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PGIM

BUILDING A BETTER PORTFOLIO

Balancing Performance and Liquidity

May 2020

Asset Allocation With Illiquid Private Assets

- **Private assets can complicate asset allocation:**
  - Unique cash flow patterns – unexpected capital calls and distributions
  - Difficult and costly to liquidate
  - Cash flow demands can disrupt public market asset allocations

- Often, decision making of **top-down** asset allocation group is separate from that of the **bottom-up** private market deal team group

- How does the interaction of these two groups affect
  - Portfolio performance?
  - Liquidity risk?

Two Goals of the Paper

1

Model the interaction of
top-down asset allocation with
bottom-up private asset investing

2

Integrate **liquidity management**
into a multi-asset, multi-period
portfolio construction process

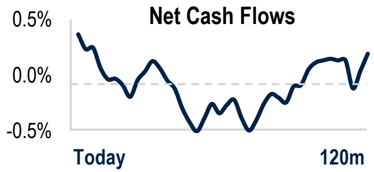
Building Portfolios: Top-Down & Bottom-Up

OASIS™ Framework Overview

Top-Down Asset Allocation

Asset Type	Description
Public Passive % (β Stocks + Bonds)	no **α** - generally available for liquidity at low cost
Public Active % (α Stocks + Bonds)	**α** generating – liquid but costly to provide liquidity
Private % (NAV)	Unavailable for Liquidity

Bottom-Up Private Market Investing



Portfolio Performance & Liquidity Tradeoff

Source: GIC EIS & PGIM IAS. Provided for illustrative purposes only.

Key Features of OASIS

- Incorporates private asset **commitment strategy** into the measurement of a portfolio's liquidity characteristics
- Models **Private Asset Cash Flows** and Valuation
- Reflects the **unique characteristics** of private assets such as the delay and uncertainty of capital calls and high idiosyncratic risk
- Allows CIOs to express **views** on the performance of private assets and their **fund-selection skill**

Answering Some Important CIO Questions

- How to formulate a **private asset commitment strategy** to manage private asset exposure and the uncertainty in timing and magnitude of their cash flows over time?
- What should be the **desired allocations** (public vs. private, public passive vs. public active) given my liquidity risk tolerance?
- How would various **market scenarios** impact my portfolio's liquidity and performance?

Top-Down Asset Allocation

- A CIO defines **which assets serve as liquidity sources**
- A "**waterfall**" for sourcing liquidity
  - First sell assets from the least disruptive and expensive level
  - If more assets must be sold, then sell from more disruptive liquidity levels
- A **liquidity event** occurs when a CIO must move down the waterfall to source liquidity

Portfolio Structure & Waterfall

Liquidity Sources for…		… these Liquidity Demands			
Asset Type	Liquidity Level Description	GP Capital Calls	Rebalancing	Dry Powder Creation	Dry Powder Reversal
(1) Liquid Passive (β stocks + bonds)	Capital Call Reserve	√	–	–	–
	Available for Liquidity	√	√	√	√
(2) Liquid Active (α stocks + bonds)	Only Available for Capital Calls if Level (1) is exhausted	√	–	–	–
(3) Illiquid (NAV)	Unavailable for Liquidity	–	–	–	–

Source: GIC EIS & PGIM IAS. Provided for illustrative purposes only.

Portfolio Structure – CIO's Baseline Portfolio Structure

- For this presentation, we assume the following portfolio structure:

Asset Type	Liquidity Level	Liquidity Level Description	Baseline Portfolio	
			Stock	Bond
(1) Liquid Passive	1A	**Committed, but Uncalled** Capital Call Reserve	1%	1%
		Uncommitted Capital Call Reserve	0%	0%
	1B	Passive Liquid Available for Liquidity	1%	2%
(2) Liquid Active	2	Available for Capital Calls if Level 1 is exhausted	45%	35%
(3) Illiquid (NAV)	3	Unavailable for Liquidity (LP Investment NAV)	15%	

Note: Yellow field indicates an investor input. Liquid active management alphas are assumed to be 100bp/y for stocks and 50bp/y for bonds.
Source: GIC EIS & PGIM IAS. Provided for illustrative purposes only.

A Portfolio Liquidity Risk Measure – Severity Scores

- A CIO can assign a subjective **liquidity severity value** to <u>each type</u> of liquidity event

Liquidity Severity Values – An Example

Liquidity Events		Severity Value
Rebalancing Liquidity Shortage (1 type)	1B_RB	1
Dry Powder Creation Liquidity Shortage (1 type)	1B_DP	1
Dry Powder Reversal Liquidity Shortage (1 type)	1B_DP_RB	1
Capital Call Liquidity Shortage (3 types)	1A_CC	2
	1B_CC	3
	2_CC	4

Note: Yellow field indicates an investor input. Source: GIC EIS & PGIM IAS. Provided for illustrative purposes only.

- A portfolio's **liquidity severity score** quantifies a portfolio's liquidity risk, across different market environments

Bottom-Up Private Asset Investing

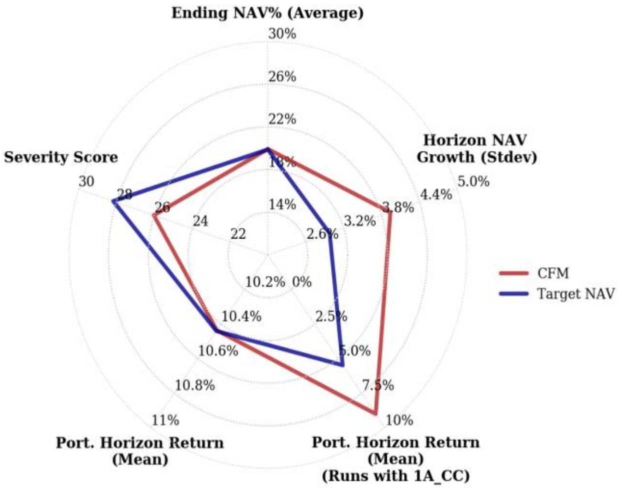
- CIO makes decisions on **how to invest in private assets**:
  - Vintage diversification
  - How quickly to build up and maintain private assets exposure (NAV% of overall portfolio)?
- These CIO decisions have **implications** for
  - Timing and magnitude of net cash flows (*i.e.*, distributions minus calls)
  - Private asset valuation (NAV)
- Commitment strategy should **match CIO's objectives**:
  - Achieve zero net cash flows for minimal disruption to public portfolio; or
  - Maintain NAV% of the entire portfolio; or
  - Target a higher NAV% of the entire portfolio

Impact of Commitment Strategy Decision

Given a portfolio asset allocation:

- Measures tradeoff between performance and liquidity risk, incorporating the commitment strategy design
- Helps to select appropriate commitment strategy

Comparison of Commitment Strategies



Target NAV%

- Target a certain horizon NAV%
- Stable commitment pattern
- Lower dispersion of NAV growth

Cash Flow Matching (CFM)

- Higher NAV% at horizon
- Few liquidity events, esp. in bad economic environments

Source: GIC EIS & PGIM IAS. Provided for illustrative purposes only.

Commitment Strategy & Liquidity Sensitivity to Market Environment

- **CFM**: Fewer 1A_CC liquidity events and uncorrelated with market environment
- **Target NAV%**: All 1A_CCs occur when market is below average

➔ Capital call liquidity shortages occur when liquidity is precious

Liquidity Event Sensitivity to Market Environment

Past performance is not a reliable indicator of future results. Source: Datastream, GIC EIS & PGIM IAS. Provided for illustrative purposes only.

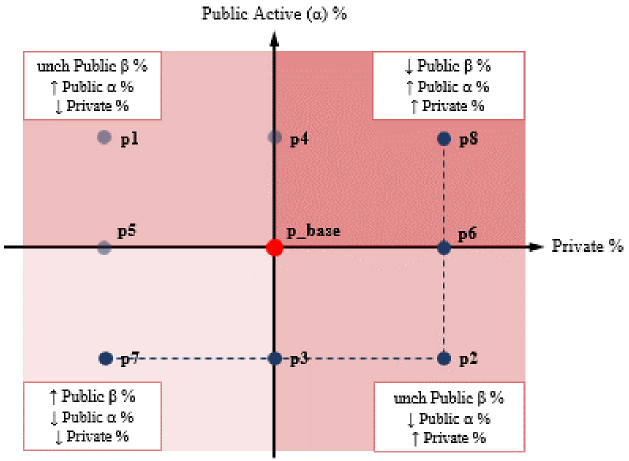
Impact of Asset Allocation Decision

Given a commitment strategy:

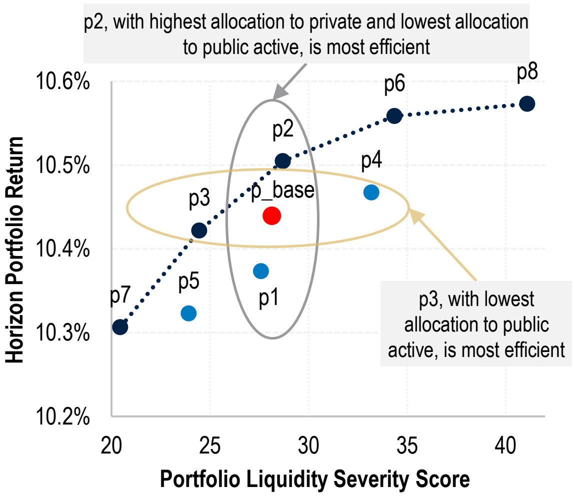
- Evaluates impact on portfolio's liquidity severity score and performance
- Helps make more informed asset allocation decisions

  ➔ Private assets, given our assumptions, are more efficient in generating performance than public active assets

Different Portfolio Asset Allocations



Portfolio Liquidity – Performance Tradeoff



Source of both charts: GIC EIS & PGIM IAS. Provided for illustrative purposes only.

Market Scenarios: Impact of U-shape vs. V-shape Recovery

Given a commitment strategy *(e.g., Target NAV%)*

- Economic paths with a V-shape recovery lead to expected portfolio returns higher than those with a U-shape recovery
- A U-shape recovery encounters capital call liquidity shortages more often than a V-shape recovery
  - 3 vs. 0 quarters in 10y horizon

Liquidity Events Arising from U-Shape and V-Shape Recoveries

	U-shape	V-shape
Occurrence of 1A_CC in 10y	3	0
Expected Horizon Portfolio Return	6.6%	11.3%
Economic Paths (of 5,000)	193	789

Source: GIC EIS & PGIM IAS. Provided for illustrative purposes only.

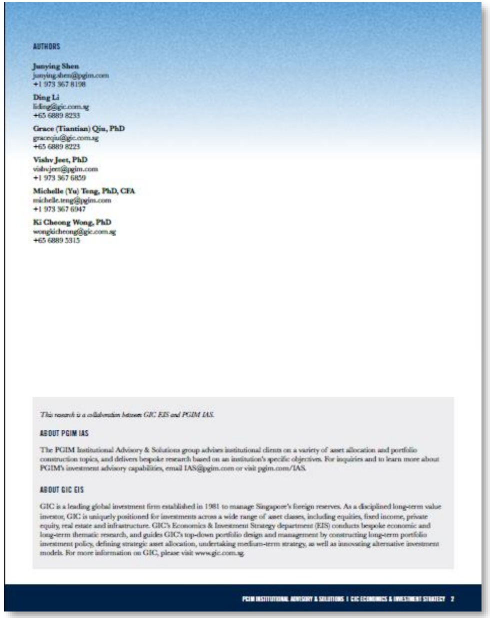
CIO Takeaways

CIOs can use the framework to

- Analyze how their bottom-up private asset investment activity interacts with their top-down asset allocation decisions
- Study how their portfolios are exposed to various liquidity events
- Examine how their portfolios behave in various market scenarios
- Evaluate the consequences of changing their views on private asset performance relative to public markets

➔ **Help CIOs evaluate the tradeoff between expected portfolio performance and liquidity risk**

Building a Better Portfolio: Balancing Performance and Liquidity



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