Modelling Illiquid Assets within Multi-Asset Portfolios

Dan Baxter

Head of Portfolio Design

Jacobi

www.jacobistrategies.com

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Executive Summary

- Illiquid asset classes have become a significant contributor to return and risk for institutional investment portfolios. However, the dynamics of how these asset classes behave within multi-asset portfolios are not captured very well by traditional portfolio modelling processes.

- Properly incorporating illiquid asset classes into multi-asset class modelling requires taking account of the unique characteristics of those asset classes. These include capital calls and capital/income distributions, the interaction of fund size and undrawn commitments (the "denominator" effect), limitations on rebalancing, and building allocations through commitments.

- These factors can have a material impact on asset allocation, return and risk. Failing to incorporate them into portfolio modelling can leave an investor with unidentified, and unmanaged risks. This was clearly illustrated through the Financial Crisis when some investors found themselves overcommitted to illiquid asset classes, much to the detriment of future returns.

- This paper explores how multi-asset investors can incorporate the unique characteristics associated with illiquid asset classes into their multi-asset portfolio modelling to produce more complete risk and return estimates, as well as to inform future commitment/redemption activity.

1. A common (but flawed) approach to incorporating illiquid asset classes

It is common practice for investors and consultants to establish return, volatility and covariance assumptions for all their asset classes, and to use these to produce a raft of portfolio return and risk statistics. A key assumption underpinning this kind of analysis is that portfolios can be rebalanced to target, even after large market drawdowns. One of the key benefits of diversification comes from the idea that we can rebalance from assets that have performed well into those that have not, and then reap the benefits as they mean revert to their long-run returns.

But certain characteristics of illiquid asset classes can invalidate this key assumption. To illustrate this, you simply need to recall the situation that some funds found themselves in during the Financial Crisis. After years of strong returns and expanding fund balances, these funds found themselves underweight private market asset classes and made unfunded commitments to get back to target. When equity markets collapsed the size of the funds shrank, but their unfunded commitments remained. To retain liquidity to meet potential capital calls, some funds were forced to reduce distributions, sell equities at depressed prices, or even borrow, while elsewhere in the market many asset classes offered valuations at generational lows.

2. Lessons from the Financial Crisis

The introduction of illiquid asset classes into a portfolio brings with it several features that investors need to incorporate into their portfolio modelling if they are to gain a more complete picture of their risks and opportunities. The experience of the Financial Crisis highlights that investors should consider the following when modelling illiquid asset classes:

- Breaking the nexus between the fund size and the percentage allocation to illiquid asset classes.
- Incorporating cash flows: Capital calls and distributions, along with growth and income, need to be factored into portfolio modelling.
- Incorporating unfunded commitments into portfolio modelling and stress testing.

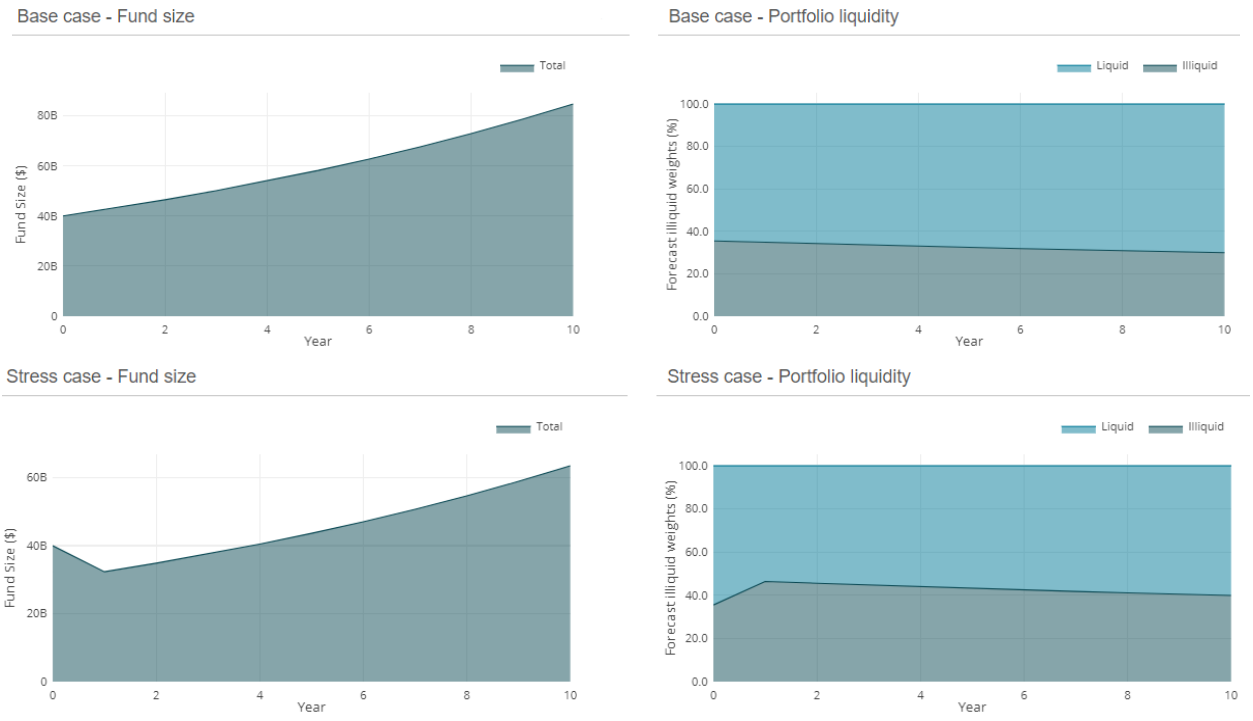
3. Breaking the nexus between fund size and percentage allocations

Assuming an illiquid asset class's weight is fixed as x% of total fund size does not always make sense, as the overall portfolio value can change day-by-day with market moves or cashflows, while illiquid asset values may only be updated once per quarter and can take months or years to rebalance.

Instead, investors should be able to identify which of their asset classes are illiquid and allow their portfolio weights to be determined by how the value of those asset class move relative to the overall portfolio. This is particularly useful for stress-testing applications as shown in Figure 1 below.

The top panel of Figure 1 shows a forecast for fund size and the relative allocation to illiquid asset classes assuming no new investments are made. The bottom panel shows the same charts assuming a market drawdown event in year one. By breaking the nexus between fund size and illiquid asset class weights we can see that overall illiquidity spikes after the fund drawdown in year one. This analysis can also be extended to include the impact of recurring or one-off cash flows into or out of the fund.

Figure 1: Breaking the nexus between fund size and illiquid asset percentage



Source: Jacobi. Simulated results only.

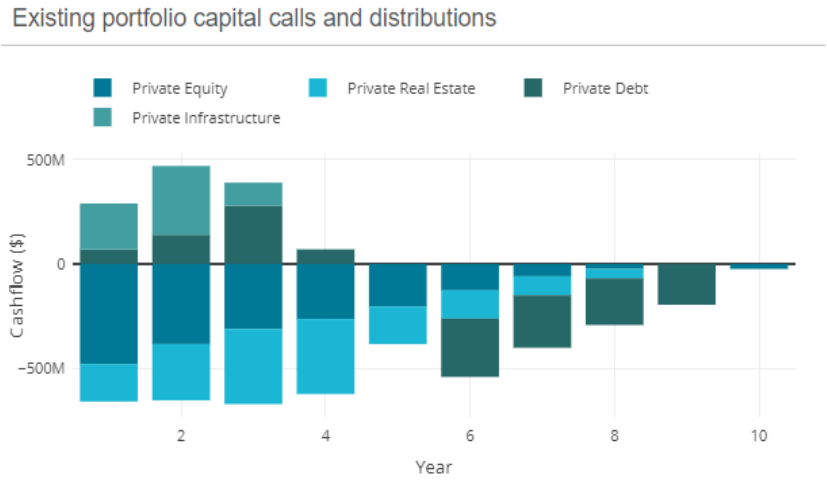
4. Incorporating cash flows

An existing portfolio of illiquid asset class investments will have cash inflows (capital calls) and outflows (income or capital distributions) that need to be considered, especially when stress testing. To demonstrate the importance of cash flows in this paper, we use results based on an example multi-asset portfolio from the Jacobi platform that includes four illiquid asset classes – private equity, real estate, debt and infrastructure.

In the early years of our analysis, both the private debt and infrastructure asset classes are drawing capital from pre-existing commitments, while private equity and private real estate are returning capital. Later in the simulation the private debt portfolio begins returning capital also. These assumptions are easily visualized in the platform as shown in Figure 2.

With these assumptions, and splits between growth and income for returns, the investor could forecast their total portfolio volatility as shown in Figure 3. The left panel of Figure 3 shows the total level of illiquid assets in the portfolio, while the right panel shows the value of illiquid assets relative to the target level.

Figure 2: Cash flows



Source: Jacobi. Simulated results only.

Figure 3: Illiquid asset class forecasts with cash flows

Source: Jacobi. Simulated results only.

In this example the weight to illiquid assets falls through time, leading to the portfolio becoming significantly underweight the portfolio targets. Without the ability to incorporate cash flows the modelling would not reflect the extent to which the portfolio was becoming underweight illiquid asset classes. This in turn could result in the portfolio failing to achieve the expected returns and diversification objectives that went in to setting the target weights.

While some investors naturally anticipate the direction of these results, they don't have tools to accurately forecast how much they need to commit/redeem to remain at target weights. This point leads us to the next lesson from the Financial Crisis, the need to forecast and incorporate unfunded commitments.

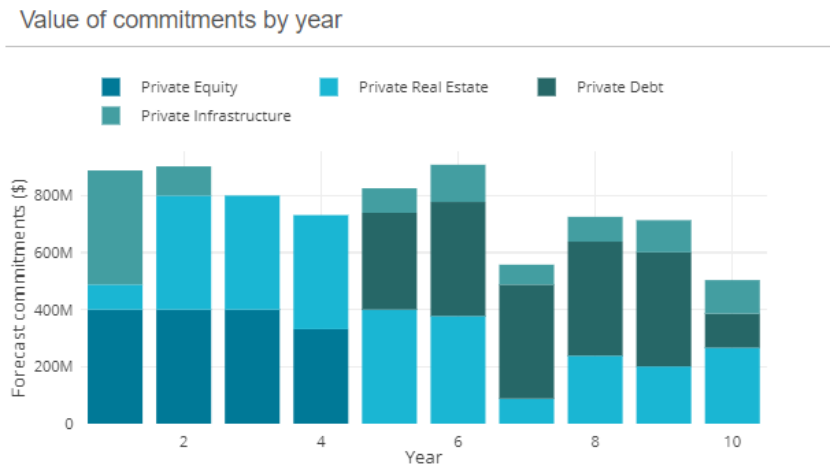
5. Incorporating commitments

Existing commitments can be incorporated into portfolio modelling using the cash flow approach described above. For stress testing and liquidity management purposes the Jacobi platform allows users to have multiple cash flow profiles that can reflect different drawdown rates.

A more interesting application of commitment modelling involves estimating the correct size and pace of future commitments. To maintain illiquid asset classes at their target weights investors continually need to be thinking about the right amount to commit or redeem from their illiquid asset classes. For any given set of circumstances and constraints, Jacobi allows users to solve for the value of commitments or redemptions that best achieves their desired portfolio targets.

Consider again the results shown in Figure 3, where the portfolio becomes materially underweight to illiquid asset classes over time. Given a set of target illiquid asset class weights and constraints on what can realistically be committed, Jacobi identifies the commitments shown in Figure 4 to minimize variation from target levels of liquidity.

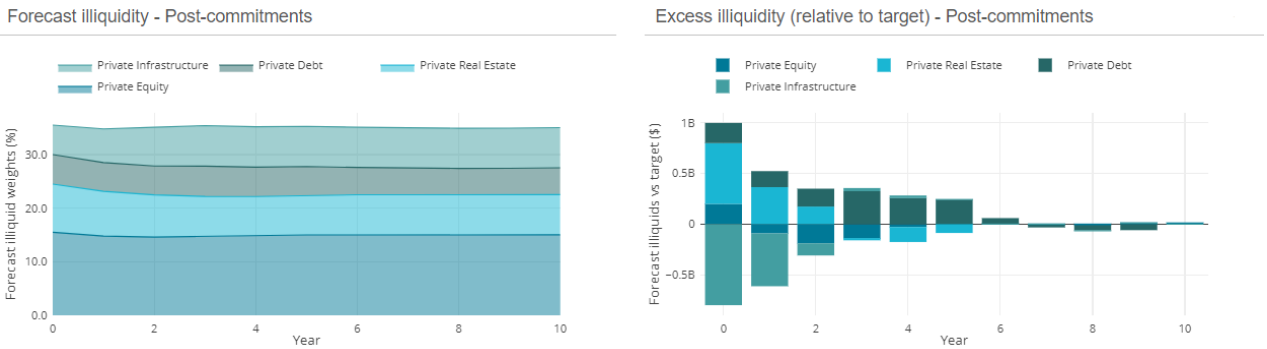
Figure 4: Forecast commitments



Source: Jacobi. Simulated results only.

Incorporating those commitments gives the total portfolio liquidity and excess liquidity (relative to target) shown in Figure 5. Clearly, this framework for incorporating cash flows and commitments can be helpful for identifying the size and pace of commitments that are required to help the fund achieve its illiquidity targets.

Figure 5: Illiquid asset class forecasts with cash flows and commitments



Source: Jacobi. Simulated results only.

6. No two investors and no two portfolios alike

The examples used in this paper are relatively simple to clearly illustrate the concepts being discussed. Behind the scenes, there are a wide range of practical questions that investors need to address for their own circumstances to properly model illiquidity within their portfolios. These include:

- How many illiquid asset classes and sub-asset classes do you invest in? What are your assumptions for return and risk?
- From where are capital calls into illiquid asset classes funded?
- What type of rebalancing occurs within liquid asset classes if illiquid weights deviate from target?
- How are fund commitments in foreign currencies handled?
- What pace of drawdowns/capital return should be assumed across asset classes?
- What is the maximum amount the fund can reliably commit in any given year?

We believe that investors need to think very clearly about these questions as they relate to their own portfolios, and be wary of generic, one-size-fits-all solutions or industry "short cut" assumptions.

Conclusion

Investing in illiquid asset classes is not a simple endeavour, yet many investors adopt overly simplistic approaches to modelling them and incorporating them into multi-asset portfolios. Key elements that investors should consider for illiquid assets include breaking the nexus between fund size and portfolio allocation, cash flows, and how commitments/redemptions will impact future asset allocation and liquidity.

Incorporating these three elements into a multi-asset portfolio model, especially in conjunction with the ability to stress factors such as fund returns and cash flows, provides a much more robust way to estimate portfolio risk. As simple as this sounds, there are an infinite number of ways in which this type of analysis could be customized for a given investor's situation. Investors therefore need a solution that is highly customizable.

If you are a multi-asset class investor that invests in illiquid assets and would like to improve the way you model them in your portfolios, Jacobi has the solution for you. At Jacobi, we recognize that multi-asset investing involves a range of challenges, like those associated with illiquid assets, that cannot be addressed by systems designed for equity or fixed interest investing. Our cloud-based technology combines powerful modelling processes with professional visualization tools to tackle problems unique to the multi-asset class portfolio management space.

About Jacobi

Jacobi's storyboard technology has its roots in institutional investment management and brings together investment expertise and a market-leading technology platform. Headquartered in San Francisco, the company is led by a team of experienced investment professionals and engineers.

For more information on Jacobi's modelling framework or other tools available within our portfolio modelling and visualization suite, please do not hesitate to contact us.

Contact:
Aaron Simon
Head of Business Development
info@jacobistrategies.com