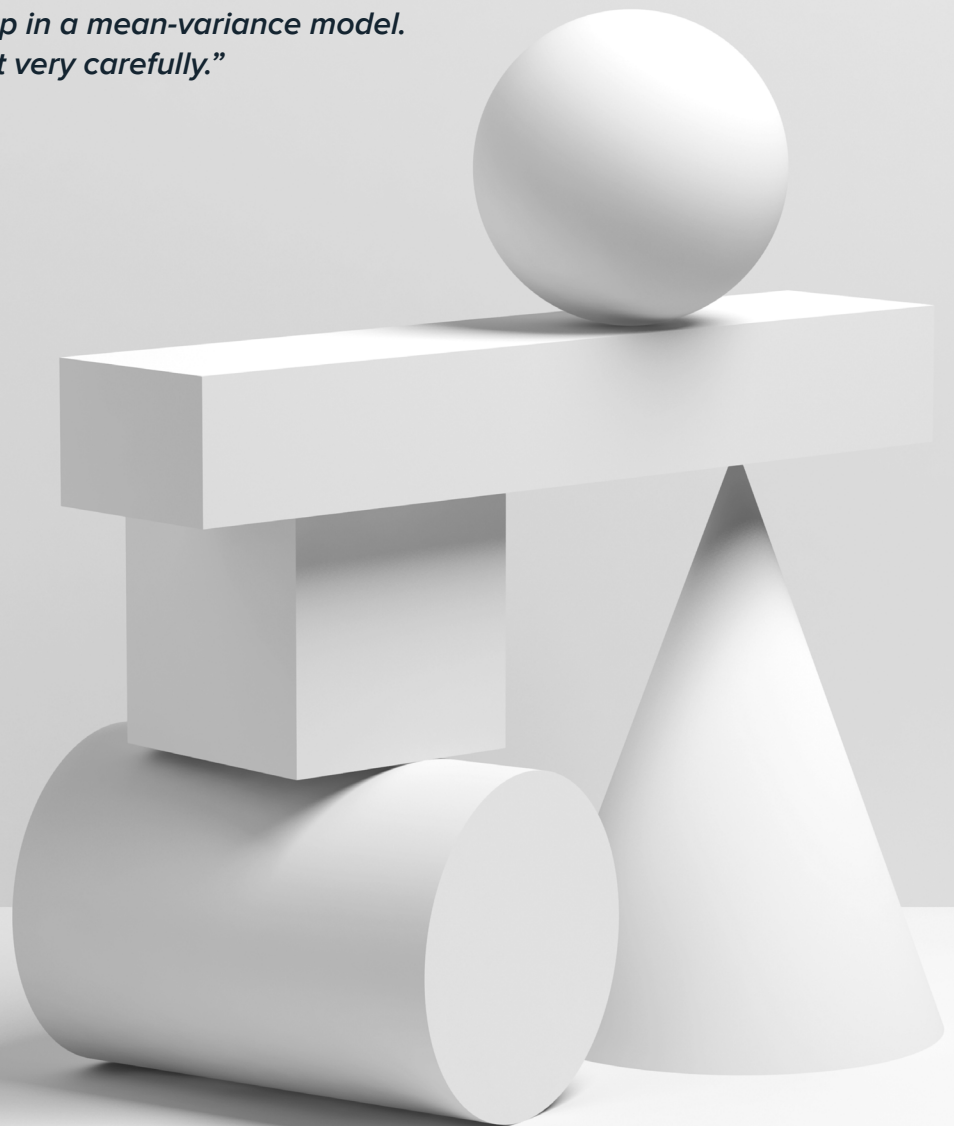


Balancing Liquidity Constraints in a Private Investment Program

Creating Normalcy for Multi-Asset Class Institutions

*“Liquidity doesn’t show up in a mean-variance model.
You have to think about it very carefully.”*

—David F. Swensen



Liquidity is the lifeblood of investing. It is there until you most need it. In 2006 Alan Mulally left Boeing to take over Ford; one of the four tenets in his presentation to the board was improving the balance sheet. Restructuring finished in the nick of time as Ford was the only member of the US “Big Three” auto companies that did not require a government bailout during the financial crisis.

There are many other examples of how financial preparedness drives success across businesses. Jamie Dimon speaks of his fortress balance sheet. Warren Buffet hoards cash so that he can pounce when there is fear in the market. Hedge fund managers generally try to ensure that their investments will still have buyers when the market convulses. For institutional investors, private market drawdown vehicles are the most illiquid form of investing. Though historically a great source of alpha, every basis point of return comes with hidden risks. Liquidity, or lack thereof, is one of the biggest concerns institutional investors should consider when navigating the private market seas.

Private Investment Program: Sources Versus Uses of Liquidity

After a Limited Partner (LP) signs subscription documents for a hedge fund, it wires funds for the full investment to the General Partner (GP), and the fund’s trader deploys the new capital expeditiously. The cash is typically deployed within a day or two of capital arriving. For private

equity investments it takes years, not hours. Private equity GPs call capital multiple times over the course of the fund’s life span to purchase private companies. Capital calls are issued as opportunities appear, and typically the LP has no more than two weeks to respond. Failure to meet a capital call can have drastic consequences, including the extreme cases of forfeiting interests in previously funded investments or blacklisting from future funds. In other words, liquidity is paramount. For LPs, predicting future cash needs is never easy. The precise size and timing of future capital calls are uncertain, while fund distributions are unpredictable.

Asset owners can manage this uncertainty in a few ways. The simplest approach would be to maintain large cash reserves or invest in treasuries to match unfunded commitments, but excessive cash creates a cash drag. Luckily, there are other sources of liquidity. A savvy asset owner has numerous levers to pull, but calibrating which levers to pull and when to do so requires a steady hand. Equity index futures can be used as swing capacity, or liquidity lines can be established with banks. A CIO may redeem from investments with shorter lockups like hedge funds, or rely on distributions from a mature private equity program. Whatever the lever, asset owners must understand the costs and immediacy of liquidity sources. Figure 1 highlights a simple way of thinking about liquidity levels from an asset owner’s perspective.

Liquidity Classification of Assets

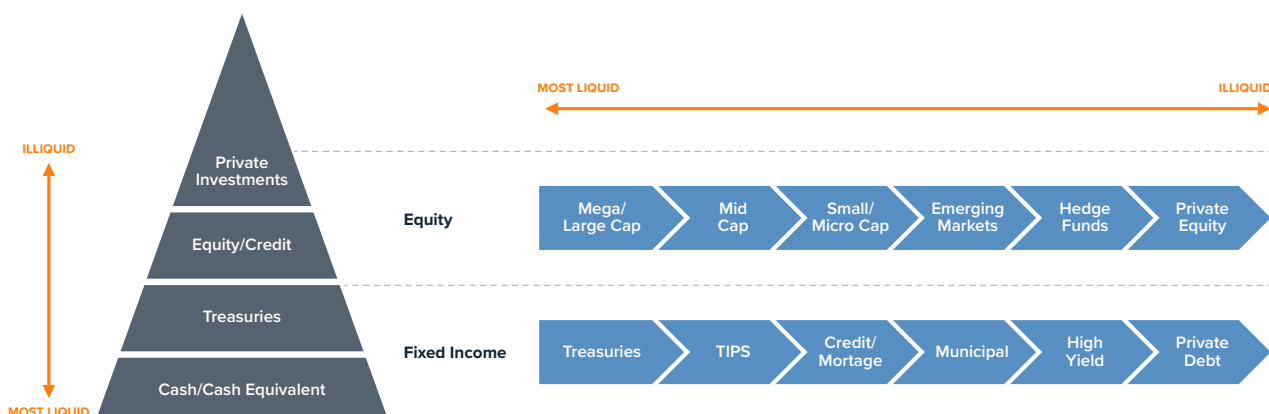


Figure 1: Liquidity scale for asset owners and asset managers. SOURCE: “A Primer on Liquidity from an Asset Management and Asset Allocation Perspective”, by Harshdeep Ahluwalia, Anatoly Shtekhman, Venky Venkatesh, and Yu Zhang. *The Journal of Portfolio Management* Volume 48 (6). Page 83.

While it's great to have options when it comes time to meet a commitment, asset owners can reduce their need to draw on liquidity sources in the first place by smoothing future inflows and outflows. The probability of finding oneself in a painful liquidity trap can be decreased through commitment pacing, as well as diversifying across vintage years and fund types. A Leveraged Buy-Out (LBO) fund will draw and return capital more quickly than a venture capital (VC) fund, and even different vintages of the same strategy can behave very differently.

Planning and regularly stressing the private investment program helps prepare asset owners for a difficult market environment—where the best CIOs prove their skill. It is crucial for investment teams to have a flexible portfolio monitoring process that covers all investments across all asset classes.

Liquidity Analysis

Liquidity analysis starts with meticulous data management. In addition to monitoring their manager's portfolios for potential liquidity concerns, LPs need to track their redemption restrictions such as initial lock-up period, liquidity gates, and exit windows for every hedge fund investment—asking questions such as, “Is there a redemption notice?” and “What is the maximum redemption?”

A thorough understanding of liquidity constraints for each investment allows a CIO to know which investments are already liquid versus ones that could become liquid in the short or medium term. The art of portfolio management involves considering where to draw liquidity (source of liquidity) to fund capital calls or other investment opportunities (uses of liquidity).

By tracking liquidity terms for each investment, asset owners can construct liquidity schedules that project not just how much liquidity will be available at future dates, but also the specific funds or strategies that will provide it. Anticipating notice periods or outsized distributions informs how the team allocates its research efforts.

To source liquidity for upcoming capital calls, CIOs can study how much liquidity is available in durations such as the next 30, 90, or 180 days.

Compounded Liquidity by Time

Jul 2024

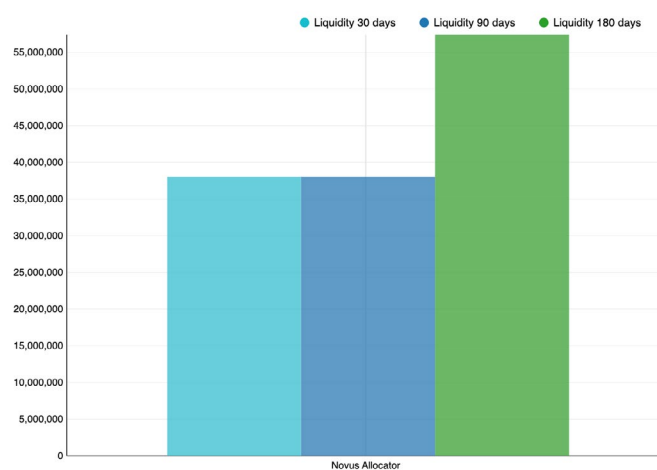


Figure 2: Liquidity by period SOURCE: SEI Novus. Data shown in the above charts is from a paper portfolio created by SEI Novus for demonstration purposes only.

Good portfolio construction starts with a long-term perspective and staggers lock-ups. CIOs should be aware of jumps in the cumulative liquidity graph as these demark decision points for the CIO to consider the investment against the opportunity set of available investments.

Investment Agreement Overview

Fund	Lockup Terms	Max Redemption	Redemption Frequency	Notice Period	Rolling Gate	Max Consecutive Requests	Suspendable Requests
Gentilini Capital	1 Business Days Hard Lockup	150000.0	Every 2 Months	1 Business Days	No investor gate	Any number of consecutive requests can be made	Redemption requests can't be suspended
Gentilini Capital	1 Business Days Hard Lockup	150000.0	Every 2 Months	1 Business Days	No investor gate	Any number of consecutive requests can be made	Redemption requests can't be suspended
Mayfair Macro	No Lockup Period	No limit	Every 1 Business Days	1 Business Days	No investor gate	Any number of consecutive requests can be made	Redemption requests can't be suspended
Current Cash Account - USD	No Lockup Period	100.0	Every 1 Days	1 Days	100.0 every 1 Days	Any number of consecutive requests can be made	Redemption requests can't be suspended
Evolution Capital II	20 Years Hard Lockup	No redemptions are allowed	Every 1 Days	1 Days	No investor gate	Any number of consecutive requests can be made	Redemption requests can't be suspended
Progressive Investors I	20 Years Hard Lockup	No redemptions are allowed	Every 1 Days	1 Days	No investor gate	Any number of consecutive requests can be made	Redemption requests can't be suspended
Renewable Growth IV	20 Years Hard Lockup	No redemptions are allowed	Every 1 Days	1 Days	No investor gate	Any number of consecutive requests can be made	Redemption requests can't be suspended
Current Cash Account - EUR	No Lockup Period	100.0	Every 1 Days	1 Days	100.0 every 1 Days	Any number of consecutive requests can be made	Redemption requests can't be suspended
Expense Cash Account	No Lockup Period	100.0	Every 1 Days	1 Days	100.0 every 1 Days	Any number of consecutive requests can be made	Redemption requests can't be suspended
Private Market Cash Account	No Lockup Period	100.0	Every 1 Days	1 Days	100.0 every 1 Days	Any number of consecutive requests can be made	Redemption requests can't be suspended
Dynamo Administrativo de Recurs...	No Lockup Period	100.0	Every 1 Quarters	45 Business Days	100.0 every 1 Business Days	Any number of consecutive requests can be made	Redemption requests can't be suspended

Figure 3: Example of fund terms SOURCE: SEI Novus. Data shown in the above charts is from a paper portfolio created by SEI Novus for demonstration purposes only.

Cumulative Liquidity

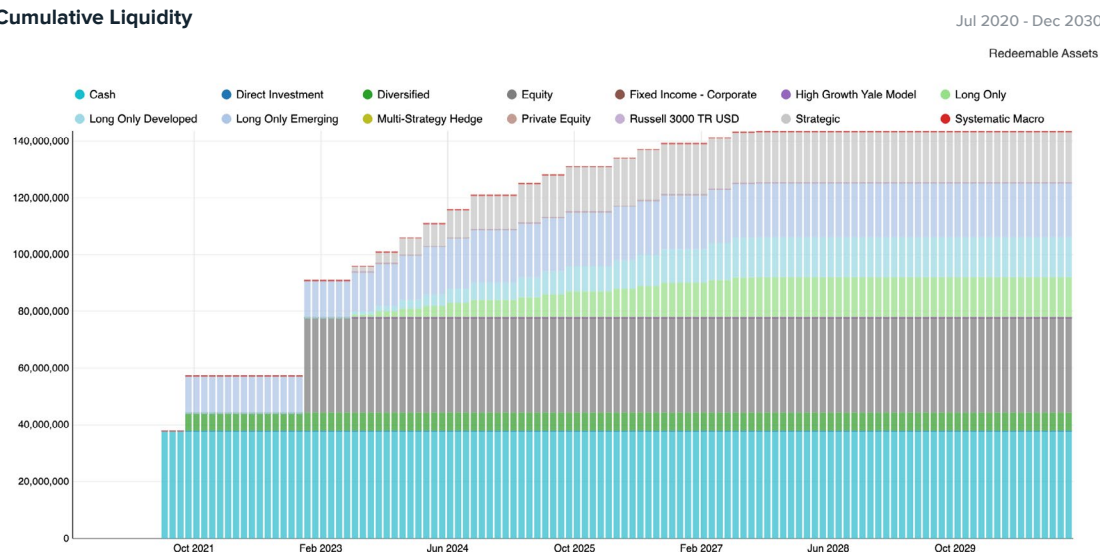


Figure 4: Liquidity waterfall by strategy SOURCE: SEI Novus. Data shown in the above charts is from a paper portfolio created by SEI Novus for demonstration purposes only.

Cash Flow Forecasting

A private equity investment program aims to maintain an exposure target by balancing capital calls and distributions. Since both are lumpy and unpredictable, a narrow exposure target can be hard to hit. One simple and sensible option for forecasting future net cash flows is the Takahashi-Alexander Forecast Model. The model user can analyze varying return scenarios, as well as adjust expected rates of both investment and distribution. Conveniently, the model works across asset types. There are six inputs to the model: Rate of Contribution, Capital Commitments, Life of the Fund, Bow (a factor that describes the change in the rate of distribution over time), Annual Growth Rate, and Yield. The model produces three key outputs: Capital Contributions, Distributions, and NAVs.

By stressing a cash flow forecasting model, a CIO can test cash requirements during market downturns. The widely used Takahashi-Alexander Forecast Model is often leveraged to study how changes to distribution timing or growth rates will impact expected net cashflows over time.

The modeler enters a rate of contribution in Year 1 (i.e. 25% of commitment) and Year 2 (i.e. 33% of commitment) and 50% of remaining uncalled capital in each subsequent year (i.e. Year 3 = $50\% * (1 - 25\% - 33\%)$).

The formula for Distributions is:

$$D(t) = RD * [NAV(t-1) * (1 + G)]$$

Where...

RD = Rate of Distribution

G = Annual Growth Rate

The Rate of Distribution is the maximum of the Yield and Realizations. Realizations occur as investments are sold or harvested.

One of the key inputs is the change in the rate of distribution, which is commonly referred to as the Bow Factor (B). A higher bow indicates lower initial distributions, with the rate increasing in later years. From the original paper, "Illiquid Alternative Fund Modeling" in the Journal of Portfolio Management, Takahashi and Alexander included the following picture.

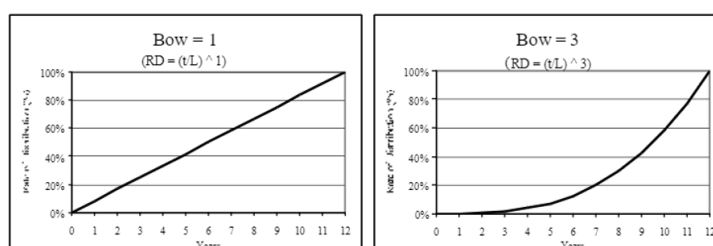


Figure 5: Rate of Distribution by Bow SOURCE: Takahashi & Alexander

Figure 6 illustrates how the different distribution rates would translate to expected cash flows. These graphs show the same fund and time period, but with a Bow of 1 on top and Bow of 3 below:

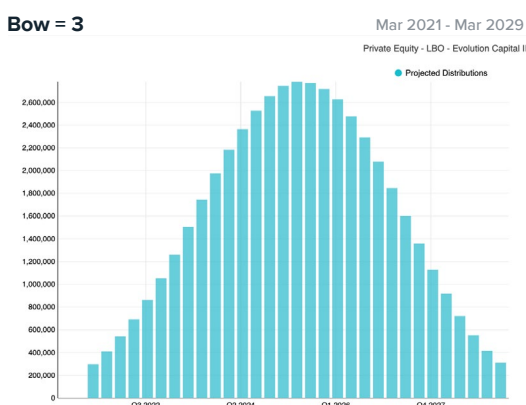
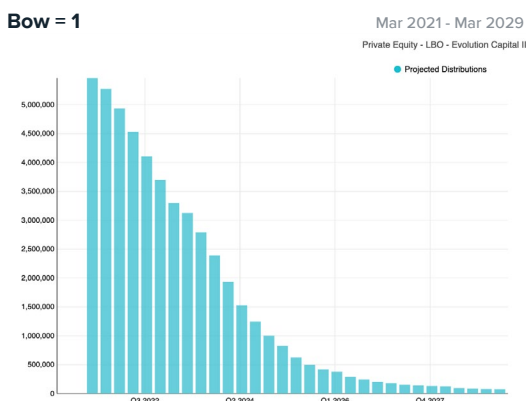


Figure 6: Projected distributions by bow. For illustrative purposes only. SOURCE: SEI Novus

CIOs study the impact of potential distress such as slowing VC distributions when rates rise and Initial Public Offerings (IPOs) slow down. To stress the portfolio, a CIO can boost the Bow factor for a single fund, funds of the same vintage year, or funds of the same strategy (such as LBO, VC, or Real Estate).

Conversations with GPs can tighten near-term cash flow forecasts for specific funds. By applying tailored models on a fund-by-fund basis—including custom assumptions where needed—teams will have a better understanding of upcoming capital requirements. For example, if a GP indicates there will be a potential distribution in the 2nd quarter, an analyst will manually construct a cash flow curve instead

of relying on a model. The result will be a comprehensive projection of expected future capital calls, distributions, and NAVs.

Model Configuration

Title Expected Distributions (Late Stage VC Fund)				
Type Custom Model				
Data Series	Period	Contribution (as % of Unfunded Capital)	Distributions (as % of NAV)	Return
	1	0.00	0.00	0.00
	2	10.00	0.00	0.00
	3	20.00	0.00	0.01
	4	50.00	30.00	0.05
	5	50.00	50.00	0.07
	6	100.00	100.00	0.09

Figure 7: Custom model configuration SOURCE: SEI Novus

As a private equity investment matures, actual cash flows will inform forecasted cash flows. Rolling up historical and future cash flows for each fund underpins the J curve for the private investment program. For a newer private investment program, near term calls will greatly outweigh distributions as exposures increase. As the program develops, distributions will become a more meaningful source of liquidity to fund future capital calls—but that is the rub. In turbulent times, liquidity from distributions dries up just as risk seeking GPs begin finding better opportunities. In Figure 8, the bottom of the aggregate 'J' will drop and move closer to t=0.

Long Term Cash Flow Projection

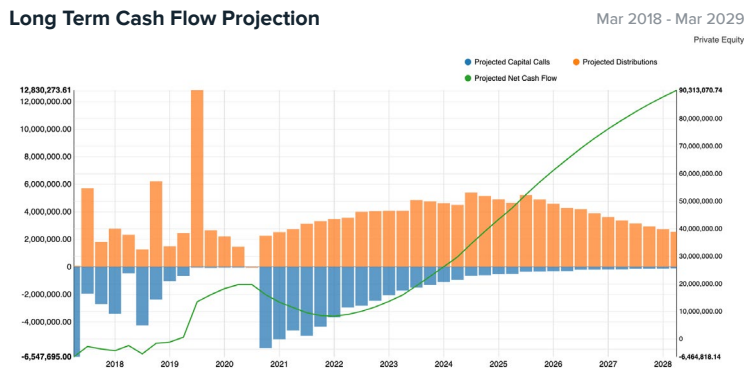


Figure 8: Cash flow projection curve. For illustrative purposes only. SOURCE: SEI Novus

CIOs need to ensure they have sufficient access to liquidity to withstand an acute 'J' drop for the full duration of the lower 'J'. The best come prepared with a liquidity plan informed by the liquidity analysis described above. Primary sources are cash, marketable securities, and credit lines. Secondary sources require the team to evaluate the portfolio based on the liquidity waterfall and the opportunity set.

Valuation Lags

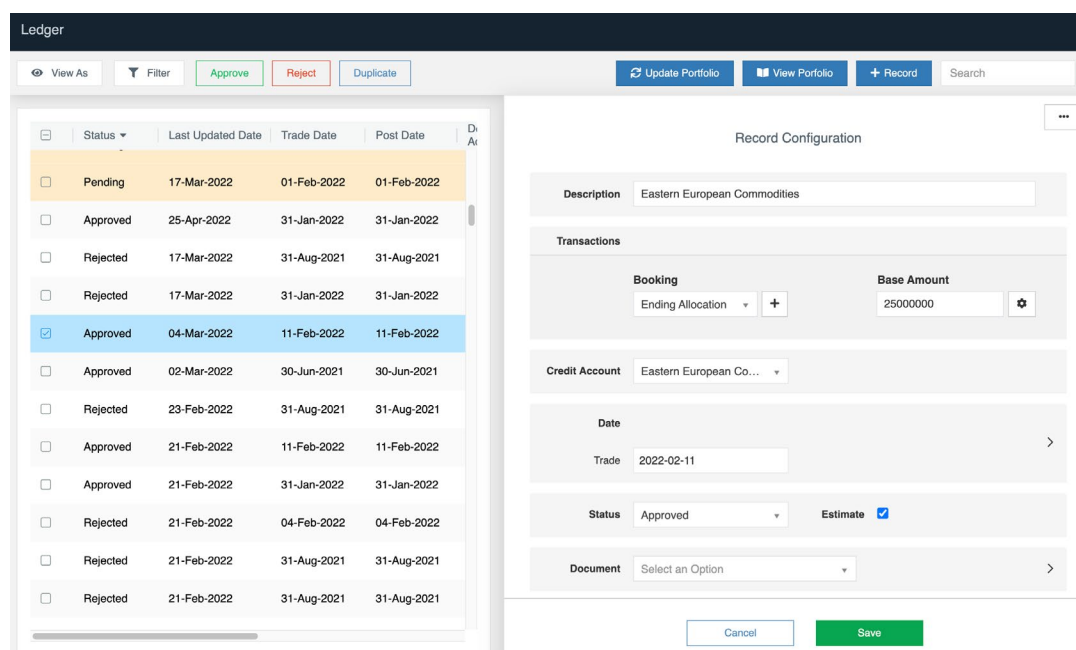
Marking a private investment to market is a notoriously slower and more involved process than marking a public investment. Valuation lags for private investments complicate life for LPs. In a previously published [blog post](#) we discuss benchmark timing mismatch from the valuation lag, but the valuation lag also skews exposures. Public market investments reflect the latest market prices right away. Given the valuation lag, the exposure to private investments can be impacted by fluctuations in the public markets. One solution is to maintain an Investment Book of Record (IBOR) with maximum transparency and timeliness of data, even if certain values are estimates. Tools allow investors to maintain both the lagged accounting records, as well as an IBOR with either estimated or finalized NAVs. By using estimates until finalized numbers are available, LPs can better gauge their exposure to illiquid private investments.

Figure 9 shows some key parameters that investors should specify when maintaining an

up-to-date IBOR, including trade date, post-date, and settlement date for transactions and valuations. Additionally, estimates should be clearly marked to facilitate their replacement when finalized numbers are available.

Periods of Stress: Public vs Private

During times of market stress, marks for public market investments quickly reflect negative returns. As previously discussed, privates are marked to market, but these marks may not arrive on investors' desks or inboxes for several weeks or even months. Figure 10 reflects what could happen to exposures if the equity markets drop drastically during a quarter. Public investments reflect market reality, while private valuations lag—causing outsized exposure swings for the portfolio. Figure 10 depicts a hypothetical example of how much the exposure to privates can swing upward when publics and privates reflect different market realities. This isn't to say privates are less volatile, but rather, the lagged marks distort the true size of the investment in real time.



The screenshot displays the SEI Novus Ledger Interface. On the left, a table lists investment records with columns for Status, Last Updated Date, Trade Date, and Post Date. The table includes rows for Pending, Approved, and Rejected transactions. The right panel, titled 'Record Configuration', allows users to edit transaction details. It includes fields for Description, Booking, Base Amount, Credit Account, Date, Trade, Status, Estimate, and Document. The 'Estimate' checkbox is checked, and the 'Save' button is highlighted in green.

Status	Last Updated Date	Trade Date	Post Date
Pending	17-Mar-2022	01-Feb-2022	01-Feb-2022
Approved	25-Apr-2022	31-Jan-2022	31-Jan-2022
Rejected	17-Mar-2022	31-Aug-2021	31-Aug-2021
Rejected	17-Mar-2022	31-Jan-2022	31-Jan-2022
Approved	04-Mar-2022	11-Feb-2022	11-Feb-2022
Approved	02-Mar-2022	30-Jun-2021	30-Jun-2021
Rejected	23-Feb-2022	31-Aug-2021	31-Aug-2021
Approved	21-Feb-2022	11-Feb-2022	11-Feb-2022
Approved	21-Feb-2022	31-Jan-2022	31-Jan-2022
Rejected	21-Feb-2022	04-Feb-2022	04-Feb-2022
Rejected	21-Feb-2022	31-Aug-2021	31-Aug-2021
Rejected	21-Feb-2022	31-Aug-2021	31-Aug-2021

Record Configuration

Description: Eastern European Commodities

Transactions

Booking: Ending Allocation + Base Amount: 25000000

Credit Account: Eastern European Co...

Date: Trade: 2022-02-11

Status: Approved Estimate: ☒

Document: Select an Option

Buttons: Cancel, Save

Figure 9: SEI Novus Ledger Interface. For illustrative purposes only. SOURCE: SEI Novus

USD \$mm

Beg of Q				End of Q		
	Exp \$	Exp %	Return	Exp \$	Exp %	Exp Chg
Fixed Income	2,500	29%	-18%	2,050	30%	1%
Equity	4,500	53%	-30%	3,150	47%	-6%
Privates	1,500	18%	3%	1,545	23%	5%
Total	8,500	100%		6,745	100%	0%

Figure 10: What if the IPS had a 20% exposure threshold for privates? For illustrative purposes only.

With that background, we have seen large institutions wrestle with their options because these very real circumstances may trigger an IPS exposure violation. In the above scenario for a public pension scheme with a 20% Exposure Threshold for privates, the plan may need to request an easing of the cap from the state legislature.

If that flexibility isn't granted, what does the plan do if GPs issue capital calls? Further calls will inflate their already overweight allocation to private equity. Is the LP allowed to fund the capital call or would that violate state rules? Do rules allow the LP to fund capital calls, but restrict new commitments until the privates exposure is once again below the threshold?

In addition to the acute pain, there can be harsh long-term consequences. What if a favorite manager raises a fund during this time to

capitalize on opportunities given the dislocation in the funding markets? Will the LP lose its reserved seat to participate in future fund raises if it has to pass on the latest fund raise? Will the LP be forced to crystalize a negative mark and sell some of its private fund exposure in the secondary market?

It is during periods of stress that the best CIOs prove their mettle. The best investment teams are able to avoid these situations, or have already planned for market stress by building flexibility into their liquidity picture. Investors can leverage analytical tools to combine Value-at-Risk (VaR) frameworks with allocations to provide a "worst-case-scenario" prediction of liquidity erosion within marketable funds. Applying VaR frameworks to the public portion of the portfolio helps inform liquidity planning for those once-a-century events that seem to happen every decade or so.

Max Loss (Dollar VaR)

May 2021

Fund	Beginning Allocation (\$)	StDev (%)	VaR95 (%)	VaR99 (%)	95% Dollar VaR	99% Dollar VaR
Artisan International Fund	14,235,908	2.52	8.20	11.91	1,167,342	1,695,745
Cedar Rock Capital Ltd.	14,057,328	3.93	7.02	10.33	987,496	1,451,450
Dynamo Administratpo de Recursos...	13,355,534	2.78	16.26	23.64	2,171,163	3,157,216
Effissimo Capital Management Pte ...	6,522,911	4.40	11.04	16.08	720,295	1,049,067
Gentilini Capital	3,485,767	1.86	5.36	7.95	186,768	277,010
Gentilini Capital	7,482,781	1.86	5.36	7.95	400,928	594,649
Castle Investors Ltd.	33,457,188	3.43	6.49	9.66	2,170,438	3,232,216
Global Opportunities Offshore Fund	6,361,900	1.69	2.95	4.35	187,647	276,974
Strategic Allocation Fund	6,950,903	3.21	11.86	17.24	824,722	1,198,654
JW Opportunities Fund	11,517,656	2.03	4.25	6.28	489,424	722,744
Mayfair Macro	15,261,444	1.22	0.00	0.00	0	0
Page Total	132,689,320	0.00	78.79	115.39	9,306,223	13,655,725

Figure 11: Liquidity loss with VaR analysis. SOURCE: SEI Novus. Data shown in the above charts is from a paper portfolio created by SEI Novus for demonstration purposes only.

Exposure Management

As the CIO works toward constructing a portfolio that fits within the target asset allocation, much effort is spent maintaining private investment allocations to achieve exposure targets.

There are three approaches to portfolio design: bottom-up, top-down, and hybrid. In a bottom-up approach, investors emphasize manager selection to capture the material performance differential between the top and bottom quartiles. In top-down, the lens shifts to diversification and strategic asset allocation. The third approach is a hybrid of both. The top-down approach can have liquidity benefits as investments are paced across vintage years and strategically spread across geographies and sectors. In a bottom-up scenario, the best managers may be concentrated in US Tech which could expose the portfolio to increased liquidity risk when the IPO market seizes up. As such, applying a top-down discipline to a bottom-up approach can spread liquidity risk.

In a dynamic market where the structure of private versus public investments causes them to behave differently, investors need a way to view exposures by asset class, sector, and geography across the entire portfolio. To manage exposures for private investments, CIOs benefit from combining total portfolio liquidity analytics with cash flow forecasting. As one investment moves, it impacts sizing of other portfolio investments. In times of stress, a portfolio can unexpectedly violate exposure thresholds while liquidity constraints of private investments make it difficult to tweak short-term investment sizing. Savvy CIOs utilize a portfolio monitoring system to stay abreast of both near-term capital requirements and short-term sources of liquidity, taking advantage of all the arrows in their quiver.

Instituting elements of the top-down approach builds balance across vintage year, fund type, geography, and sector. Balance diversifies liquidity requirements from future capital calls. LBO funds typically call capital faster than VC funds. Some vintages may call capital faster than others. Certain vintages may benefit from more and larger distributions. Maintaining balance in the private investment program is important because a bad decision today can't be unwound easily, so spreading bets diversifies risk. A

balanced private investment program helps smooth the pace of capital calls and distributions.

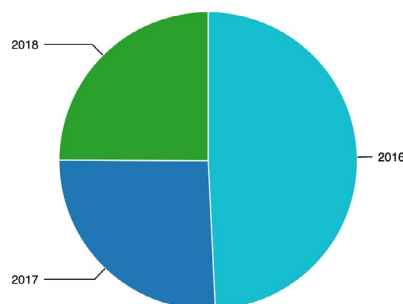


Figure 12: Exposure by Vintage Year
SOURCE: SEI Novus. Data has been anonymized.

Mapping exposures over time can highlight evolving trends and potential areas of overexposure.

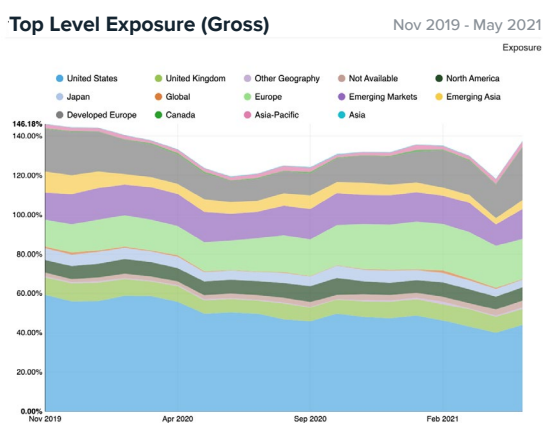


Figure 13: Historical Exposure by Geography. For illustrative purposes only. SOURCE: SEI Novus

Monitoring commitments, paid-in-capital, and distributions can provide clues to exposure pacing. If the rate of capital calls for a later vintage exceeds the rate for an earlier vintage, capital calls may not only be concentrated over a tighter time period, distributions will compress over a narrower time frame as well. The harvest periods will overlap, thus causing a bump and a valley in expected future cash in-flows.

Funded vs Unfunded Commitments by Vintage

May 2021

Fund	Commitment	Paid In Capital	Distributions	Net Cash Flow	Unfunded Commitment
> 2016 (1)	30,000,000	(11,989,395)	11,495,386	(494,009)	18,010,605
> 2017 (1)	25,000,000	(9,405,170)	13,593,923	4,188,753	15,594,830
> 2018 (1)	26,000,000	(2,092,305)	18,163,413	16,071,108	23,907,695

Figure 14: Funded vs unfunded commitments by vintage. For illustrative purposes only. SOURCE: SEI Novus. Data has been anonymized.

Closely monitoring the pace of paid in capital and unfunded commitments can spawn questions for GPs to keep them on mandate to ensure balanced exposures across vintages, thus smoothing calls and distributions.

Data Management Considerations

While CIOs prove their mettle in times of stress, COOs prove their worth day-in and day-out. To power all of the analytics, COOs operate behind the scenes to ensure clean data drives portfolio monitoring analytics. Rigorous data management practices allow for investors to track information over time and identify issues through alerting logic, as well as feed sophisticated analytical approaches for calculating risk and attribution metrics. Many COOs extend their staff by leaning on third party partners to help gather, cleanse, ingest, and maintain investment data. At the very least, a custodian maintains a list of investments and balances for each, but this is only the starting point for a comprehensive, timely, and transparent Investment Book of Record (IBOR). For example, systems should be in place to catch discrepancies between manager reported figures and what a custodian calculates. The best investors have a set process to extract rich data from manager updates; this includes exposures or positions from hedge fund reports and portfolio company details from private equity managers' quarterly financial updates. Structuring this data drives key exposure visualizations. Figure 15 shows a comprehensive exposure by sector across an entire asset owner portfolio, a view made possible by meticulous data collection and normalization across managers.

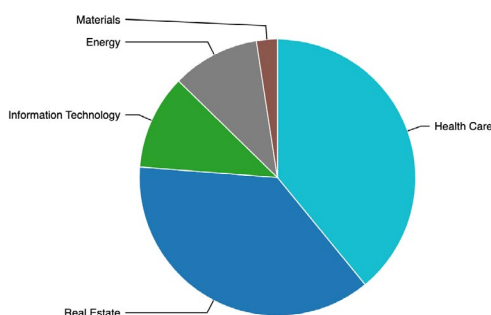


Figure 15: Top level exposure snapshot by sector. Data has been anonymized. SOURCE: SEI Novus

Insights can be gleaned from standardizing and aggregating company data which could inform conversations with managers, as well as predictions about future cash flows. Rapid growth or high multiples for older vintage portfolio companies suggest distributions may be pending. High multiples and above normal turns of leverage may inform the Growth and Bow to use in the Cash Flow Forecasting Model for a newer vintage LBO fund.

A valuation waterfall by company for each investment vehicle can help measure manager skill. The best GPs generate growth in the top and bottom line rather than multiple expansion or leverage. Multiple expansion is influenced by vintage year while leverage is financial engineering—which an investor could do without paying expensive carried interest.

Company Level Valuation Bridge



Figure 16: Company level valuation bridge. For illustrative purposes only. Data has been anonymized. SOURCE: The Novus Platform.

Conclusion

Managing liquidity is paramount to successful institutional investing, but liquidity analytics is not to be done in a vacuum. A portfolio is built from a collection of interrelated, dynamic investments. Over a typical career, a CIO may go through several full market cycles. It is during cycle downturns that the best separate from the rest. Resilient portfolios are built to have multiple liquidity levers, and sophisticated investment teams leverage all the data available when making portfolio decisions. Asset owners can navigate the choppiest of waters by maximizing transparency into their investments and stress testing frequently.



SEI Novus is a portfolio intelligence platform where asset owners and asset managers interact with their investments, and with each other. Join the thousands of investors who are leveraging portfolio intelligence.

Simplify complex multi-asset data workflows, investment processing, and portfolio planning solutions.

Data Management

Collect, digitize, and reconcile a vast array of data—from cashflows to manager-provided position-level detail. Harmonize varied transparencies, frequencies, and reporting conventions using a sophisticated normalization process.

Data Aggregation

Understand exposures and contribution at the total portfolio level. Then slice by strategy, sector, geography, or any other category.

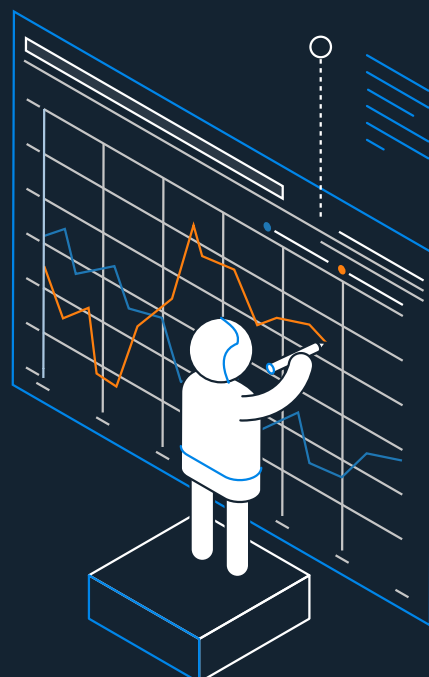
Manager Deep Dive

Perform detailed reviews of individual managers as part of due diligence processes and set alerts to ensure manager activities stay within mandated thresholds.

Portfolio Management

Understand liquidity, plan for capital calls, and test the impact of a potential new investment through What-if and portfolio construction tools.

More than a decade ago, SEI Novus invented the art of portfolio intelligence and now continues to pioneer innovative solutions for the investment community worldwide.



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