NEUBERGER BERMAN

TULLY CHENG
Head of EMEA Institutional Solutions

FLORA XU
Client Strategist

AHMED HUSAIN
Global Head of Family Offices

ANTHONY LIBERTI
Head of North American Family Offices

MARIANNE SCHOENLEBER
Head of DACH Family Offices

BENJAMIN HARRISON-CARTER
U.K. Family Offices

SANDEEP MIRANI
Principal, Private Equity

Mapping the Private Markets Journey for Family Offices

In a paper published earlier this year, we constructed a series of illustrative portfolios optimized for family offices with different risk appetites. One of the themes common to all the recommended portfolios was a higher-than-baseline allocation to private markets. Alongside this indicator from quantitative modelling, our conversations with family offices suggest a desire to take "a more active approach in private markets."

However, investing in private markets can be more complex and administratively demanding than investing in public markets. It takes longer to put an allocation to work, for example, and the long-term and illiquid nature of the investments creates significant uncertainty as to when capital will be returned.

In this paper, we present three illustrative family offices that each want to achieve something different with private markets. We explore the issues and challenges that come with these diverse objectives and suggest some potential solutions.

Executive Summary

- Private markets can help to enhance a portfolio's estimated return; a simultaneous shift from fixed income to liquid alternatives can help further enhance diversification and prevent an increase in overall portfolio volatility.
- The distinct return and cash-flow characteristics of primary funds, secondary funds and co-investments mean that different blends can meet investors' diverse return and cash-flow objectives; sophisticated cash-flow and return modelling can help find the appropriate blend.
- A new arrival to the market, the Evergreen Fund, can provide a useful new option to investors looking to mitigate the j-curve and achieve an administratively less burdensome, self-funding private markets program.
- Investors who wish to bring some or all of their private markets program in-house should start by selecting the right investment partner; we believe a track record of providing clients with tailored education and access to data and General Partners is a sign of a good partner for making this transition to in-house management.

Our three hypothetical family offices are imagined so that they bring into focus one or two specific objectives or challenges of a private markets allocation.

The first is the simplest challenge: optimizing portfolio risk when private markets are introduced to meet a stated target return. The second objective is to minimize the time it takes to get a full allocation invested in the private markets (and thereby minimize the so-called "j-curve" in private markets returns). And the third objective is to bring in-house the management of a private markets allocation.

1 Targeting a Return, Optimizing the Risk

Objectives

- Find the right allocation to private equity, starting from an existing 50% equity, 30% fixed income and 20% alternatives portfolio
- Achieve an annualized real return of at least 6%, equivalent to 9 – 10% nominal, with no liquidity requirements
- Invest with a tilt to venture capital

Challenge

- Find the optimal asset allocation for minimizing volatility considering the family office's bespoke objectives and constraints

This family office has managed to generate a 7 – 8% return from a portfolio of liquid assets, split 50% equity, 30% fixed income and credit and 20% alternatives (including hedge funds and insurance-linked strategies). It now wants to add private markets and push its expected return up to 9 – 10%, equivalent to at least 6% in real terms. As a family whose wealth was built in a single generation, it wants to support entrepreneurship with a tilt to venture capital.

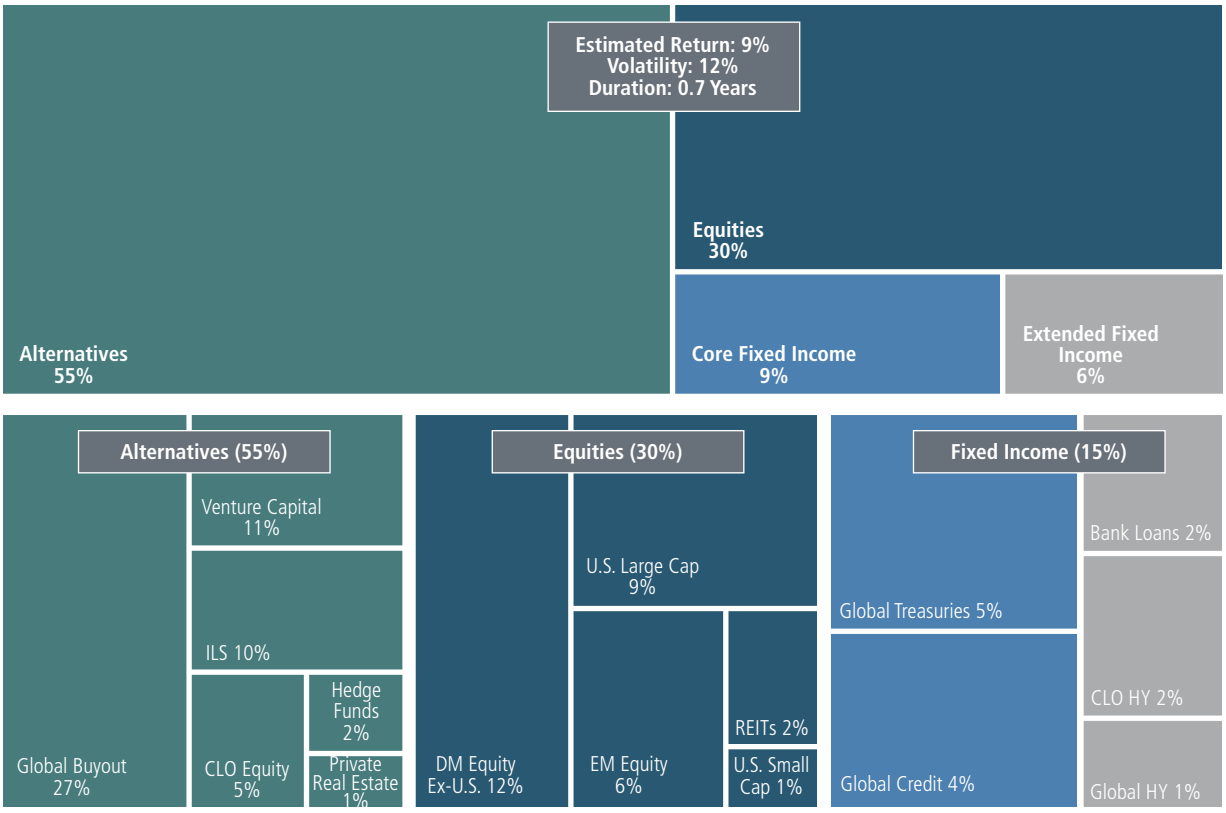
Figure 1 shows a hypothetical asset allocation that optimizes volatility relative to these objectives. The investor moves 27% into private equity buyout, 11% in venture capital and 1% into private real estate, drawn from across the original portfolio.

If we consider the liquid parts of the portfolio in isolation, we see that it is now 48% in public equity, 24% in fixed income and credit and 27% in liquid alternatives, a shift in weighting from fixed income to liquid alternatives that increases diversification. Alongside the attractive risk-return ratios for private assets in our capital market assumptions, this helps to mitigate volatility even as estimated return is raised.

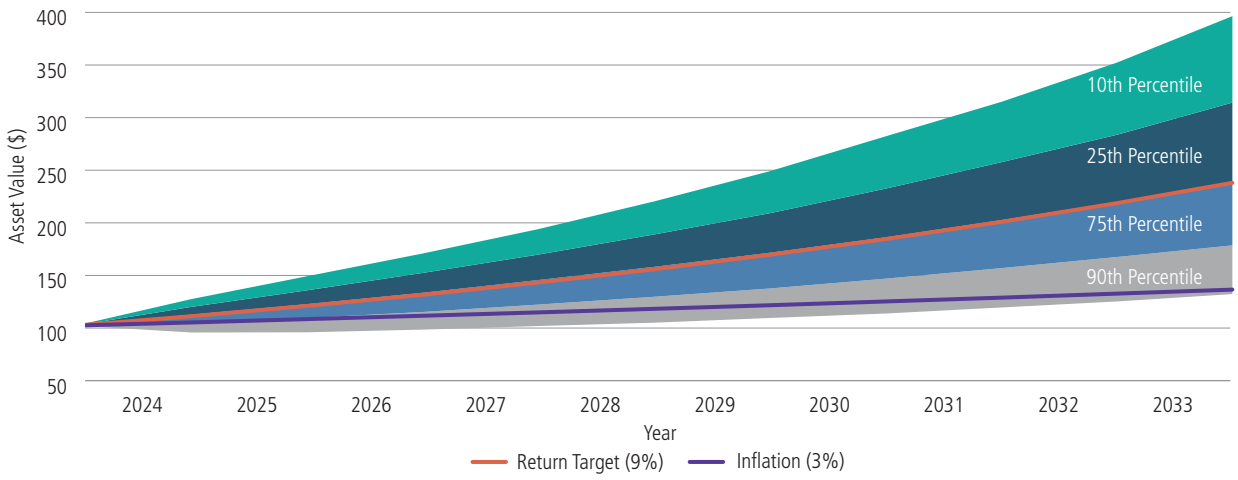
The stochastic projection illustrates the extent of the tail risk presented by this allocation. After four years, a nominal loss occurs in fewer than one in 10 of our projections. After 10 years, a real-terms loss, assuming an inflation rate of 3%, occurs in just over one in 10 projections.

FIGURE 1. EXCEEDING A 6% REAL RETURN WITH MINIMAL VOLATILITY

Optimized portfolio allocation



Stochastic projection of hypothetical portfolio performance, 2023 – 2034



Source: Neuberger Berman, Bloomberg, Cambridge Associates, FactSet. Analytics as of December 31, 2023. Asset classes are represented by benchmarks. Asset values are projected using a Monte Carlo simulation model: we calculated 10,000 different return scenarios for the portfolio and ranked the results. The median line shows the median of those 10,000 results in each year. The 10th percentile line shows the results of the best 10% asset values in each year. Results this positive or better occurred in about 1,000 of the 10,000 trials. Conversely, the 90th percentile line shows the results of the worst 10% asset values in that year. Results this negative or worse occurred in about 1,000 of the 10,000 trials. Neither should be read as a "best-case" or "worst-case" scenario, as returns can and do occur outside of this range. Please see Additional Disclosures at the end of the presentation for asset class and index definitions and Neuberger Berman Capital Market Assumptions. Investing entails risks, including possible loss of principal.

2 Minimizing the J-Curve and the Time to Self-Funding

Objectives

- Make an initial allocation to private equity, minimizing the time taken to get the allocation fully invested and the time taken to achieve positive net cash flows from the allocation
- Minimal affect on expected return

Challenge

- Find approaches to private equity investing that combine immediate exposure without compromising return

A defining characteristic of private markets investments is that they take time to complete, have a long lifecycle and are illiquid. Finding and conducting due diligence on opportunities for a multibillion-dollar fund takes many months. Completing transactions takes further weeks or months. Growth-enhancement programs for private companies are multiyear projects, with typically modest interim dividend payments. Moreover, exit-market conditions can delay liquidations at the end of those programs by many months or years.

As a result, an investor's private equity allocation spends a few years as a cash and private equity allocation, as capital for new investments could be called at any time. That cash represents an opportunity cost that can drag on portfolio returns. In addition, the portfolio investments made in years one and two of the allocation are likely to mature earlier than investments made in years three and four. As cash from those earlier transactions is returned, investors can once again find themselves underallocated to private markets. They can remedy that by investing in a new fund, but that is likely to require more cash than they have received back from their first fund.

Furthermore, because management fees are often charged on the full commitment and investments are initially held and reported at cost, the net asset value (NAV) of private equity investments tends to be meaningfully lower than the value of the invested capital in their early years. That lag begins to close as more committed capital is invested and more of those investments have their valuations marked up, compensating for the fee drag. This is what leads to the "j-curve" shape of the typical private equity returns series.

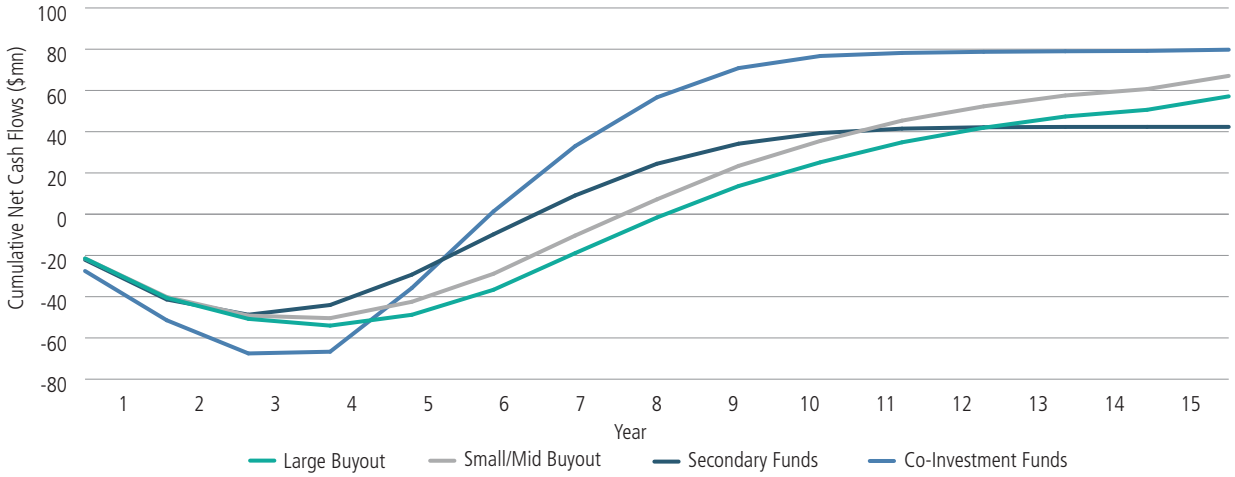
This family office wants to minimize the j-curve phenomenon, mitigate the cash drag in the early years of its program, and make it self-funding as quickly as possible, with minimal impact on expected return.

Enhancing the cash-flow profile and minimizing the j-curve using secondaries and co-investments

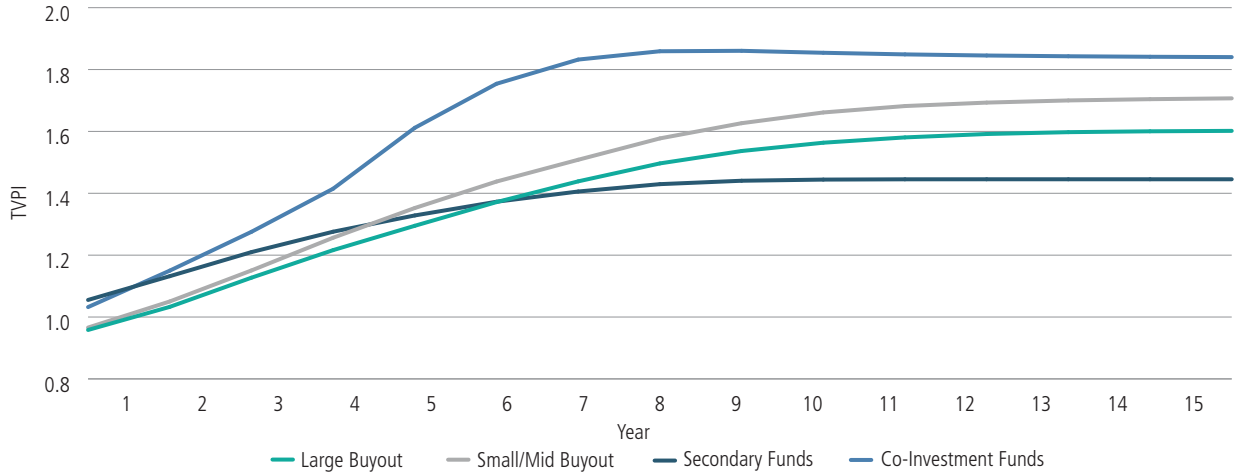
Private equity secondary funds and co-investments have long been used by investors to tackle both the cash-flow and j-curve issues. However, as figure 2 suggests, there are trade-offs to consider here.

FIGURE 2. THE TRADE-OFF BETWEEN CASH-FLOW AND LONG-TERM RETURN

Cumulative net cash flow, mean scenario of 5,000 stochastic projections



Ratio of total value to paid in capital, mean scenario of 5,000 stochastic projections



Source: Neuberger Berman, Thomson Reuters. Neuberger Berman's stochastic model uses a Monte Carlo Simulation, projecting, with varying levels of confidence, the capital call and distribution activity and Net Asset Value ("NAV") development of private market investments, based on asset class, current NAV, vintage year and drawn amount of each investment in the portfolio, as well as additional commitments. The input and assumptions used in the model are based on information from Thomson Reuters's Thomson ONE database covering 25 years of private equity industry data. Cash flows represent the pooled cash flows of all private equity funds that report performance data to Thomson Reuters and are net of all underlying fund fees and expenses. Co-investment funds are proxied by 16 quarters of deals assuming a 1% management fee on committed capital during the first 16 quarters, changing to 1% on net invested capital and a 10% carried interest rate thereafter. The projections are presented for illustrative purposes only to demonstrate the concepts discussed and are not, and are not intended to be, representative of the performance of any Neuberger Berman investment product or portfolio. See further disclosures at the end of this article.

Investing in private equity secondaries smooths out the cash flow pattern and reduces the j-curve. On average, the net cash flows don't become as deeply negative as they do in an allocation to co-investments or buyout funds via a primary fund committment; they turn positive around year six or seven (a couple of years before a primary committment to a buyout fund); and they tail off sooner and at a lower level.

This fits with the nature of secondaries investing, which involves buying existing, partly matured private equity funds from existing investors: cash can be put to work relatively quickly in that market and when it is, it gets immediate exposure to private companies that were acquired months or years earlier; moreover, investing in a mature set of assets either at a discount to NAV or immediately prior to a mark-up, with reduced fee drag, further reduces any j-curve. The cash flows tail off sooner and lower because secondary funds have shorter lives and some of their companies may have matured and been liquidated before the secondary owner buys the portfolio. The trade-off is that these same cash-flow enhancing characteristics result in lower long-term returns; returns to primary fund commitments in buyout funds typically overtake secondary funds around year five or six.

Co-investments would also look very interesting to this family office. Co-investing involves one or a small number of investors collaborating with a private equity manager on a transaction outside of a traditional pooled fund—often because the transaction is large and would take up too big a proportion of a fund.

The resulting size of these individual investments, which investors tend to hold in smaller numbers, results in a much more pronounced s-curve cash-flow profile. However, the dramatically negative profile in the first five or six years is not a problem for this family office, which can deploy the capital immediately into these transactions; and the cash-flow profile typically turns positive earlier than with either buyout or secondary funds, making a co-investment program self-funding that much sooner.

Moreover, there appears to be no trade-off against long-term return. Returns typically lag those of secondary funds for only a couple of years before going on to perform significantly more strongly than either secondary or primary fund commitments to a buyout fund. The typically reduced fees associated with co-investments also make them attractive to investors. The trade-off here is that co-investments are large and idiosyncratic, resulting in more concentrated risk than a more diversified primary or secondary fund commitment.[1]

Our family office would therefore dedicate a generous portion of its private markets allocation to co-investments, and for the remainder it would be necessary to estimate the most attractive optimization of traditional primary buyout-fund returns and secondary-fund cash-flow profiles.

Enhancing the cash-flow profile using Evergreen Funds

The cash-flow challenge can also be tackled by exploring non-traditional vehicles for private-market investing.

One option is to gain exposure via listed shares, either in private equity management companies or in closed-ended funds. These deliver immediate exposure and can be bought and sold freely, in any size, on exchanges. Investing in a private equity management company offers exposure to the fees paid by Limited Partners on the funds being managed, but exposure to the performance of the assets held in those funds is very indirect. Investing in closed-ended funds offers more direct exposure to underlying assets, often at a meaningful discount to net asset value (NAV), but their share prices can often be driven more by macroeconomic and general equity-market noise than by portfolio fundamentals.

A more recent innovation is the so-called "Evergreen Fund," an open-ended vehicle with limited regular subscription and redemption opportunities. While these funds will go through an investment period after their initial fundraising, they will then re-invest proceeds and remain open for new subscriptions from new investors—starting as low as $25,000 or equivalent with sometimes lower levels for follow-on investments. Subscription and redemption windows generally open monthly, quarterly or annually, and redemptions are usually capped at between 5% and 20% of the investor's funds.

An investor into a mature Evergreen Fund therefore avoids the j-curve in returns, escapes the demanding administration of a traditional private-markets fund, has an immediately self-funding allocation with efficient compounding of reinvested returns, and can completely liquidate their allocation over the course of around 12 – 18 months. To facilitate this structure, an Evergreen Fund will usually hold around 10 – 15% of its NAV in a liquid sub-portfolio.

Figure 3 shows what happens to a hypothetical private equity portfolio when an investor shifts half of an opening commitment of $50mn into an Evergreen Fund (amounting to 23% of a total, four-year commitment of $110mn).

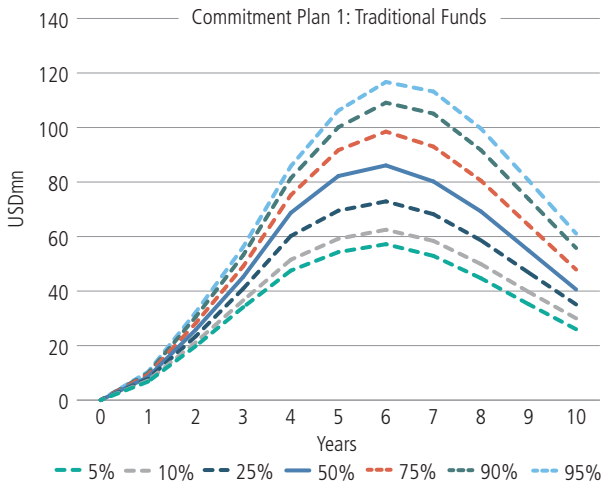
FIGURE 3. ADDING AN EVERGREEN FUND CAN SPEED-UP, ENHANCE AND SUSTAIN NAV GROWTH

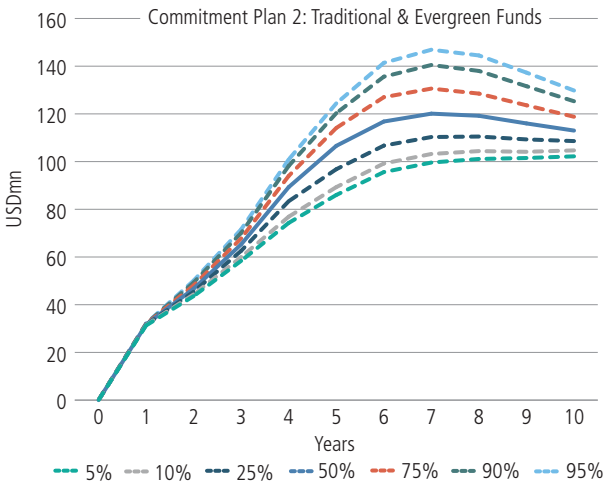
Hypothetical four-year commitment plans

	Commitment Plan 1: Traditional Funds				Commitment Plan 2: Traditional & Evergreen Funds			
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Traditional Funds	$50mn	$20mn	$20mn	$20mn	$25mn	$20mn	$20mn	$20mn
Evergreen Funds					$25mn			
Total	$50mn	$20mn	$20mn	$20mn	$50mn	$20mn	$20mn	$20mn

[1] Projections are made by Neuberger Berman's stochastic model. The input and assumptions used in the model are based on information from Thomson Reuters's Thomson ONE database covering 25 years of private equity industry data. See further disclosures at the end of this article.

Stochastic projections of NAV, percentile





Commitment Plan 1: Traditional Funds (USDmn)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
5%	0	6.8	19.8	34.1	47.5	54.3	57.2	52.9	44.7	35.2	26
10%	0	7.2	21.2	36.6	51.5	59.2	62.5	58.4	49.9	39.7	30
25%	0	7.8	23.4	40.9	60.2	69.5	72.9	68.2	58.6	46.8	35.1
50%	0	8.5	25.8	45.2	68.7	82.2	86.1	80.2	69.2	54.9	40.6
75%	0	9.3	28.2	49.1	75.2	91.7	98.5	93	80.5	64.2	47.9
90%	0	9.9	30.5	53.2	81.4	100.1	109.1	105.1	91.7	73.8	55.8
95%	0	10.4	32.2	56.2	85.8	106.2	116.7	113.2	99.6	80.6	61.1

Commitment Plan 2: Traditional & Evergreen Funds (USDmn)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
5%	0	31.3	43.6	58.4	74.3	86.0	95.6	99.6	101.1	101.5	102.2
10%	0	31.5	44.3	60.0	76.9	89.3	99.2	103.2	104.4	104.1	104.7
25%	0	31.6	45.4	62.6	83.4	96.8	106.7	110.3	110.5	109.3	108.6
50%	0	31.7	46.7	65.3	89.3	106.6	116.8	120.1	119.2	116.0	113.0
75%	0	31.9	48.1	67.8	94.0	114.1	127.0	130.6	128.5	123.6	118.8
90%	0	32.0	49.3	70.1	98.2	120.3	135.6	140.5	138.0	131.6	125.3
95%	0	32.1	50.1	71.6	100.9	124.4	141.4	146.9	144.5	137.3	129.8

Source: Neuberger Berman, Cambridge Associates, Burgiss, Thomson ONE. Analytics as of April 30, 2024. Asset values, capital calls and distributions are projected using a Monte Carlo simulation model. The input and assumptions used in the model are based on information from Cambridge Associates and Burgiss, covering more than 30 years of private markets industry data, as well as Neuberger Berman proprietary data. Cash flows represent the pooled cash flows of all private markets funds that report performance data to Cambridge Associates and Burgiss and are net of all underlying fund fees and expenses. The industry performance assumptions used in the analysis are based on long-term averages from the Cambridge Associates and Burgiss databases. Commitment Plan 1 is a projection of a portfolio of traditional private equity funds, including primary, secondary and co-investment funds. Commitment Plan 2 is a projection of a blend of a portfolio of traditional private equity funds and a typical Evergreen Fund. For the Evergreen Fund, the model assumes an 85% allocation to private equity returning 13.7% net of fees and a 15% allocation to liquid assets returning 4% (over the past 20 years, Global Private Equity funds in the Burgiss database have generated approximately a 13.7% net IRR, as of Q1 2024). The projections are presented for illustrative purposes only to demonstrate the concepts discussed and are not, and are not intended to be, representative of the performance of any Neuberger Berman investment product or portfolio. Investing entails risks, including possible loss of principal.

The most obvious effect is that almost all of the Evergreen Fund's NAV is invested by the end of Year 1, as opposed to only around a fifth of the traditional private equity commitment. In the median projection, the peak NAV for the fully traditional program is $86.1mn and it is reached at the end of Year 6; the program with the Evergreen Fund hits that level before the end of Year 4, and its NAV also continues to rise, peaking at the end of Year 7 at $120.1mn.

It's important to note that this isn't because the Evergreen Fund performs better than the traditional funds, it is simply the result of more of the Evergreen Fund's NAV remaining fully invested, as mature investments are recycled within the fund itself. The traditional funds' NAVs decline as investments mature and cash is returned—cash that must then find a home in a new fund with a new j-curve. This is also why the NAV of the program with the Evergreen Fund declines only slightly from its peak before levelling off at the end of Year 10: by this point, most of the commitment to the traditional funds has returned to the investor and the self-funding Evergreen Fund is worth around $80mn, just short of the total original commitment.

3 Bringing the Private Markets Allocation In-House

Objectives

- Bring as much as possible of an existing diversified private-markets allocation under the management of an in-house team

Challenge

- Identify the skills and knowledge necessary to manage the portfolio in-house
- Develop the relationships with and access to private markets General Partners necessary to make investments in-house

Successful private markets investing is not easy. Even a fairly standard diversified portfolio would include primary funds, secondary funds and co-investments across venture, growth, small- and mid-sized buyout, large buyout and special situations strategies in four or five regions of the world. Building and maintaining that portfolio requires access to steady deal flow from top-tier General Partners, the relationships that ensure an investor can get their desired allocations with those managers, the due diligence capabilities and information advantages that help to identify and act upon the most attractive opportunities and avoid the pitfalls, and the legal, deal-structuring and administrative resources to make all the internal plumbing work.

In our view, therefore, the most important decision a family office makes to bring a private-markets program in-house happens long before the actual decision to go in-house; it is all about selecting the right partner for the initial, outsourced private-markets allocation. The family office must have confidence in the manager's capabilities in the specialist strategies and the administrative and legal services that it may elect to keep outsourced. But it should also recognize that not every manager commits resources to the skills and knowledge transfer necessary to empower its clients to go in-house—not least because it is ultimately likely to result in a loss of revenue.

We believe the right partner prioritizes two things for its clients: education and access.

Education can take the form of conferences, seminars and workshops for groups of clients, or dedicated training sessions tailored to address specific gaps in individual clients' front-, middle- or back-office skillsets. The very best partners will offer not only their own, but also high quality third-party training. A long track record of providing these sessions is a sign of a good partner for investors looking to move in-house over time, in our view.

By access, we mean two things.

First, private equity managers should share all their information, including proprietary lists of funds in the market, fundraising calendars, Investment Committee materials and other due diligence documentation, including documentation on funds not selected for investment. We think investors should look for a track record of seeking and receiving permission from General Partners to share this kind of material with clients.

Second, private equity managers should offer access to the General Partners they know. We think investors should look for the ability and willingness to include clients in the due diligence process and arrange subsequent meetings that deepen relationships in the private markets community.

Once a partner is selected, the family office needs to consider how it will transition to in-house management of its portfolio. For example, a step-by-step approach could work well for many investors. The initial, fully outsourced allocation might be focused on large-cap, mid-cap and special situations in primary and secondary funds, alongside some co-investments, with the client's engagement starting with joint review and veto rights over General Partners in the program. After a year or two of training and experience, the client could make its own large-cap primary fund commitments, accept some small-cap, venture, specialist and private credit strategies into its outsourced portfolio, shift its training emphasis onto secondaries, small-cap and venture investing, and add to its in-house team. Over time, the client would seek to bring secondaries and venture in-house, while perhaps leaving the more specialist and private credit strategies, together with its complex, fast-moving and due-diligence-heavy co-investment program, outsourced with its partner.

Next Steps in the Private Markets Journey

Every family office is different. Each will have different return and risk objectives, which will imply different levels and mixes of allocation to private markets; each will have different cash-flow requirements, potentially implying different blends of strategies and vehicles chosen from a growing menu of options; and each will want a different level of engagement with its private markets allocation, possibly evolving over time.

Our three illustrative family offices isolate some of these key challenges and some of the potential solutions available so that an investor can begin to identify aspects of their own position in one, two or all of them, and use them to consider the next steps in their private markets journey.

Additional Disclosures

Indices Used

Asset Class	Index Name
Global Treasuries	Bloomberg Global Treasury Index
Global Credit	Bloomberg Global Aggregate Credit Index
Global HY	Bloomberg Global High Yield Index
Bank Loans	60% Morningstar LSTA U.S. BB Ratings Loan Index / 40% Morningstar LSTA U.S. B Ratings Loan Index
CLO Equity	Dow Jones U.S. Select Regional Banks
U.S. Large Cap	S&P 500
U.S. Small Cap	Russell 2000
DM Equity ex-U.S.	MSCI EAFE
EM Equity	MSCI EM
REITs	FTSE Nareit U.S. Real Estate Index - Equity REITs
Global Buyout	Burgiss Global Buyout Funds Index
Venture Capital	Burgiss Venture Capital
Hedge Funds	HFRI Composite Index
Insurance-Linked Securities	Eurekahedge ILS Advisers Index
Private Real Estate	NCREIF Fund Index ODCE

Neuberger Berman Capital Market Assumptions Framework

Asset Class	Return Estimate	Risk Estimate
Fixed Income	Market yields of public indices adjusted for default cost[1]	Historical volatility of monthly return series from 2007
Equity	"Building Block" approach[2]	
Liquid Alternatives	Factor regression	
Illiquid Alternatives	"Building Block" approach[2]	Historical volatility of quarterly series from 2007 with de-smoothing

Source: Neuberger Berman. For illustrative purposes only.

[1] For certain asset classes where a standard public index may not be readily available, Neuberger Berman will create a proxy index using a combination of similar asset classes. Default costs are estimated at the CUSIP level, then aggregated to the index level; where CUSIP-level data is unavailable, Neuberger Berman will estimate default costs at the index level.

[2] Separate estimates are made for different sources of return (income yield, valuation change, earnings growth), and these "blocks" are aggregated to establish an asset class-level estimated return.

Asset Class	Estimated Return	Option-Adjusted Spread Duration	Option-Adjusted Duration	Annualized Volatility
Global Treasuries	4.63%	0.00	7.45	3.52%
Global Credit	4.91%	6.11	6.04	4.97%
Global HY	6.00%	3.22	3.09	7.33%
Bank Loans	6.68%	3.50	0.25	4.76%
CLO Equity	15.00%	–	–	25.23%
U.S. Large Cap	6.25%	–	–	14.82%
U.S. Small Cap	7.05%	–	–	19.90%
DM Equity ex-U.S.	6.82%	–	–	16.03%
EM Equity	7.26%	–	–	17.80%
REITs	6.86%	–	–	17.90%
Global Buyout	12.26%	–	–	15.79%
Venture Capital	14.86%	–	–	22.89%
Hedge Funds	5.53%	–	–	6.21%
Insurance-Linked Securities	10.00%	–	–	3.81%
Private Real Estate	6.55%	-	-	11.92%

Source: Neuberger Berman, Bloomberg, Cambridge Associates, FactSet. Analytics as of December 31, 2023. The performance and risk projections/estimates are hypothetical in nature and reflect the Neuberger Berman's Capital Market Assumptions. The projections are presented for illustrative purposes only to demonstrate the concepts discussed and are not, and are not intended to be, representative of the performance of any Neuberger Berman investment product or portfolio. The estimates do not reflect actual investment results and are not guarantees of future results. Actual returns and volatility may vary significantly. Asset classes are represented by benchmarks and do not represent any Neuberger Berman investment product or service. Investing entails risks, including possible loss of principal.

Index Definitions

The **Bloomberg Global Treasury Index** tracks fixed-rate, local currency government debt of investment grade countries, including both developed and emerging markets. The index represents the treasury sector of the Global Aggregate Index. The index was created in 1992, with history available from January 1, 1987.

The **Bloomberg Barclays Global Aggregate Credit Index** measures the global investment grade local currency corporate and government-related bond markets. This multi-currency benchmark includes fixed-rate bonds from both developed and emerging markets issuers. It is a component of the Global Aggregate Index, and was created in 2001, with index history backfilled to September 1, 2000.

The **Bloomberg Global High Yield Index** is a multi-currency flagship measure of the global high yield debt market. The index represents the union of the U.S. High Yield, the Pan-European High Yield, and Emerging Markets (EM) Hard Currency High Yield indices. The high yield and emerging markets sub-components are mutually exclusive. Until January 1, 2011, the index also included CMBS high yield securities. The Global High Yield Index is a component of the Multiverse Index, along with the Global Aggregate, Euro Treasury High Yield, and EM Local Currency Government indices. It was created in December 1998, with history backfilled to January 1, 1990.

The **J.P. Morgan Collateralized Loan Obligation Index** is the first rules-based benchmark for broadly-syndicated, arbitrage U.S. dollar-denominated CLO debt. Representing the entire debt capital structure, the index covers 1,700+ deals and 10,000+ tranches managed by 140+ CLO managers.

The **Dow Jones U.S. Select Regional Banks Total Return Index** measures regional banks providing a broad range of financial services, including retail banking, loans and money transmissions. The index is quoted in U.S. Dollars.

The **S&P 500 Index** measures the performance of the 500 largest U.S. companies, and captures approximately 80% coverage of available market capitalization.

The **Russell 2000 Index** measures the performance of the small cap segment of the U.S. equity universe and includes the 2,000 smallest securities of the Russell 3000 Index based on a combination of their market cap and current index membership.

The **MSCI EAFE Index** is a free float-adjusted market capitalization index that is designed to measure developed market equity performance, excluding the U.S. and Canada.

The **MSCI Emerging Markets Index** is a market-value weighted index designed to represent the performance of large- and mid-cap securities in 26 emerging markets.

The **FTSE NAREIT U.S. REIT Index** measures the performance of all publicly traded equity real estate investment trusts traded on U.S. exchanges.

The **Burgiss Global Buyout Funds Index** tracks the performance of closed-ended private equity buyout funds in the Burgiss Manager Universe, converted to U.S. dollars.

The **Burgiss Venture Capital Index** tracks equity investments in small to medium private companies that are early in their development and are in need of capital to grow their business.

The **HFRI Composite Index** is a global, equal-weighted index of hedge funds with minimum assets under management of USD $500MM which report to the HFR Database and are open to new investments. The index constituents are classified into Equity Hedge, Event Driven, Macro or Relative Value strategies. The index is rebalanced on an annual basis.

The **Eurekahedge ILS Advisers Index** is an equally weighted index of 29 constituent funds that explicitly allocate to insurance linked investments and have at least 70% of their portfolio invested in non-life risk. The index is base weighted at 100 at December 2005, does not contain duplicate funds and is denominated in local currencies.

The **NFI-ODCE** is a capitalization-weighted, gross of fee, time-weighted return index with an inception date of December 31, 1977. Open-end funds are generally defined as infinite-life vehicles consisting of multiple investors who have the ability to enter or exit the fund on a periodic basis, subject to contribution and/or redemption requests, thereby providing a degree of potential investment liquidity. The term Diversified Core Equity style typically reflects lower risk investment strategies utilizing low leverage and generally represented by equity ownership positions in stable U.S. operating properties diversified across regions and property types.

This material is provided for informational purposes only and nothing herein constitutes investment, legal, accounting or tax advice. This material is general in nature and is not directed to any category of investors and should not be regarded as individualized, a recommendation, investment advice or a suggestion to engage in or refrain from any investment-related course of action. Information is obtained from sources deemed reliable, but there is no representation or warranty as to its accuracy, completeness or reliability. All information is current as of the date of this material and is subject to change without notice. The firm, its employees and advisory accounts may hold positions of any companies discussed. Any views or opinions expressed may not reflect those of the firm as a whole. References to third-party sites are for informational purposes only and do not imply any endorsement, approval, investigation, verification or monitoring by Neuberger Berman of any content or information contained within or accessible from such sites.

Investing in any market entails risks, including possible loss of principal. The historical performance of the market or of an individual asset class cannot predict or guarantee future performance. Investments in hedge funds and private equity are speculative and involve a higher degree of risk than more traditional investments. Investments in hedge funds and private equity are intended for sophisticated investors only. Indexes are unmanaged and are not available for direct investment. **Past performance of indexes or asset classes is no guarantee of future results.**

This material includes estimates, outlooks, projections and other "forward-looking statements." Due to a variety of factors, actual events or market behavior may differ significantly from any views expressed. Investing entails risks, including possible loss of principal. Investments in hedge funds and private equity are speculative and involve a higher degree of risk than more traditional investments. Investments in hedge funds and private equity are intended for sophisticated investors only. Indexes are unmanaged and are not available for direct investment. **Past performance is no guarantee of future results.**

The views of the research analyst and the firm and its employees on medical topics should not be relied upon as medical advice and are not intended to serve as a substitute for consulting with a qualified medical professional. There is no representation or warranty as to its accuracy, completeness or reliability. All information is current as of the date of the material and is subject to change without notice. The firm, its employees and advisory accounts may hold positions of the manufacturers of the products discussed.

Description of Neuberger Berman's Proprietary Stochastic Model

Neuberger Berman Private Equity uses stochastic modeling capabilities to forecast capital call / distribution activity and Net Asset Value ("NAV") development of private market investments. NB's stochastic model uses a Monte Carlo Simulation, projecting, with varying levels of confidence, how a private markets portfolio of funds, co-investments and secondaries will develop over time. The model projects capital calls, distributions and NAV development based on asset class, current NAV, vintage year and drawn amount of each investment in the portfolio, as well as additional (potential) future investments and commitments.

The input and assumptions used in the model are based on information from Thomson Reuters's Thomson ONE database covering 25 years of private equity industry data (cash flow, NAV development, etc.). Cash flows represent the pooled cash flows of all private equity funds that report performance data to Thomson Reuters and are net of all underlying fund fees and expenses. The industry performance assumptions used in the analysis are based on long-term averages from the Thomson ONE database, not on NB's historical or projected returns. The inputs used within the model include the median historical net IRR, median historical yield, average holding period, mean and standard deviation of contributions for various private market asset classes (i.e., large-cap, small & mid-cap buyout, venture & growth capital, special situations, private credit, real estate and infrastructure debt) and strategies (i.e., primary fund investments, secondary fund investments, direct co-investments and direct credit investments). Yield is calculated as actual annualized cash coupon of current unrealized investments divided by current unrealized invested capital.

The assumptions are for illustrative purposes only and are not intended as a promise or prediction of performance. There can be no assurance that the fund will achieve comparable results, that targeted diversification or asset allocations will be met, that the fund will be able to or will ultimately elect to implement the assumptive investment strategy and approach described in the model. Alternative assumptions may result in significant differences or complete loss of capital in such projections.

Note, all targets and underlying assumptions can be adjusted if desired as requested by the client. There is no guarantee that returns targeted in any underwriting process will be realized or achieved or that an investment strategy will be successful, and actual returns may be significantly lower than the targeted returns referenced herein. Investors should keep in mind that the securities markets are volatile and unpredictable. There are no guarantees that the historical performance of an investment, portfolio, or asset class will have a direct correlation with its future performance.

Asset Class Assumptions & Estimates

Capital market assumptions used herein reflect Neuberger Berman's forward-looking estimates of the benchmark return or volatility associated with an asset class. Estimated returns and volatilities are hypothetical return and risk estimates generated by Neuberger Berman's Institutional Solutions Group. Estimated returns and volatilities do not reflect the alpha of any investment manager or investment strategy/vehicle within an asset class. Information is not intended to be representative of any investment product or strategy and does not reflect the fees and expenses associated with managing a portfolio or any other related charges, such as commissions and surrender charges. Estimated returns and volatilities are hypothetical and generated by Neuberger Berman based on various assumptions and inputs, including current market conditions, historical market conditions and subjective views and estimates. Capital market assumptions shown reflect Neuberger Berman's long-term (20+ years into the future) estimates or intermediate-term (5-7 years into the future) estimates which are reviewed at least annually. Results will differ depending on whether they are based on Neuberger Berman's long-term (20+ years into the future) or intermediate-term (5-7 years into the future) capital market assumptions. Neuberger Berman's capital market assumptions are derived using a building block approach that reflects historical, current, and projected market environments, forward-looking trends of return drivers, and the historical relationships asset classes have to one another. These hypothetical returns are used for discussion purposes only and are not intended to represent, and should not be construed to represent, predictions of future rates of return. Actual returns may vary significantly. Neuberger Berman makes no representations regarding the reasonableness or completeness of any such assumptions and inputs. Assumptions, inputs, and estimates are periodically revised and subject to change without notice. Estimated returns and volatilities should not be used, or relied upon, to make investment decisions.

Rate of Return Estimate: Rate of return or geometric return is a measure of average returns of an investment over a period of time. Geometric rate of returns are typically referred to as annualized compound rate of returns and are always less than or equal to the arithmetic mean return of the same time series. Geometric rate of returns are used for straight-line calculations within the analysis, for example, the cash flow calculations. In straight-line calculations, each year is represented as a gain, so the compound (geometric mean) rate of return is used to adjust for the amount needed to make up for a loss in a given year. For example, if you lose 5% in one year, and gain 5% the year after, you still have less than you started with at the beginning of year one.

Arithmetic Mean Estimate: Arithmetic mean or average return is calculated by dividing the sum of a series of numbers by the number of overall items. This is more typically thought of as an "average" of the data set. Arithmetic mean or average return ignores the impact of compounding in the context of analyzing investment returns and is the simple average of returns observed over a period of time. Arithmetic mean returns are used in this material and, if applicable, the Efficient Frontier, because, through randomization, losses and gains are being accounted for each year.

Standard Deviation: A statistical measure of the volatility based on the distribution of a set of data from its mean (average value). For example, a portfolio with an average return of 10% and a standard deviation of 15% would return a result between -5% and +25% the majority of the time (68% probability or 1 standard deviation), almost all of the time the return would be between -20% and +40% (95% probability or 2 standard deviations). If there were 0 standard deviation then the result would always be 10%. Generally, more aggressive portfolios have a higher standard deviation and more conservative portfolios have a lower standard deviation.

No part of this document may be reproduced in any manner without prior written permission of Neuberger Berman Europe Limited.

This material is being issued on a limited basis through various global subsidiaries and affiliates of Neuberger Berman Group LLC. Please visit www.nb.com/disclosure-globalcommunications for the specific entities and jurisdictional limitations and restrictions.

The "Neuberger Berman" name and logo are registered service marks of Neuberger Berman Group LLC.

NEUBERGER | BERMAN

Neuberger Berman
1290 Avenue of the Americas
New York, NY 10104-0001

Z0611 12/24 2043600 ©2024 Neuberger Berman Group LLC. All rights reserved.

www.nb.com