# Total Portfolio Liquidity Planning inclusive of Private Assets

Cash Flows, Redemption Capacity, Rebalancing Value

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## Needs Addressed

#### **Liquidity Planning**

- Private Assets are not *Illiquid*. They are *Periodically Liquid*. Forecasting their inflows and outflows has an important impact on future liquidity and liability capacity
- The interaction of Private Assets with Publicly Traded Assets further raises the question of the right balance between:
  - (a) being guaranteed to be liquid at a future point in time likely increased weights of public assets
  - (b) the long term growth of a portfolio likely higher weight of private assets



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## More Needs Addressed

#### **Economic Values of Private Assets**

- Private fund GPs provide valuations that are slow to adjust, and subjective. Three problems with this:
  - (a) In a crisis, private assets appear to have a large weight and low volatility which gives the false impression of low Total Portfolio risk
  - (b) If target policy weight is breached in a "dislocation", this will prompt the sale of
    private fund stakes at a very steep transaction cost, while also adversely affecting the
    long term growth of the Total Portfolio
  - GP valuations do not reflect the economic views of the investor in a timely fashion

#### Long Term Correlation between Asset Classes

- All factor risk models are "single period" models. Investors in private and public assets are long term investors, however.
  - (a) There has been some research into converting asset classes' single period estimates of standalone volatility into long term estimates
  - (b) There has not been any noteworthy research or products that deal with long terms correlations of asset classes. Because it was hard, until now.





## Steps Involved

- Create Pacing Models for Private Asset Investment Cash Flows
   Enhanced version of Takahashi and Alexander model
- Incorporate Uncertainty of Cash Flows

Best of breed risk factor models for equity, debt, and real assets form Northfield

Convert cash flow projections to cumulative, multi-period statistical probability distributions of liquid resources available in each future period

Super efficient simulation engine from Aspequity instantaneously captures 10<sup>21</sup> cash flows paths over ten year investment horizon

 Build cumulative cash flow covariance matrix of asset classes and an efficient frontier of tradeoff between preset confidence liquidity capacity level and expected long term portfolio value. User picks a portfolio based on their desired confidence – e.g. 85%.

Northfield's optimization application automatically builds the efficient frontier based on cash flow covariance model inputs



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## Bonus

Two key metrics fall out of the Liquidity Planning Analysis:

- Correlations among asset classes are a byproduct of the steps Show the degree of diversification in the long run
- The cumulative cash flow probability distribution of private fund and assets, another byproduct of the liquidity analysis, are the key input into economic valuations of such assets

The Certainty Equivalent Income Approach to Valuations conforming to the guidelines of AICPA, CFA Institute, and IPEV



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## Liquidity Planning Illustrated





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## Simulating More Cash Flow Paths...





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## More Paths...





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## **Preview: Our Solution**



Using 10<sup>21</sup> cash flow paths provides a continuous probability distribution which immensely reduces sampling error of Monte Carlo simulations



## The Plan in Action

# Step1. Build Cash Flow Pacing Models for Private Assets

Builds on and improves on the well familiar Takahashi-Alexander model



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## **Building Cash Flow Pacing Models**

#### **HIGHLIGHTS**

- Our models are related but distinct from the Yale model.
- They provide an improved fit to observable fund cash flows behavior by recognizing that GPs control and adjust the rate with which they liquidate holdings.
- Another key differentiator is the probability distribution around the forecasted "average" cash flow which reflects the inherent uncertainty of investment cash flows.
- The true success metric of a cash flow model is explanatory power of *periodic* distributions and contributions.
   *Cumulative* cash flow comparisons are misleading due to secular time trends.



Correlation: 0.82; T-statistic: 11.8

Fund Contribution Rates: Realized vs.



Correlation: 0.92; T-statistic: 10.4



## Model Fits Using SSPEI data





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## The Plan in Action

# Step 2: Incorporate Uncertainty of Cash Flows

Builds on four decades of industry experience embedded in the award-winning risk models for equity, debt, and real assets of Northfield



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## **Private Fund Distributions Uncertainty**

#### **Cash Flow Forecast**





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## **Private Fund Contributions Uncertainty**

#### **Cash Flow Forecast**







## The Plan in Action

# Step 3: Cumulative, multi-period statistical probability distributions of liquid resources available

Builds on the unique power of Aspequity cash flow engine to calculate continuous nonparametric probability distributions



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### Cumulative Statistical Distribution of a Private Fund CFs







## The Plan in Action

## Step 4: Build efficient frontier





### **Correlations from Cumulative Cashflow Distributions**

- Can be estimated from the projected cumulative cash flow distribution processes for *B* and  $B \sim f(A)$
- A computational short-cut:

$$Corr_{Horizon T}(B, A) = \frac{\sigma_{B \sim f(A), T}}{\sigma_{B, T}} = \frac{\beta_{B-to-A, T} * \sigma_{A, T}}{\sigma_{B, T}} = \frac{COV(B, A)_T * \sigma_{A, T}}{\sigma_{A, T}^2 * \sigma_{B, T}}$$
$$= \frac{COV(B, A)_T}{\sigma_{A, T} * \sigma_{B, T}}$$

where  $\sigma_{B \sim f(A),T}$  and  $\sigma_{B,T}$  come directly from the projected cumulative cash flow distribution processes for *B* and  $B \sim f(A)$ 



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#### Time Dependency of Correlation of Public and Private Equity







#### Time Dependency of Correlation of Fixed Income and Private Equity





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## Feasible Set of Efficient Portfolios





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## Efficient Portfolios with different Liquidity Levels





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## Picking the Preferred Efficient Portfolio



From the Efficient Frontier, pick the portfolio which guarantees the amount of liability due with the chosen level of confidence



## Key Points About Liquid Optimal Portfolio Choice

- Liquidity Driven Optimization has some resemblance to MVO. Mean-variance tradeoff, however, is not the end objective of LDO, as there are multi period constraints and dependencies that are factored in the LDO analysis.
- An optimal asset mix in a Multi-period setting involves filtering through optimality in sequential periods. In period N+1, use only the portfolios that are efficient in period N, as an input to the N+1 period optimization. The efficient solutions in period N+1 then is a linear combination of period-N optimal portfolios. Linear combination of efficient portfolios is also efficient. So, the optimal solution in N+1 also satisfies period-N optimality due to the linear combination efficiency.
- If the Private Assets to which the investor has access are strong performers, they can get high weights in the optimal mix. Otherwise public assets compete well on the growth dimension. There is no one-size fits-all prescribed allocation, the investor and investment details are important.



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**Private Asset Valuation** 

# The Importance of using Economic Valuations in optimization



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## Not all Fair Value is Equally "Fair"

The term *Value* has vastly different meanings in different investment settings and asset class situations. Yet very often "values" across the board are treated all the same and put under a common denominator.

- Public assets have quoted market prices a type of value which the investor can redeem for cash at any moment in time
- Private assets have values assigned which are nominally designed to replicate an amount at which the investor can redeem the asset, but this is only in theory based on one of the following:
  - Accounting *historic, accrual, convention-based*
  - Mark-to-market often a misnomer: a subjective assignment of comps
  - Mark-to-model only as good as the model used
  - Utility to buy and hold *subjective by definition*





## How Public and Private Asset Really Differ

- Public asset investors pay a premium to stay liquid at all times, and they are subject to extreme "fat tails" type of volatility when the listed markets, like recently, hoard to dump exposure and obtain liquidity, or if in strong up markets, hoard to provide liquidity and buy exposure.
- Long term investors, as long as not subject to the same liquidity requirements, are also not subject to such extreme volatility.
- In the long run, the performance of private equity converges with that of public equity because most targeted exits are going public or getting acquired by a public entity.
- With regards to the mean or "expected" performance, however, private management has the advantage of:
  - lower entry point due to the capacity of investors to stay illiquid for long
  - the ability of concentrated ownership to produce better management decisions for growing faster than the particular sector due to better cost saving and improved market share.



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## Industry Guidelines on Fair Value

- The main sources of industry guidance on private asset valuations come from organizations like the AICPA, IPEV, and the CFA Institute. All of them define fair value as the amount to be realized for an asset sale in an orderly market transaction.
- With some variation in themes they agree that the following valuation approaches are applicable to the usual situations that arise in practice:
  - Cost approach adjusting historic values with write-ups and write-downs for events of significance; accounting driven approach
  - Market Comparable finding suitable similar assets that recently traded public or private, and assume that value
  - Economic Approach a range of related techniques and variations: DCF, scenario based, EV-build-up, certainty equivalent approach, PWERM, etc.





## What approach makes sense

- Captures the projected behavior of the specific fund or investment in terms of expected growth and cash flow pacing
- Reflects the risk of the uncertain cumulative net cash flow value over the lifetime of the fund or investment
- Acknowledges the non-normal statistical distribution properties of the cumulative net cash flow value. Private investments have serially dependent growth and volatility from one period to the next, so they become non-normally distributed over their lifetime.
- Incorporates explicitly a multi-period view. In contrast, a DCF model with a discount rate from a single period model like CAPM *does not* reflect evolving beta or higher-moments of payoff distribution.
- Adjusts for investor risk aversion exhibited in recent market transactions





# **Testing Our Valuation Model Since 1950**

- Using year-end data going back to 1950, this analysis took as inputs the average S&P500 stock's dividend per share as basis of building a forecasted cash flow curve, and the volatility of the dividend to forecast the cumulative cash flow probability distribution of investing in the average S&P500 index share.
- Then the approach priced the share at the end of each year using our EXPLO model as one case, as well as using Mean-Variance utility (traditional portfolio theory) algorithm as an alternative. The analysis then compares the actual level of the average share price of the S&P500 index at each year end with both the EXPLO and MV value estimates.
- While the S&P500 is an example form the public markets, it demonstrates the value of the approach that can applied to both public and private markets, using as an example the most recognizable investment benchmark globally.



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## **Testing Our Valuation Model Since 1950**





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## Why Value Weights Matters in Optimization

- If an optimal solution suggests the sale of a LP interest in the secondary market, or reduction of a commitment program, the proceeds should match a like-size purchase of a public market investment.
- And vice versa.
- If not, the Optimization path is practically infeasible
- GP provided NAVs are not standardized to assure this property
- Economic Value Is !



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## Case Study: COVID-19 and PE valuations

	Buyouts	
	V-recession writedown	U-recession writedown
2 year since inception	-15.1%	-25.8%
7 year since inception	-18.4%	-26.4%

	Debt	
	V-recession writedown	U-recession writedown
2 year since inception	-14.3%	-20.8%
7 year since inception	-15.2%	-19.6%

	Venture	
	V-recession writedown	U-recession writedown
2 year since inception	-16.3%	-26.6%
7 year since inception	-19.1%	-27.7%



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## Case Study: Longevity of Impact

Projected Residual Value over Remaining Quarters of Fund Lifetime - Venture, 2 years since inception





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## Case Study: Longevity of Impact (cont'd)

Projected Residual Value over Remaining Quarters of Fund Lifetime - Venture, 7 years since inception





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## Best course of action in "dislocation"

In theory asset owners' tools to mitigate the dislocation are:

- Curtail commitment programs the first "go to" place as it offers a low "transaction costs" avenue
- If this is not enough, investors may need to sell LP stakes at depressed prices.

However, there are a couple of challenges in practice with either of these:

- The Secondary Market has all but dried up, with potential buyers entirely at a loss what the "market comps and EBITDA" are. Lack of consistent methodology for valuation has affected in real time the price discovery. The LPs would face a very fat lower tail if they go to the secondary market now.
- The actual drop in private asset economic values in Q1 and Q2 of 2020 might not be too far form the drop in public asset classes, so the allocation "dislocation" might be not of the magnitude touted across the board, or even be in the reverse direction.





## What we offer

- Access to our Excel interfacing desktop Cash Flow Engine *explo* to forecast cash flows from and to funds invested in private equity, private debt, and real estate, infrastructure, and resource assets
- Access to the desktop Northfield Open Optimizer to build efficient frontiers for liquidity and liability capacity
- Consulting help with constructing public-private covariance matrix, building the efficient frontier, and understanding optimal portfolios
- Consulting help with configuring *explo* to perform economic valuations of private assets and their Total Portfolio weights
- Support and industry leading research related to all of the above items. Help with preparing presentations to organizational stakeholders.



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## Thank you

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