed debt by 2.6% p.a. The Sharpe ratios of private debt are significantly higher than those of global aggregate corporate debt and high-yield. Compared with leverage loans, the levels of outperformance are similar to those of global aggregate corporate debt. In all, private debt significantly outperformed leverage loans and corporate debt, and delivered higher risk-adjusted returns than even high-yield.

Exhibit 9: Performance and risk calculated

Performance and risk calculated from Preqin private debt benchmark indices and from Bloomberg and Credit Suisse public fixed-income indices, all based on quarterly data and geometric returns. Net returns in EUR for private debt indices and in total returns for public debt. The calculations are based on data from Q1-2001 through Q4-2021. The VaR are empirical and based on quarterly data.

		Private Debt			Public Debt		
EUR	**Cash**	**Private Debt All**	**Mezzanine**	**Distressed Debt**	**Credit Suisse Leveraged Loan Total Return**	**Bloomberg Global Agg Corporate Total Return Index Value Unhedged**	**Bloomberg Global High Yield Total Return Index Value Unhedged**
Annualized Net Returns	1.3%	8.5%	8.5%	9.5%	3.7%	4.3%	6.9%
Annualized Excess Return Over Cash		7.2%	7.2%	8.2%	2.4%	2.9%	5.6%
Sharpe ratio		0.70	0.64	0.72	0.20	0.42	0.47
Annualized Volatility		10.3%	11.2%	11.4%	11.9%	6.9%	11.8%
VaR @ 99%		-13.6%	-13.1%	-13.5%	-14.5%	-5.4%	-17.1%
VaR @ 95%		-6.0%	-6.5%	-6.4%	-7.6%	-3.9%	-8.9%
Maximum Drawdown		-25.5%	-32.5%	-31.0%	-40.6%	-12.9%	-29.7%

Data as at 31 October, 2022. Sources: Preqin, Bloomberg, Credit Suisse.

4. INVESTING IN PRIVATE ASSETS WITH OPEN-ENDED FUNDS

It is easy to see from the above why traditional open-ended funds would benefit from an allocation to private assets. It would allow them to capture the illiquidity premium, diversify and take advantage of the lower risk that at least some types of private assets appear to offer relative to their public market equivalents. Moreover, as we shall discuss in this section, the valuations of private assets are published with a lag and the valuation frameworks used by private asset funds – which are anchored on capturing idiosyncratic risks and returns of individual assets over longer investment periods – mean we can expect valuations to provide comparative stability during times of market turbulence. This helps to diversify the portfolio's performance, reducing volatility and improving returns in periods of poor performance of public equities and debt (even if the effect of the valuation lag is somewhat artificial).

There are three main challenges when it comes to allocating to private assets in open-ended funds. The first is how to design a strategy that efficiently allocates to private assets, managing the calls and distributions, and capturing the time-weighted IRR of the private asset investments over time. The strategy needs to avoid the dilution of returns resulting from the fact that the capital committed to a private asset fund is neither put to work immediately nor fully returned to investors on a single future date at the end of the lifecycle of the fund.

The second challenge is to make sure that the drift in portfolio weights resulting from the different performance of the assets in the open-ended fund does not lead to undesired allocations, e.g., the outperformance of private equities over public equities in an equity bear market could lead to a significant overweight of private equities and underweight of public equities relative to their respective strategic allocation portfolio weights. This could create liquidity issues or breach the formal constraints of the open-ended fund. The strategy needs mechanisms to rebalance the allocation to private assets despite their illiquid nature.

The third challenge is to design the strategy so that it can offer the liquidity requirements expected from an open-ended fund, with redemptions and investments, while committing capital that will be locked up for many years in the private asset funds.

IN THIS SECTION, WE PROPOSE A DYNAMIC RECOMMITMENT STRATEGY THAT ADDRESSES THESE CHALLENGES AND WHICH CAN BE STRESS TESTED FOR POSSIBLE LIQUIDITY ISSUES.

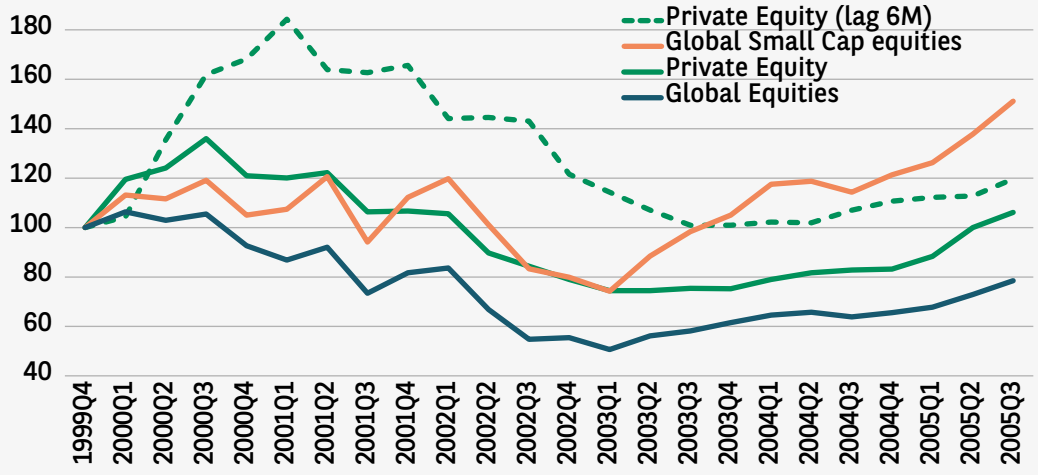
4.1. IMPACT OF VALUATION LAG AND SMOOTHING OF PRIVATE ASSETS

Private asset valuations are generated less frequently and with a delay commonly referred to as the *valuation lag*. For example, the Preqin benchmark indices have a valuation lag of at least six months for the latest quarter-end data to become available. However, private asset values are more than just simply delayed public market valuations. Fundamentally, private asset valuations are anchored on capturing idiosyncratic risks and returns of individual assets over longer investment periods. Thus, the nature of valuation frameworks used by private asset funds means that we can expect valuations to provide comparative stability during the times of market turbulence. This is known as smoothing.

Both valuation lag and smoothing have an important impact on the net asset values of open-ended funds which invest in private assets since, at any point in time, the net asset value of the open-ended fund can only use available information.

In exhibits 10 through 15, we compare the performance of the Preqin Private Equity and the Preqin Private Debt indices with the performance of public indices during three crisis: The Tech Bubble, the Global Financial Crisis and the Covid pandemic. The time series from Preqin were also lagged by six months to reflect how long it takes for

Exhibit 10: Tech Bubble
Performance of private equities lagged six months compared with the performance of private equity non-lagged, global equities and global small cap equities during the Tech Bubble based on quarterly net returns in EUR.



Data as at 31 October 2022. Sources: Preqin and MSCI. Rebased to 100 on Q4 1999.

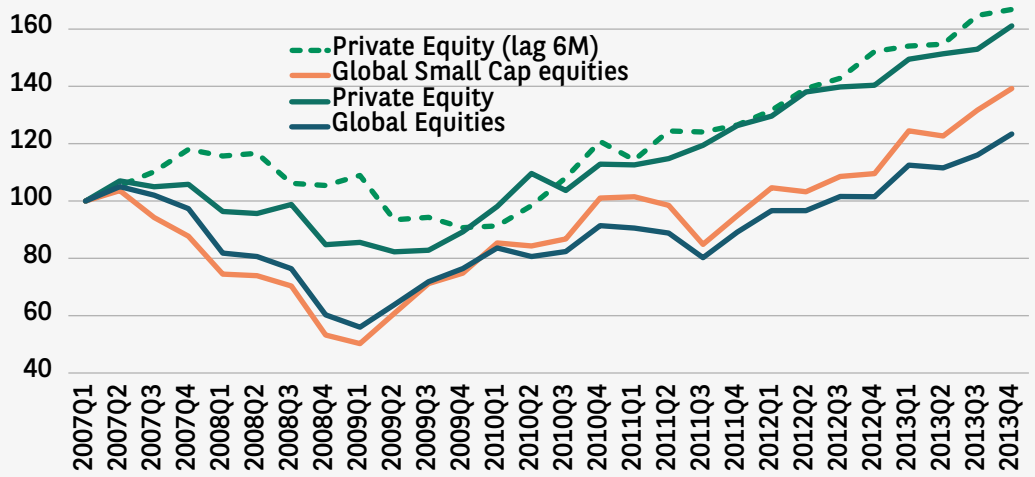
each data point to be made available. For public equities, we used the MSCI World and MSCI World Small Cap indices and for public debt we used the Credit Suisse Liquid Leveraged Loans, the Bloomberg Global Aggregate Corporate Value Unhedged and the Bloomberg Global High Yield Total Return Index Value Unhedged indices.

Exhibits 10, 11 and 12 show that adding private equity to a portfolio of public equities would have helped its performance in each of these crises. The lagged performance of private equity combined with the impact of performance smoothing in each of the crises helps to diversify underperforming public equities during each correction, in particular during the Tech Bubble and the Global Financial Crisis. For the Covid pandemic, the drawdown in public equities was so short that private equity hardly had the time to produce a drawdown, probably due to the valuation lag.

Exhibits 13, 14 and 15 show that adding private debt to portfolios of public debt would have helped their performance during the corrections and in particular when compared to leveraged loans. The benefit during corrections is less clear when compared to global aggregate corporate bonds. Exhibit 15 shows that the drawdown in private debt came later because of the valuation lag and is smaller quite likely because of the recovery in public debt prices.

In summary, adding private assets to portfolios invested in public assets has an impact due to the publication lag and the comparative stability of private asset valuations, which help to smooth performance, at least as long as the latest valuation available for private assets is used to estimate the net asset value of the overall portfolio.

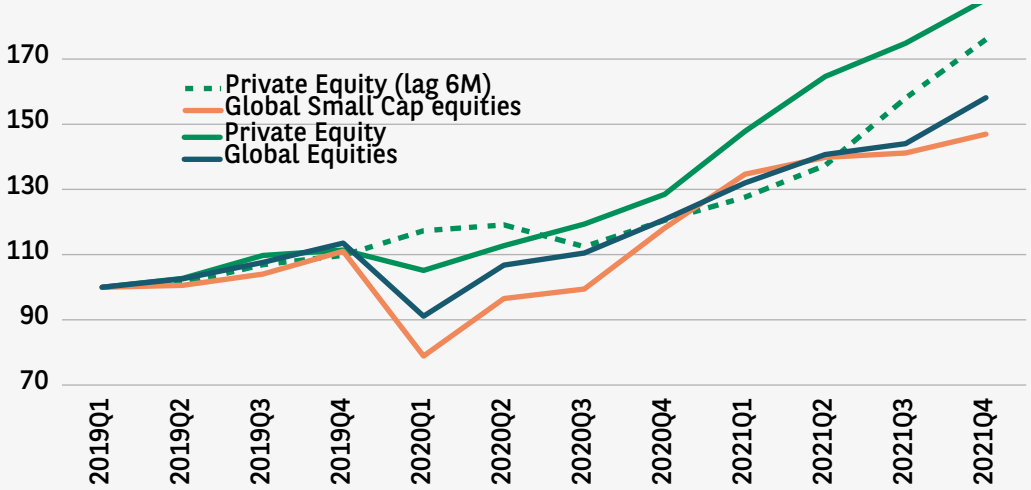
Exhibit 11: Global Financial Crisis
Performance of private equities lagged six months compared to performance of private equity non-lagged, global equities and global small cap equities during the Global Financial Crisis based on quarterly net returns in EUR.



Data as at 31 October 2022. Sources: Preqin and MSCI. Rebased to 100 on Q1 2007.

Exhibit 12: Covid Pandemic

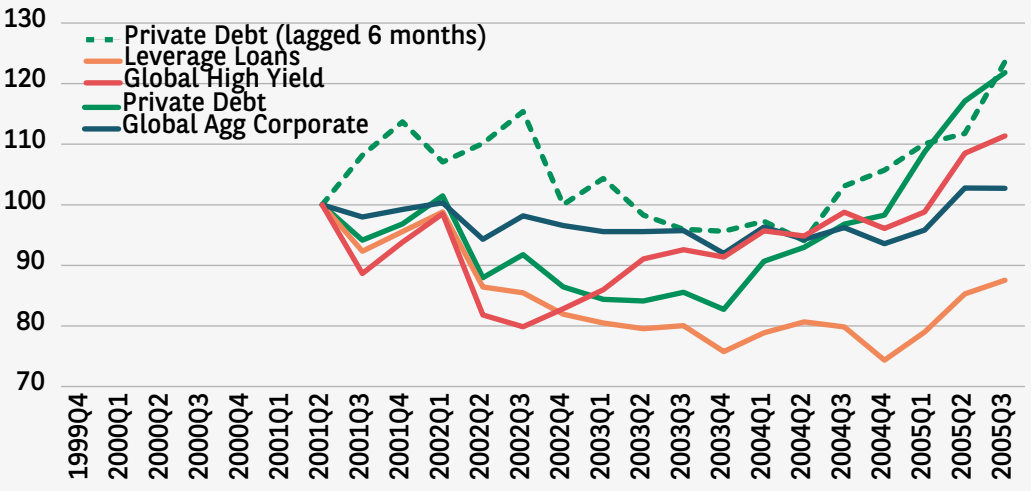
Performance of private equities lagged six months compared to the performance of private equity non-lagged, global equities and global small cap equities during the Covid pandemic based on quarterly net returns in EUR.



Data as at 31 October 2022. Sources: Preqin and MSCI. Rebased to 100 on Q1 2019.

Exhibit 13: Tech Bubble

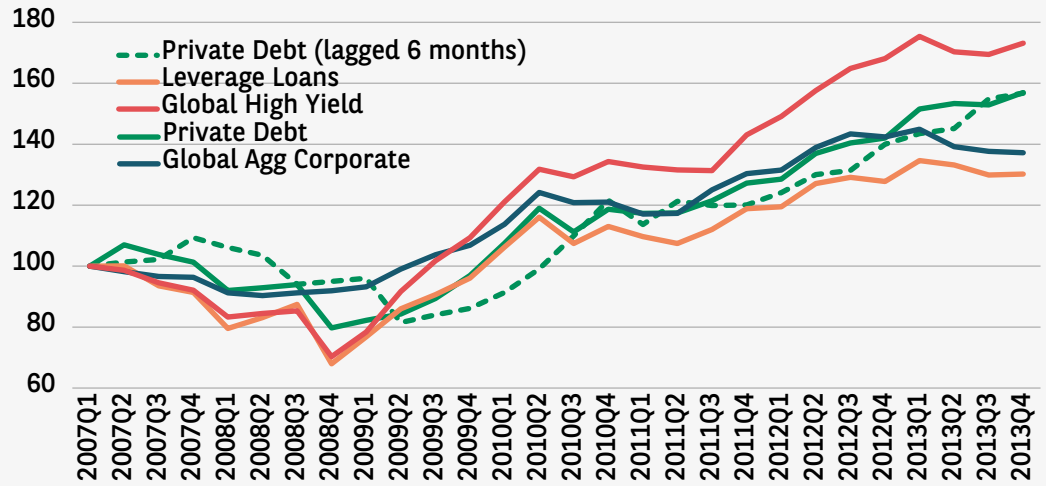
Performance of private debt lagged six months compared to performance of private debt non-lagged, leverage loans, global aggregate corporate bonds and global high-yield bonds during the Tech Bubble based on quarterly net returns in EUR.



Data as at 31 October 2022. Sources: Preqin, Bloomberg and Credit Suisse. Rebased to 100 on Q4 2000.

Exhibit 14: Global Financial Crisis

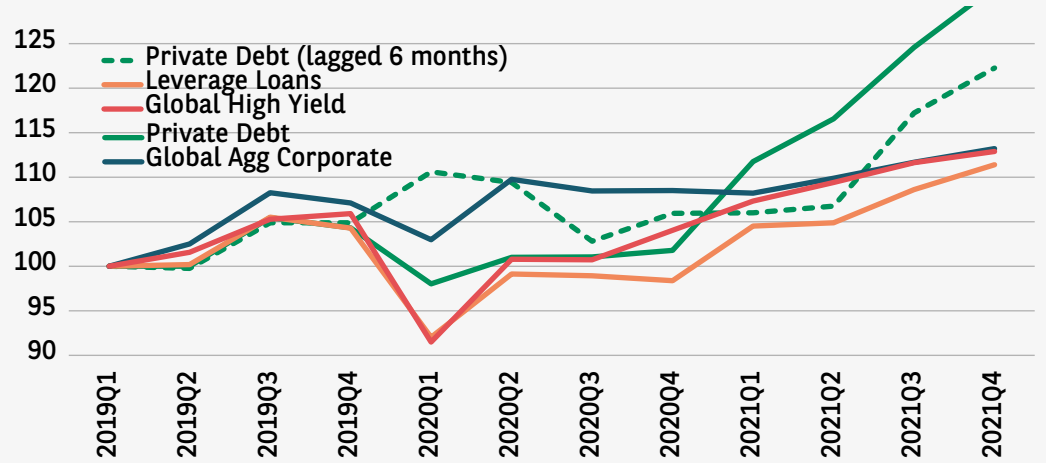
Performance of private debt lagged six months compared to performance of private debt non-lagged, leverage loans, global aggregate corporate bonds and global high-yield bonds during the Global Financial Crisis based on quarterly net returns in EUR.



Data as at 31 October 2022. Sources: Preqin, Bloomberg and Credit Suisse. Rebased to 100 on Q1 2007.

Exhibit 15: Covid Pandemic

Performance of private debt lagged six months compared to performance of private debt non-lagged, leverage loans, global aggregate corporate bonds and global high-yield bonds during the Covid pandemic based on quarterly net returns in EUR.



Data as at 31 October 2022. Sources: Preqin, Bloomberg and Credit Suisse. Rebased to 100 on Q1 2019.

4.2. ILLUSTRATION OF THE DYNAMIC RECOMMITMENT STRATEGY

The first challenge cited above can be addressed with a dynamic recommitment strategy aimed at keeping the allocation to private assets at the desired strategic asset allocation level. Such strategies, first proposed by de Zwart et al. (2012), use multi-period portfolio simulations to calculate the commitments to new private asset funds which are required on a regular basis (e.g., annually), so that the capital put to work at a given point in time remains at the level targeted in the strategic asset allocation. The capital put to work is the sum of the capital already called by private asset funds and not yet distributed.

The objective here is to illustrate how the recommitment strategy works for an open-ended fund invested in public equities, public bonds and multiple vintages of private equity and private debt funds. In our example, each year, the strategy allocates to a new vintage of private equity and private debt funds. In this way, the fund is permanently invested in several vintages of both private equity and private debt. The question is how much the fund should commit to new vintages each year, so that the allocation to capital put to work in all the private equity and private debt funds is at the targeted strategic allocation to private equity and private debt, respectively. This can be found by simulating the future performance of the open-ended fund using the expected IRRs of the private equity and private debt funds, their expected calls and distributions and the expected returns of the public asset classes.

Exhibit 16: Long-term returns and portfolio allocation used in the examples. The allocation to liquid assets was chosen, so that it is sufficiently large to act as a buffer to manage future calls and distributions from private assets and to manage redemptions

Management fees: 1.20%	Excess Return over cash	Allocation Strategic
MSCI World index	6.1%	32.5%
Private Equity (PE)	11.5%	7.5%
Bloomberg Global Aggregate unhedged	1.3%	35.0%
Private Debt (PD)	5.3%	25.0%
Total portfolio gross of management fees	4.6%	100.0%
Total portfolio net of management fees	3.4%	
Total illiquid assets		32.5%
Total liquid assets		67.5%
Equities		40.0%
Fixed income		60.0%

Data as at 31 October 2023. Source: BNP Paribas Asset Management.

We consider a portfolio invested in 40% equities and 60% bonds as shown in exhibit 16. We target a constant allocation throughout time of 7.5% to the capital at work in private equity funds and 32.5% to public equities. For bonds, we target a constant allocation of 25% to the capital at work in private debt funds and 35% to global fixed income including government bonds, corporate bonds and other publicly traded fixed income. These weights were chosen, so that we can rely on the same example for all illustrations while keeping it as simple as possible.

For simplicity, we also assume that all private equity funds have the same profile of calls and distributions throughout time, and thus the same IRR, exactly as in exhibit 4. For private debt, we assume that all funds have the same IRR, albeit smaller than for private equity, with the same profile of calls and distributions as in exhibit 7. All other assumptions can be found in exhibit 16. The long-term returns for private equity and for private debt are the same as those in exhibit 5, and for World equities and Global Aggregate are based on BNP Paribas Asset Management's long-term forecasts for these asset classes.

Based on the assumptions of IRR and long-term expected returns in exhibit 16 and with cash returns at 0.5%, we can calculate that an annual commitment of 1.90% should be made every year to the newest vintage of private equity. Intuitively, and in good approximation, the annual commitment to private equity should be chosen so that the blue bars in exhibit 4 add to the targeted allocation of 7.5% to private equity:

$$\begin{aligned}&\text{Target allocation to PE capital at work}\\&\approx \sum_{n=2011}^{2022} (\text{Annual commitment to PE} \cdot \text{share of commitment at work of vintage}_n \text{ after } 2022 - n + 1 \text{ years}) \end{aligned} \quad (7)$$

where $\text{share of commitment at work of vintage}_n \text{ after } 2022 - n + 1 \text{ years}$ takes into account calls and distributions through time.

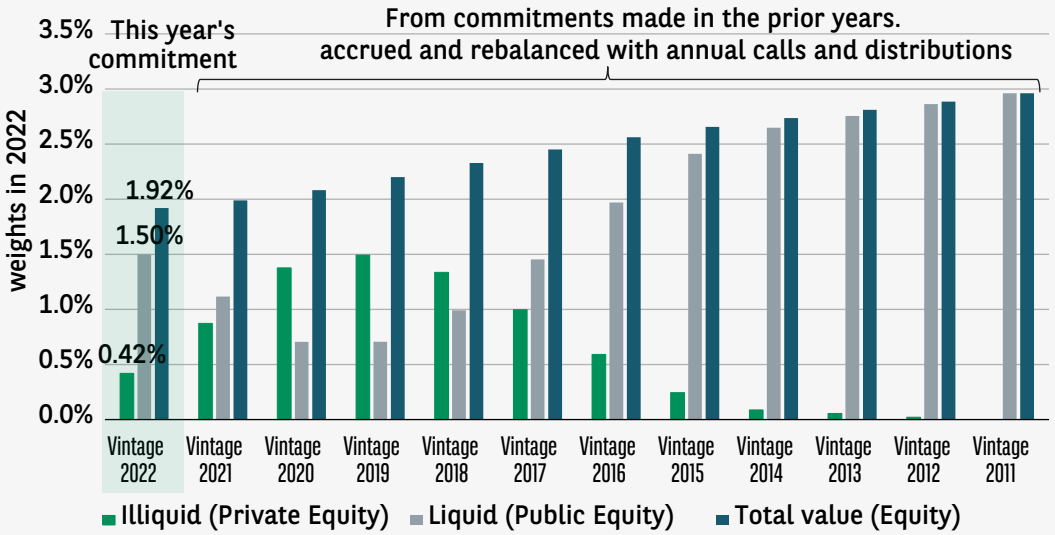
Of this capital, 0.42% will be used to meet the first call of this new vintage and put to work immediately. However, instead of keeping the other 1.50% of the commitment in cash while waiting for future calls, this will be invested in public equities and accounted for in the allocation of the portfolio to public equities, avoiding dilution of returns. This allocation to public equities can used as a buffer to manage future calls and distributions of this new vintage. We can consider this commitment of 1.90% per year as a sub-portfolio created each year, in which public equities will be sold in future to meet the new calls over time and public equities will be bought with the proceeds from future distributions. The equity position in this sub-portfolio will accrue at the expected return of public equities. The capital put to work in the sub-portfolio will change over time, accruing at the IRR, and increasing or decreasing every year as a function of calls and distributions. This sub-portfolio will exist during

the entire life of the private equity fund which we assumed to be 12 years. When closed, the proceeds will help fund the new annual commitment for the newest vintage in the year when it ceases to exist.

The size of the required annual commitments can be calculated from a simulation of the portfolio over time with the assumptions referred to above. The result is 1.90%, split between the allocation required to meet the first call of the newest vintage of private equity, 0.42%, and an allocation to a buffer invested in public equities which should be big enough to meet future calls, i.e., 1.50%. This commitment to the new vintage is calculated on the assumption that the capital put to work in private equity funds remains constant at 7.5% over time. The simulation takes into account a) that a new commitment to the newest vintage is repeated each year; b) how the different assets in the portfolio accrue over time; c) how the investments in each of the sub-portfolios committed to a given vintage accrue over time; and d) how the allocation to capital at work changes over time in each sub-portfolio based on the expected calls and distributions. At any point in time, there are 12 sub-portfolios, one for each new vintage used in the last 12 years.

Exhibit 17: Allocation to sub-portfolios of Private Equity vintages and corresponding Public Equity to manage cash

Current allocation to public equities and to the capital at work of each vintage of private equity in each respective sub-portfolio. The strategy commits 1.90% to the newest vintage of private equity every year, with 0.42% of this capital immediately called and put to work and 1.50% allocated to public equities to manage future calls and distributions from this fund. The IRRs and expected returns of public asset classes are assumed constant over time. It is assumed that all private equity funds have the same IRRs, the same calls and distributions over time and the same lifecycle of 12 years. The sum of the allocation to capital at work (illiquid) in all private equity funds totals 7.5%. The sum of the allocations to public equities (liquid) totals 22.1%. We assume the lifecycle of a private equity fund to be 12 years.

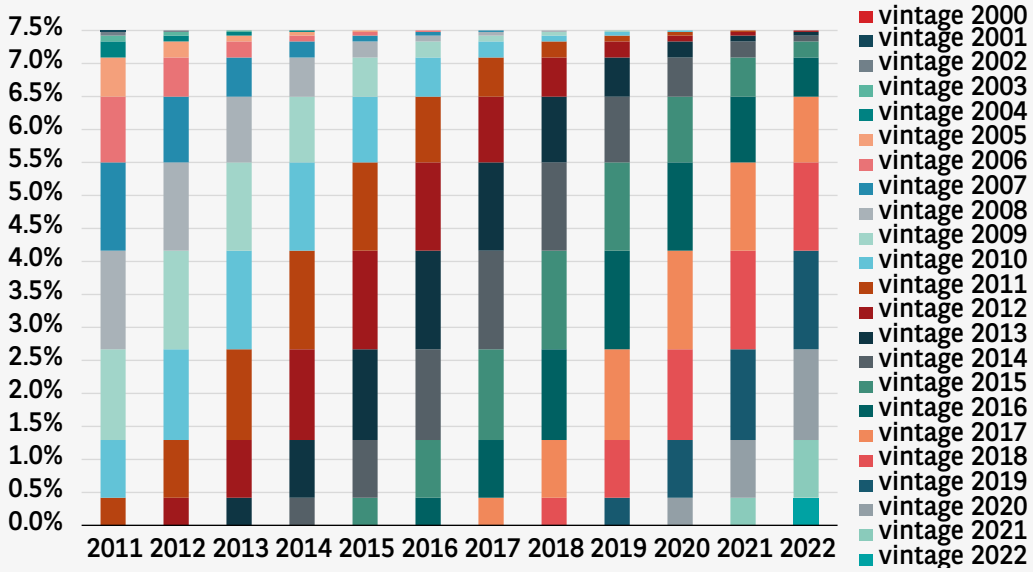


In exhibit 17, we show what the portfolio would look like today. The first bars labelled Vintage 2022 are the new commitment. The bars immediately to the right, labelled Vintage 2021, show what the allocation made last year to the 2021 vintage looks like today after calling more capital, selling public equities to satisfy this capital call and accruing both the investment in public equities and the capital at work in private equity. Because all vintages have exactly the same IRR, calls and distributions, this corresponds to what the new allocation to Vintage 2022 will look like in one year from now.

Similarly, the other bars to the right represent what the sub-portfolios allocating to older vintages look like today after accruing public equities and capital at work in the private equity funds and trading public equities as required to meet calls or invest distributions. These bars to the right represent what the new commitment to vintage 2022 is expected to look like over the next 11 years.

If we add all the allocations to the capital at work from the different vintages (illiquid) in exhibit 17, we arrive at precisely 7.5%. In exhibit 18, the bar on the right labelled 2022 shows the allocation to the capital at work of each of the 12 vintages currently in the portfolio. Because we assume that IRRs and expected returns are constant over time and that call and distribution profiles are identical for all funds, it is relatively easy to simulate how the strategy would have invested in the past. In exhibit 18, we show how the allocation to the capital at work of each vintage would have changed over time up to today if we had followed the strategy and committed 1.90% each year

Exhibit 18: Allocation to private equity vintages targeting a total of 7.5%
Allocation to the capital at work of every vintage of private equity in the portfolio changing over time, assuming the same IRR, calls and distributions for all vintages and constant expected returns for all other assets in the fund.

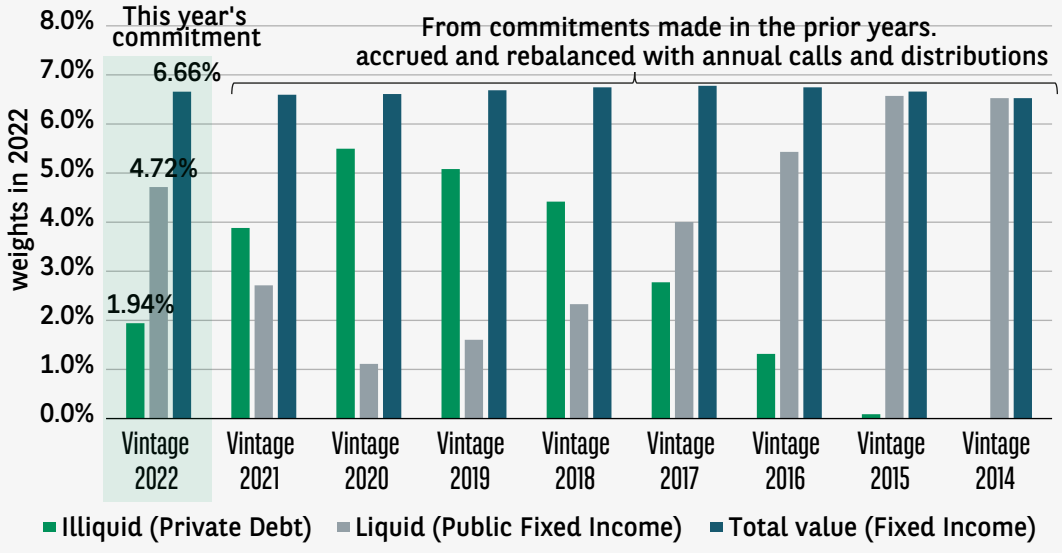


to a new vintage, with a split of 0.42% to the first call by the private equity fund to put capital at work and 1.50% to public equities.

The sum of the allocation to public equities in exhibit 17 is 22.1% (liquid). This is the expected total allocation to public equities resulting from the 1.50% annual investment in public equities, along with the 1.90% commitment. In fact, all this can be pooled together and is counted as part of the allocation to public equities. In our example, there is a total of 32.5% allocated to public equities.

In exhibit 19, we show how the same strategy behaves when applied to private debt. This is equivalent to exhibit 17 for private equity. Based on similar simulations, we find an annual commitment of 6.65% to the newest vintage, with 1.94% of this capital immediately called and put to work by the most recent private debt fund vintage and the other 4.71% allocated to our public fixed-income portfolio. In this case, there

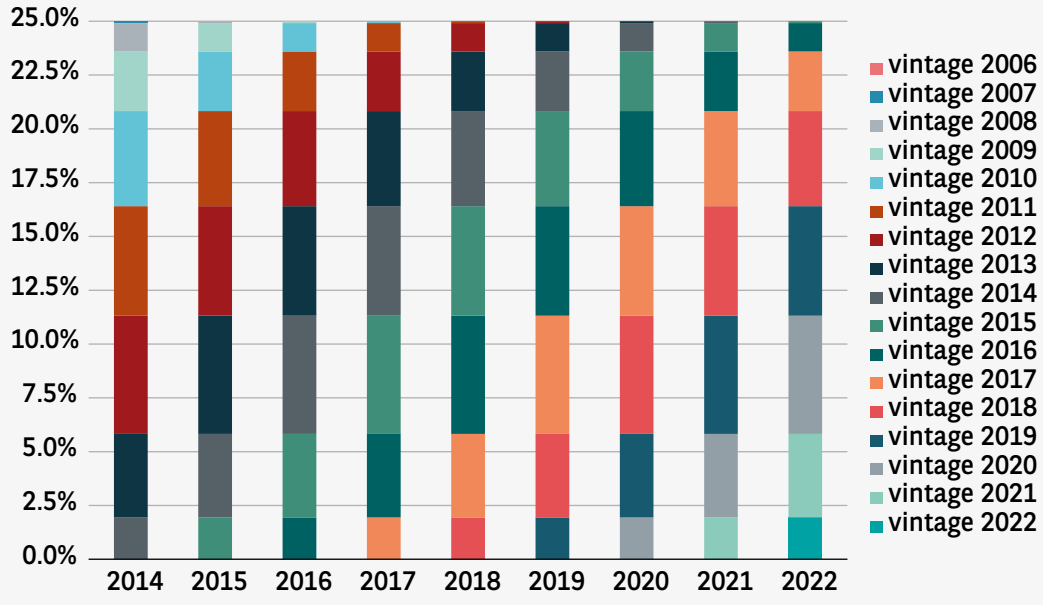
Exhibit 19: Allocation to sub-portfolios of Private Debt vintages and corresponding Public Debt to manage cash flows
Current allocation to public debt and to the capital at work of each vintage of private debt in each respective sub-portfolio. The strategy commits 6.65% to the newest vintage of private debt every year, with 1.92% of this capital immediately called and put to work and 4.71% allocated to public fixed income to manage future calls and distributions from this fund. The IRRs and expected returns of public asset classes are assumed to be constant over time. It is assumed that all private debt funds have the same IRRs, calls and distributions over time, and the same lifecycle of 12 years. The sum of the allocation to capital at work (illiquid) in all private debt funds totals 25%. The sum of the allocations to public fixed income (liquid) totals 35%. We assume the lifecycle of a private debt fund to be nine years.



will be nine sub-portfolios because each private debt fund has a lifecycle of only nine years, as in exhibit 6. Each year, the portfolio will be invested in the capital at work of the most recent nine vintages. Exhibit 20 is the equivalent of exhibit 18 while using private debt. Here we show how the allocation to the capital at work of the different vintages of private debt would have evolved over time.

This strategy, albeit simple, does capture the IRR of private asset funds as a contribution to the return of the overall portfolio and uses public equities and fixed income to efficiently manage the calls and distributions. The strategy would be more complex in a real portfolio as it would have to adapt dynamically to the fact that neither all private equity funds nor all private debt funds have exactly the same profile of calls and distributions, nor the same realised IRRs. The realised returns of the different asset classes are also likely to differ from their expected returns. Nevertheless, the same principles can be applied to the design and management of the strategy in a real portfolio. The optimal annual commitment to the newest private equity and private debt vintages will likely change over time because they need to take into account the actual allocation in the portfolio resulting from realised conditions, while also taking into account more realistic expectations of expected returns, IRR and calls and distributions of individual funds, when available.

Exhibit 20: Allocation to private debt vintages targeting a total of 25%
Allocation to the capital at work of every vintage of private debt in the portfolio changing over time assuming the same IRR, calls and distributions for all vintages and constant expected returns for all other assets in the fund.



4.3. IMPORTANCE OF DYNAMIC RECOMMITMENT STRATEGY TO TARGET DESIRED ALLOCATION

The importance of a strategy to manage the commitments dynamically can be demonstrated in particular in the case of a strong dislocation of the portfolio away from the strategic allocation to private assets. One example of a large dislocation is at the inception of the fund. It is clear that when the open-ended fund is created, the allocation to private assets needs to be built from scratch, making sure that this will converge towards the strategic allocation as soon as possible. The question is how this allocation should be built. By investing the annual commitments calculated in section 4.2., the portfolio will eventually reach the strategic allocation. However, until that point, the portfolio will remain underweight for many years because of the small amounts invested each year. Allocating a large amount to private assets at inception accelerates the convergence towards the strategic allocation to capital at work from private assets, but runs the risk of overshooting in the following years. Moreover, if larger amounts are invested at inception, what impact would this have on future commitments? What would be the optimal amount of annual commitments from inception that would accelerate the convergence of the allocation to private assets towards the strategic targets, while minimising the risk of significantly overshooting?

Let us call *ramp-up regime* the period used to build a diversified allocation to private asset funds from inception and *permanent regime* the period thereafter. The strategy discussed in section 4.2. assumes that the portfolio is in a permanent regime and that the annual commitments were estimated so as to keep the portfolio allocation to private assets at the strategic targets.

Below, we discuss the application of two strategies to the ramp-up period of the open-ended fund. The first of these strategies ignores the fact that the portfolio is significantly underweight private assets funds at inception and invests as if the portfolio was in the permanent regime, with the same commitments each year and in line with what was described in section 4.2. The second strategy, a dynamic recommitment strategy, optimises the annual commitments over the entire lifecycle of the private assets (12 years for private equities and nine years for private debt), so as to accelerate the convergence of the allocation to capital at work towards the strategic asset allocation to private assets, while constraining the maximum overshoot of the allocation. The optimisation algorithm finds the (Allocation to PE capital at work (%))_n that solves:

$$\text{Optimal profile of future annual commitments 2022 to 2033} = \text{Argmin}\left[\sum_{n=2022}^{2033}\left(\left(\text{Allocation to PE capital at work (\%)}\right)_n - \text{Target allocation to PE capital at work (\%)}\right)^2\right] \quad (8)$$

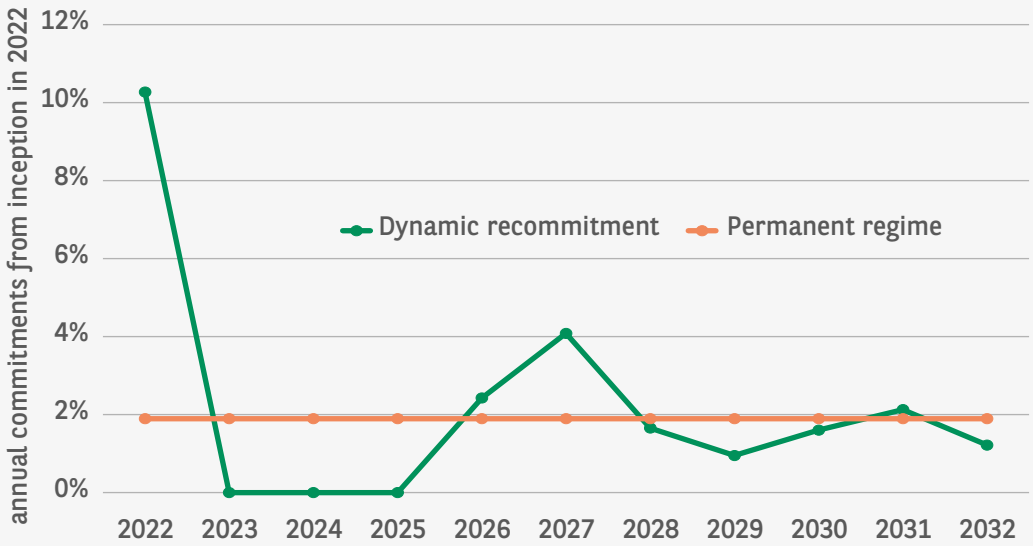
with constraints, for example, that the allocation to capital at work in private equity and private debt is capped. The result of the optimisation is the profile of future annual commitments that minimises the time to reach the strategic allocation to capital at work while not overshooting by more than is allowed.

The results of the simulations of the behaviour of these two strategies are shown in exhibits 14 through 17. The assumptions are the same as those in the examples in section 4.2. Additionally, the allocation to capital at work was constrained in the optimisation so as not to exceed 8.25% for private equity and 27.5% for private debt.

In exhibit 21, we show the annual commitments to new vintages of private equity funds determined by each strategy. In exhibit 22, we show the capital at work invested in private equity funds in the ramp-up period for both strategies.

Exhibit 21: Annual commitments to private equity since inception of the open-ended fund

Annual commitments to private equity in an open-ended fund from inception using two strategies, one with the same commitments each year and another with the profile of dynamic commitments calculated from optimisation for the entire lifecycle of private equity funds, i.e. 12 years. Allocation to capital at work of private equity at any point in time is capped at 8.25%.



For a target of 7.5% strategic allocation to private equity, the dynamic recommitment strategy commits 10.3% to the first vintage of private equity at inception, of which 2.3% will be called in the first year, as seen in exhibit 22. The fund will not commit in the following three years. After that, it starts committing again, with the amounts committed each year converging towards those expected during the permanent regime. The dynamic recommitment strategy will build an allocation to private equity capital at work much faster than the strategy that ignores the underweight of private equity and commits the same amount each year. The allocation to private equity capital at work overshoots before converging to 7.5%, reaching a peak in 2026 without exceeding the constraint of 8.25%.

In exhibit 23, we show there are similar results for private debt. For a target of 25% strategic allocation to private debt capital at work, the dynamic recommitment strategy will commit 34.3% to the first vintage and then stop committing for three years before starting again. 9.6% of this commitment is called in the first year, as shown in exhibit 24. The dynamic recommitment strategy converges much faster towards the strategic targeted allocation than the strategy that ignores the underweight to private debt despite the fact that it overshoots in 2025 at the constraint of 27.5%.

Exhibit 22: Allocation to capital at work in the private equity funds
Allocation to capital at work in private equity in an open-ended fund from inception using two strategies, one with the same commitments each year and another with the profile of dynamic commitments calculated from optimisation for the entire lifecycle of private equity funds, i.e. 12 years. Allocation to capital at work of private equity at any point in time is capped at 8.25%.

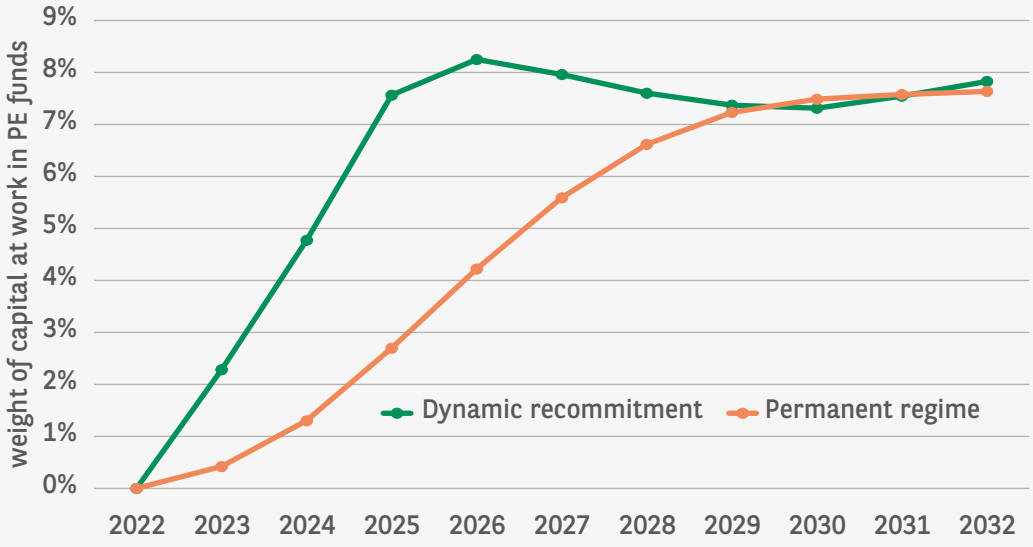


Exhibit 23: Annual commitments to private debt since inception of the open-ended fund
Annual commitments to private debt in an open-ended fund from inception using two strategies, one with the same commitments each year and another with the profile of dynamic commitments calculated from optimisation for the entire lifecycle of private equity funds, i.e. nine years. Allocation to capital at work of private debt at any point in time capped at 27.5%.

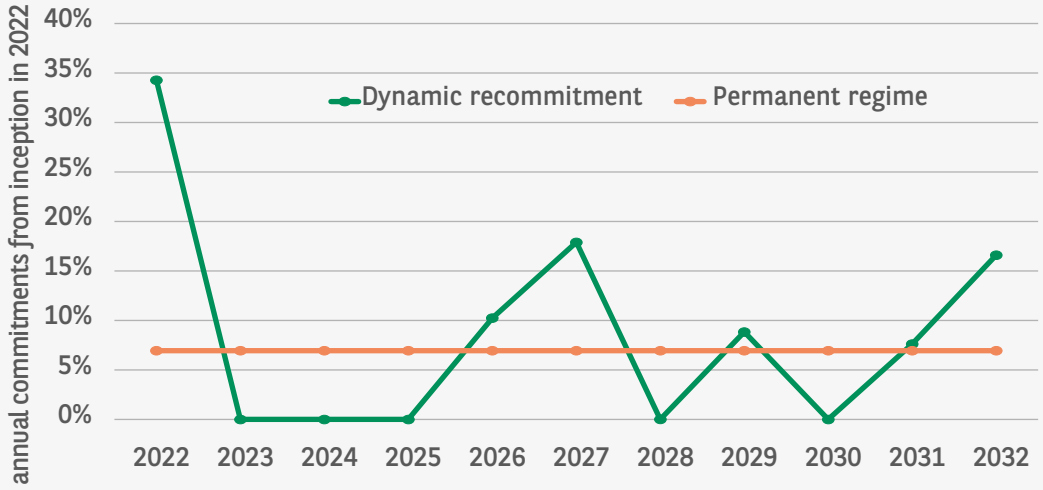
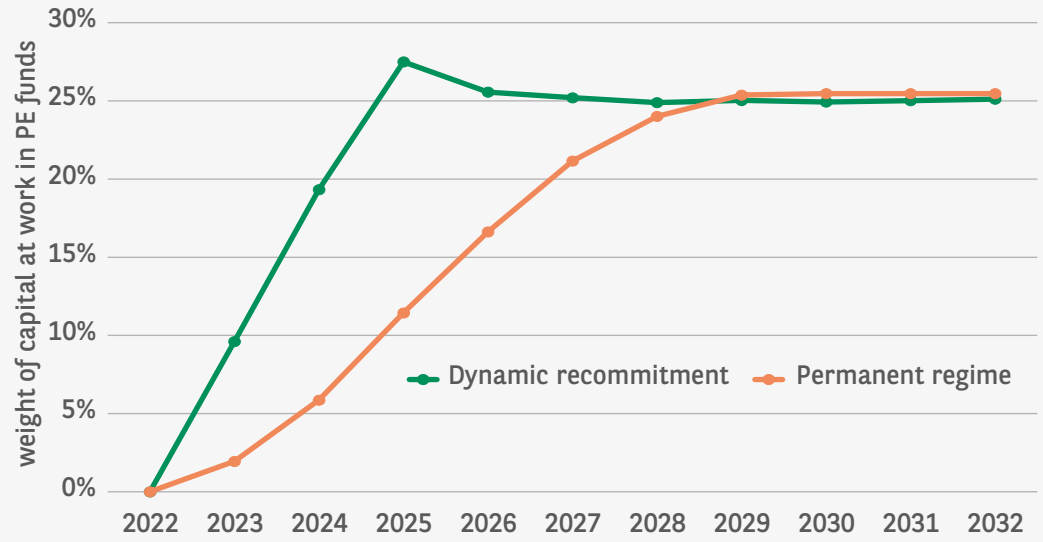


Exhibit 24: Allocation to capital at work in the private equity funds
Allocation to capital at work in private debt in an open-ended fund from inception using two strategies, one with the same commitments every year and another with the profile of dynamic commitments calculated from optimisation for the entire lifecycle of private equity funds, i.e. nine years. Allocation to capital at work of private debt at any point in time capped at 27.5%.



4.4. IMPACT OF EQUITY MARKET CRASH

We now look into the second challenge, that of managing the allocation to private assets while capital is locked up for a number of years, in particular in making sure the allocation to the capital at work in private assets can be rebalanced back to the strategic allocation portfolio weights in the event of a market shock that may lead to a strong dislocation.

If the allocation to private assets increases because of the underperformance of other asset classes in the fund, the cheapest way to bring the allocation of private assets back to target weights is by reducing the size of annual commitments to new vintages, reducing them to zero, if necessary.

Here, we simulate the impact of a significant market dislocation on the portfolio allocation. We use the same example portfolio that was introduced in section 4.2. In exhibit 25, we show how a market shock such as that experienced during the Global Financial Crisis of 2008 would impact the allocation. We calculate the impact on the portfolio allocation by considering that the portfolio was at the strategic asset allocation weights by the end of Q4 2007 and that no rebalancing takes place for the next five quarters until the equity market bottoms out at the end of Q3 2009. We use the (rounded) returns over this five-quarter period for the MSCI World index for public equities, for the Bloomberg Global Aggregate unhedged index for public fixed income and for the Preqin benchmarks indices of private equity and private debt funds.

Exhibit 25: Impact on the performance of the different assets in their allocation in a portfolio
The period of the Global Financial Crisis of 2008 is used.

Stress Test on asset allocation: Global Financial Crisis 2008 (GFC-08)			
Management fees: 1.20%	**Excess Return over cash**	**Allocation**	
	GFC-08*	**Strategic**	**end of Q1-09****
MSCI World index	-50%	32.5%	21.5%
Private Equity (PE)	-25%	7.5%	7.4%
Bloomberg Global Aggregate unhedged	0%	35.0%	46.3%
Private Debt (PD)	-25%	25.0%	24.8%
Total portfolio gross of management fees	-24%	100.0%	100.0%
Total portfolio net of management fees	-26%		
Total illiquid assets		32.5%	32.2%
Total liquid assets		67.5%	67.8%
Equities		40.0%	28.9%
Fixed income		60.0%	71.1%

* rounded net returns for the period Q4-07 through Q1-09 (five quarters)
** assuming no portfolio rebalancing and that the portfolio was at the strategic asset allocation in Q4-07
Data as at 31 October 2023. Source: BNP Paribas Asset Management

The results in exhibit 25 show that the allocation to private assets changed only slightly in this five-quarter period. The effect of the poor performance of public equities was compensated for by the outperformance of public fixed income, which includes government bonds. As a result, there was an increase in the weight of public fixed income. Public equities, which underperformed significantly, had the biggest drop in weight. Such changes in allocation of public equities and public fixed income could have been rebalanced to the strategic asset allocation weights if desired. This could be done easily by selling listed fixed income to buy listed equities, rebalancing the total allocation of equities back to 40% and of fixed income back to 60%.

It is reassuring that in this example of an extreme market shock, there was no need to change the strategy of annual commitments to private assets because their allocations stayed close to the strategic weights.

4.5. IMPACT OF FUND REDEMPTIONS

The third challenge can be addressed by using public equities and public bonds to manage the immediate liquidity needs of the open-ended fund. This means that when a subscription or a redemption is made, public equities or public bonds will be bought or sold until there is the opportunity to bring the allocation to private assets funds back to strategic target by changing the commitments to new private asset funds. The amount of public equities and bonds in the open-ended fund needs to be sized not only to take into account strategic asset allocation targets, but also the need to use them both to manage the fund's liquidity. There must be sufficient amounts of each to handle the immediate impact of large redemptions. This acts as a constraint on the maximum allocation to private assets and on the minimum allocation to public equities and bonds in the open-ended fund.

In this section, we consider the impact of large redemptions from the open-ended fund with private assets. If a portfolio manager sells only public assets to meet the redemption, the allocation to private assets will increase. The easiest way to bring down the allocation to private assets is by reducing or outright suspending the commitments to new vintages of private assets for as long as necessary. In this case, we can simulate the strategy by taking the impact of the redemption on the allocation to all assets in the fund while suspending future commitments to new vintages for as long as necessary.

In the examples, we consider the same portfolio as in sections 4.2. and 4.3. and redemptions of 30% and 50% throughout one year. We show the results from the simulations in exhibits 26 and 27, using the assumption that the portfolio manager took action in the middle of the year, suspending all new commitments to private asset funds.

By selling public equities and public fixed income to meet a redemption of 30%, the allocation to capital at work in private equities will increase from 7.5% to 10.4% and the allocation to private debt from 25.0% to 34.3%. This overshoot in the allocation to capital at work in private asset funds relative to their strategic target will trigger a suspension of all commitments to new vintages of private equity and private debt funds to zero from the middle of year 0. As shown in exhibit 26, the allocation to capital at work in private equity remains higher than the strategic target of 7.5%, despite only half the expected allocation in year 1 and even without any new commitments in year 2 and year 3. Only by the end of year 3 is the allocation in the portfolio expected to fall back to the strategic target, signalling that recommitments can start again in year 4.

In exhibit 27, we can see that an outflow of 50% would have pushed the allocation to private equity even higher by the end of year 0 to 14.7%, almost twice the targeted

Exhibit 26: Simulation of the impact of a 30% redemption from the open-ended fund on the allocation to private assets
Assuming the portfolio manager would have sold only public equities and public fixed income and also assuming the suspension of all new commitments to private assets by the middle of year 0. Assumptions of returns, IRR and call and distribution profiles as in the example used in sections 4.2. and 4.3.

		Private Equity Target allocation = 7.5%				Private Debt Target allocation = 25.0%			
Year	Redemption from fund	Dynamic recommitent		Constant recommitment		Dynamic recommitent		Constant recommitment	
		New commitment	Allocation	New commitment	Allocation	New commitment	Allocation	New commitment	Allocation
0	0%	1.9%	7.5%	1.9%	7.5%	6.8%	25.0%	6.8%	25.0%
1	-30%	0.9%	10.4%	1.9%	10.7%	3.4%	34.3%	6.8%	35.8%
2	0%	0%	9.4%	1.9%	10.4%	0%	30.1%	6.8%	35.0%
3	0%	0%	7.7%	1.9%	10.1%	0%	23.3%	6.8%	33.3%

level. The allocation to capital at work in private equity requires an additional year of suspension of commitments for it to fall back to target. In turn, the allocation to private debt capital at work falls back to the strategic target of 25.0% sometime in the second half of year 2. The recommitments to private debt can restart before the end of year 2.

In exhibits 26 and 27, we show what the allocation to capital at work in private equity and private debt would have been if commitments to new vintages of funds had not been suspended. The allocation would have remained significantly higher than the strategic targets for a long time.

In exhibit 28, we show how the allocation to capital at work in private equity funds changes over time following the outflows of 30% and 50%, both in the case where commitments to new vintages were suspended, and in the case where commitments are kept. In exhibit 29, we show the same for private debt. It is clear that such large outflows have a significant impact on the allocation to private assets when only public assets are sold to meet the redemptions. It is also clear that it takes time for the allocation to eventually fall back to target even if all new commitments to private asset funds are suspended.

Exhibit 27: Simulation of the impact of a 50% redemption from the open-ended fund on the allocation to private assets

Assuming the portfolio manager would have sold only public equities and public fixed income and also assuming the suspension of all new commitments to private assets by the middle of year 0. Assumptions of returns, IRR and call and distribution profiles as in the example used in sections 4.2. and 4.3.

		Private Equity Target allocation = 7.5%				Private Debt Target allocation = 25.0%			
Year	Redemption from fund	Dynamic recommitent		Constant recommitment		Dynamic recommitent		Constant recommitment	
		New commitment	Allocation	New commitment	Allocation	New commitment	Allocation	New commitment	Allocation
0	0%	1.9%	7.5%	1.9%	7.5%	6.8%	25.0%	6.8%	25.0%
1	-50%	0.9%	14.7%	1.9%	15.1%	3.4%	48.6%	6.8%	50.5%
2	0%	0%	12.7%	1.9%	14.0%	0%	41.8%	6.8%	47.6%
3	0%	0%	10.6%	1.9%	13.3%	0%	33.1%	6.8%	44.2%
4	0%	0%	7.7%	1.9%	11.9%	0%	22.6%	6.8%	38.8%

Exhibit 28: Private equity allocation (% of NAV)

Annual commitments to private debt in an open-ended fund from inception using two strategies, one with the same commitments each year and another with the profile of dynamic commitments calculated from optimisation for the entire lifecycle of private equity funds, i.e. nine years. Allocation to capital at work of private debt at any point in time capped at 27.5%.

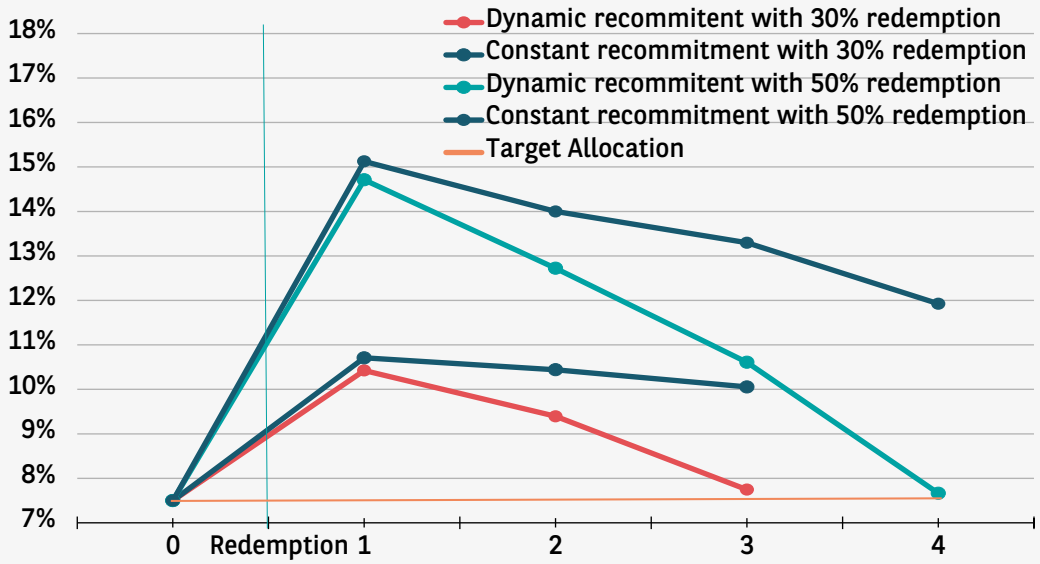
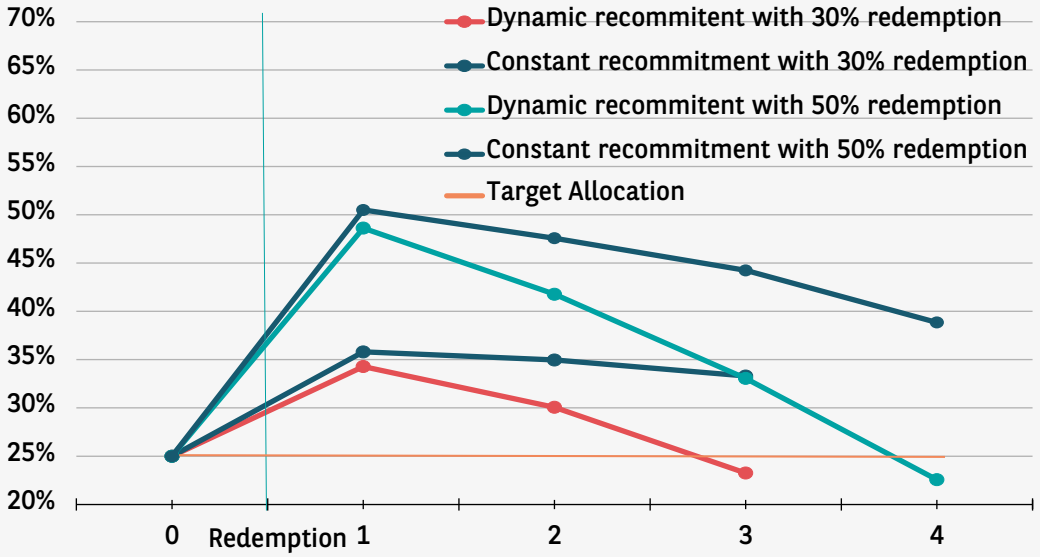


Exhibit 29: Private debt allocation (% of NAV)

Allocation to private debt capital at work through time following a redemption of either 30% or 50% and assuming, in one case, that commitments to new vintages were suspended by the middle of year 1 and, in the other case, that commitments to new vintages were not suspended. The results plotted can be found in exhibits 26 and 27.



There is of course a limit when it comes to using public assets to manage fund redemptions. In the example here, with the allocation as shown in exhibit 25, it is clear that a redemption of 50% is already quite large and would significantly reduce the amount of public assets in the fund. For example, a redemption of about 58% would lead to selling the entire allocation to public fixed-income assets. Larger redemptions of up to 67.5% could still use the small amount of public equities left in the fund, but the ratio of equities to bonds could no longer be kept at the targeted level. Beyond that, finding buyers for the private assets in the fund would be required, which is not desirable. Thus, it is clear a) that the allocation to public assets in an open-ended fund should be sufficiently large to accommodate large redemptions, and b) that open-ended funds should not invest entirely in private assets.

5. CONCLUSION

In this paper, we discuss and confirm the evidence of an illiquidity premium and lower risk at least in some types of private assets. We also propose a way to efficiently invest in private asset funds so as to realise returns on those investments that are in line with the typically reported IRRs for those funds. In particular, we propose a strategy to invest in private asset funds which is designed for open-ended funds. The strategy invests in multiple private asset funds while making sure that the sum of capital at work from all the private asset funds remains at the targeted allocation levels throughout the investment period. This is achieved by committing capital every year to new vintages of private asset funds and adequately managing all the capital calls and distributions from the private asset funds in the portfolio. The strategy uses allocations to public asset classes to efficiently manage the cash flows in the portfolio. The public asset classes are also used to manage the liquidity offered by the open-ended fund. We stress tested the impact of large market dislocations and the impact of large redemptions from the open-ended fund on the allocation to private assets in the portfolio. We show how the strategy should react so as to bring allocations back to target when required.

We believe investment in private assets should continue to grow, given their potential to enhance returns and reduce risk and the role they can play in sustainable investing. We trust that this paper offers value in showing how asset managers can construct portfolios for open-ended funds that include allocations to private assets, providing a way for smaller investors to be able to gain exposure to this attractive asset class.

6. ACKNOWLEDGEMENTS

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7. DATA PROVIDERS

There are three major providers of benchmarking data for private assets:

- Preqin collects performance data from a variety of sources including institutional investors, fund managers, financial reports, public filings and annual reports. In that sense, its data sources are well diversified. Preqin's benchmark indices are calculated using performance information from more than 10 000 private capital funds.

- Burgiss includes the complete transactional history of more than 12 400 private asset funds in their manager universe, sourced directly from institutional investors (LPs) data. Thus, the data it uses in its benchmarks is representative of the actual investor experience because it is sourced exclusively from limited partners of various sizes worldwide, rather than from voluntary manager submissions, web-scraping or direct requests. This avoids the natural biases introduced by sourcing data from general partners.

- Cambridge Associates provides aggregate fund-level performance data sourced directly from fund managers' quarterly financial statements and covers more than 9 000 funds of various sizes and from a range of sectors and regions.

8. GLOSSARY

In this section, we summarise a number of common terms associated with private equity and private debt.

Vintage year: The year in which a private equity or debt fund makes its first investment using the capital raised from investors.

Capital commitment: The capital that investors in private equity or private debt funds commit to invest over a specific period of time. In the case of private equity, this amount should exclude the GP contribution to the fund.

Capital calls/drawdown: The transferring of the capital committed by investors, including the management fees. Capital calls occur when the private equity firm or the private debt manager decides to put capital to work by making an investment and approaches the investors for part of their committed capital. 'Called up' measures the percentage of capital transferred relative to capital committed.

Called up (%) = 100 x total investors contribution / total investors commitment (1)

Capital distribution: The returns realised by the investor in the private equity or private debt fund. It is the income and capital realised from investments, less expenses and liabilities. This amount should exclude any carry/performance fees earned by the GPs of private equity firms or the portfolio managers of the fund. 'Distributed to Paid-in' measures the capital distributed relative to the capital invested.

Distributed to Paid-in (%) = 100 x total investors' distribution / total investors' contribution (2)

Fair value/market value: Also referred to as Ending Market Value, Net Asset Value or Residual Value, this is a valuation of the amount at which the assets in the fund could be bought or sold between willing parties. The amount should exclude any carry/performance fees earned by the GPs of private equity firms or the portfolio managers of the fund. 'Residual to Paid-in' measures the unrealised value of the fund relative to the capital invested.

Residual to Paid-in (%) = 100 x unrealized value of fund / total investors' contribution (3)

Multiple of Money (MoM) or Multiple of Invested Capital (MoIC) or Total Value to Paid-in (TVPI): This captures the return on invested capital, measuring by how much investors multiplied the invested capital. It is the sum of the residual value of the portfolio plus the distributed capital:

MoM = (distribution (%) + value (%)) / 100 (4)

While the terms MoM and MoIC tend to be used at company level, TVPI is more often used when it comes to the multiple relative to net capital invested.

J-Curve: This represents a tendency of private asset funds to post negative returns in the initial years and post increasing returns in later years when the investments mature. The negative returns in the first years result from the investment costs and management fees relating to an investment portfolio in which not enough of the committed capital has yet been put to work.

Internal rate of return (IRR): The performance metric of choice in the industry, it captures a fund's time-adjusted return, representing the discount rate that renders the net present value (NPV) of a series of investments at zero. The IRR reflects the performance of a private equity or private debt fund by taking into account the size and timing of its cash flows (capital calls and distributions) and its net asset value at the time of the calculation. The IRR can found by solving:

$$0 = \text{net present value} = \sum_{n=0}^{\text{Holding period}} \frac{\text{Cash Flow}_n}{(1+\text{IRR})^n} \tag{5}$$

Public Market Equivalent (PME): A performance metric which addresses the incompatibilities between the traditional calculation of public market returns and the calculation of the private asset funds' IRR or TVPI. The Long-Nickels PME (LN-PME), proposed by Long and Nickels (1996), does this by replacing the public market returns with an IRR-like metric that accounts for irregular and fluctuating cash flows. This is done by calculating the IRR of a fictitious strategy with the same timing of calls and distributions as for the private asset fund, while assuming that all cash flows had been invested into the public markets instead, thus creating equivalency with the IRR of the private asset funds it is benchmarking. Another approach, popular with academics, is that of Kaplan and Schoar (2005) (KS-PME) who proposed the calculation of the PME as a market-adjusted cash multiple much like the TVPI, but using a similar fictitious strategy of cash flow investments into public markets as for the private asset fund. The results of the calculation are straightforward: If the end value is greater than one, then the private market fund has outperformed the respective public market index; if it is less than one, it underperformed.

Direct Alpha: This is a measure of the precise rate of excess return between cash flows of private asset funds and the time series of returns of a reference benchmark. Unlike the IRR, which uses the discounted values of cash flows to obtain the annualised rate of excess return, direct alpha discounts the private capital fund cash flows by the public market index value. The direct alpha method is closely related to the KS-PME which seeks to measure the wealth multiple effect of investing in a private asset fund versus the reference benchmark. A KS-PME of greater than/less than one indicates that the private asset fund generated higher/lower returns relative to the reference benchmark. Direct alpha can be thought of as annualising the KS-PME and is zero whenever the KS-PME is equal to one. Direct alphas are often provided by data vendors specialising in private assets.

9. REFERENCES

Bönia, P. and S, Manigart. (2021) "Private Debt Fund Returns and General Partner Skill." *SSRN Working paper 3932484*

Brown, G. and S. Kaplan (2019) *"Have Private Equity Returns Really Declined?"* Institute for Private Capital Chicago Booth.

Cojoianu, T. F., A. G. F. Hoepner and Y. Lin. (2021) "Impact vs. ESG Investing in Private Markets." *Michael J. Brennan Irish Finance Working Paper Series Research Paper No. 21-12*

Delivorias, A. (2022) "Amending the European Long-Term Investment Funds (ELTIFs) Regulation." EPRS | European Parliamentary Research Service.

De Zwart, G., B. Frieser and D. van Dijk. (2012) "Private Equity Recommitment Strategies for Institutional Investors." *Financial Analysts Journal*, Vol. 68, No. 3, pp.: 81-99.

Firzli, M. N. J., N. Sherry and G. S. Khoo (2022), *"ESG and Private Market Assets: UK, EU, and Australian Investors Shifting the Trillions (2022 – 2026)"* Institutional Investment Research (IIR).

Harris, R., T. Jenkinson, S. Kaplan and R. Stucke. (2020) "Has Persistence Persisted in Private Equity? Evidence from Buyout and Venture Capital Funds." *Becker Friedman Institute for Economics at UChicago, Working Paper* No. 2020-167.

Indahl, R., and H. G. Jacobsen. (2019). "Private Equity 4.0: Using ESG to Create More Value with Less Risk." Journal of Applied Corporate Finance, Vol. 31, No. 2, pp.: 34-41.

Ilmanen, A., S. Chandra and N. McQuinn. (2020)."Demystifying Illiquid Assets: Expected Returns for Private Equity." *The Journal of Alternative Investments*, Vol. 22, No. 3, pp.: 8-22

Kaplan, S. N. and A. Schoar. (2005) "Private Equity Performance: Returns, Persistence, and Capital Flows." *Journal of Finance*, Vol. 60, No. 4, pp.: 1791-1823.

Long, A. M., and C. J. Nickels. (1996). "A private investment benchmark." Working paper.

McLaughlin, K. (2022) "Private markets rally to new heights." McKinsey & Company.

Maurin, V., D. Robinson and P. Stromberg. (2020) "A Theory of Liquidity in Private Equity." Swedish House of Finance Research Paper No. 20-8, Proceedings of Paris December 2020 Finance Meeting EUROFIDAI - ESSEC, *SSRN Working paper 3527298*

Munday, S., W. Hu, T. True and J. Zhang. (2018) "Performance of Private Credit Funds: A First Look" *The Journal of Alternative Investments*, Vol. 21, No. 2, pp.: 31-51.

Norton, A. (2020). *"Forming Private Credit Funds: Key Differences in Fund Lifecycle and the Use of Subscription Facilities Versus PE Funds (Part One of Two)."* Private Equity Law Report.

Rantanen, J. (2021). *"Impact & Outcomes Looking Beyond Financial Returns."* Hamilton Lane.

10. DISCLOSURE STATEMENT

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper, not BNP Paribas Asset Management.

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The following views represent our judgment as at the date of this presentation and may subject to change without notice.

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