INSTITUTIONAL ADVISORY & SOLUTIONS

THE DIFFERENTIAL

New Developments in Portfolio Construction

March 2021

THE IAS CREDO

PGIM's Institutional Advisory and Solutions Group provides objective, data-informed analysis to help Chief Investment Officers and Investment Committees manage their portfolios.

Dear Investor,

Welcome to our inaugural bulletin, designed to provide you with color and context about the PGIM Institutional Advisory & Solutions (IAS) group's mission, recent work and research pipeline.

Maintaining client connectivity during a challenging year: Our group abruptly exited our Newark offices last March and has not met with clients in person for the past year. Yet, like you, we have strived to connect in new ways and grow our capabilities. In 2020, IAS welcomed two new team members, published 10 research papers, completed seven major bespoke portfolio structuring projects, launched a blog focusing on real assets, and initiated a Research Paper Series in conjunction with the SSRN Financial Economics Network.

A look back on 2020: Our research program centers on **Real Assets, Portfolio Construction, Manager Allocation and Selection, and Illiquid Private Assets**. Our research aims to provide allocators with practical, implementable advice as they make portfolio construction decisions. For example, we launched our asset allocation framework, OASIS, to help CIOs analyze how allocations to illiquid private assets, in combination with commitment pacing strategies and fund-selection skill, affects their portfolios' ability to respond to liquidity demands. This framework allows a CIO to quantify the interaction between portfolio structure and performance, enabling the CIO to make better, more informed portfolio liquidity decisions. As another example, we developed a methodology to help CIOs determine "What is the optimal number of managers?" A CIO can express preferences across different manager types, incorporate their manager selection skill, management fee function, and surveillance cost to solve for the optimal number of managers and associated manager allocations that can achieve the highest expected information ratio. Links to our recent work, and short summaries, can be found below.

A look ahead to 2021: Several new projects will build upon our efforts to provide helpful advice and portfolio construction tools – the integration of real estate and infrastructure assets, with their unique cash flow properties, into OASIS; analyzing the portfolio allocation implications of the links between macroeconomic policies and the correlation structure of public assets; how real asset holdings of public pension funds have evolved over time; and how to evaluate the diversification benefits of illiquid private assets within a portfolio using our fair comparison framework based on the terminal distribution of wealth. Please be on the lookout for these and other research papers in 2021!

As we set course for the coming year, client needs remain our lodestar. Toward this end, and alongside our colleagues in PGIM's Institutional Relationship Group, we aim to continue to engage in deep, wide-ranging and dynamic client conversations to inform our research agenda. We look forward to our ongoing partnership, and we wish you continued success in 2021.

Bruce D. Phelps, PhD, CFA

RESEARCH ROUNDUP

IAS research is organized into four major streams: **Real Assets, Portfolio Construction, Manager Allocation and Selection, and Illiquid Private Assets**. The common thread throughout is our focus on addressing new and emerging issues facing CIOs and asset allocators that affect long-term portfolio performance. We strive to incorporate the full complexity of a multi-asset portfolio, the long-term objectives, and the short-term constraints that CIOs face. We attempt to offer concrete, data-driven, actionable answers to critical questions. Here are some examples:

REAL ASSETS

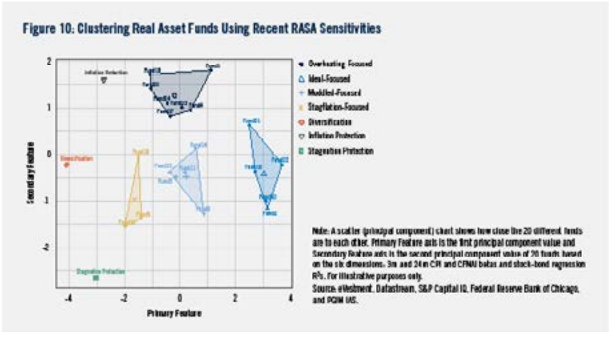
NEXT GENERATION COMMODITY BENCHMARKS

By **Harsh Parikh** - November 2020

WHAT'S IN YOUR REAL ASSETS PORTFOLIO? INTRODUCING RASA™

By **Harsh Parikh** - May 2020

In two related papers, we look beyond the "nameplate" of various real assets and real asset funds to better understand their true economic exposures, specifically with respect to economic growth and inflation. In deploying our newly created suite of tools, dubbed "Real Asset Sensitivity Analysis," or RASA™, we enable CIOs to better understand the imbedded economic tilts that are implicit in their allocation choices. Moreover, particularly with respect to commodities, RASA™ allows for the creation of benchmarks that are tailored to the set of macroeconomic risks desired by CIOs. These powerful tools allow CIOs to analyze their specific real asset and commodity holdings, to better manage their macroeconomic exposures, and to create customized solutions.

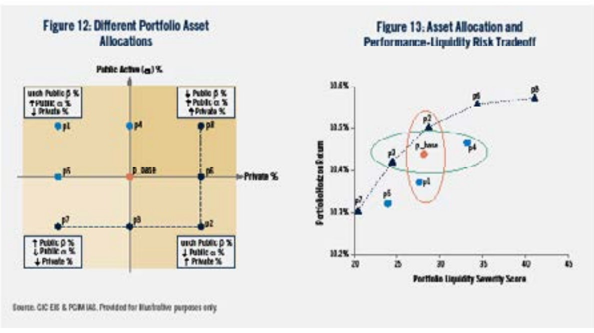


ILLIQUID PRIVATE ASSETS

BUILDING A BETTER PORTFOLIO: BALANCING PERFORMANCE AND LIQUIDITY

By **Junying Shen, Vishv Jeet, and Michelle Teng** - April 2020

This paper describes IAS' asset allocation framework - **OASIS™** (Optimal Asset Allocation with Illiquid Assets) - that formally combines liquidity needs and asset-specific cash flows into a multi-asset, multi-period portfolio construction process, integrating both public and private assets. This paper lays out how OASIS can quantify the tradeoffs between liquidity needs, returns and allocation choices. Broadly speaking, the framework allows for the analysis of how allocations to illiquid private assets (a top-down decision) and private asset commitment strategies (a bottom-up decision) affect a portfolio's ability to meet liquidity demands. However, the true power of OASIS is that it allows CIOs to formulate and "stress test" their portfolios across any number of economic and market scenarios, providing CIOs with a realistic tool to analyze their own portfolio allocation decisions, pacing strategies, and liquidity needs.

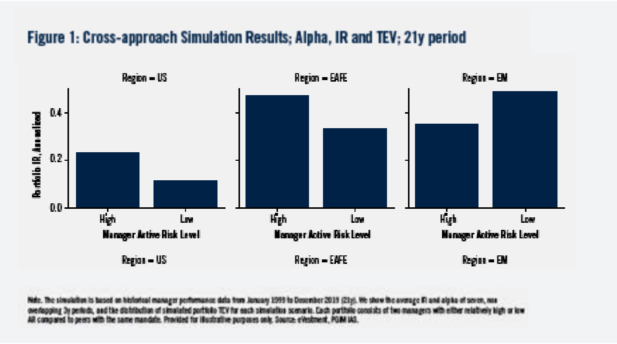


MANAGER ALLOCATION & SELECTION

EQUITY PORTFOLIO MANAGER ACTIVE RISK AND INFORMATION RATIO: HOW DOES THE REWARD VARY WITH ACTIVE RISK?

By **Wenbo Zhang** - November 2020

Are manager's rewarded for taking more active risk? We find the information ratio difference between low and high active risk managers varies by mandate and by investment approach. The hyper-efficient US mandate has relatively limited alpha opportunities compared to EAFE opportunities which, in turn, are more limited compared to EM. However, US and EAFE mandates are less risky, in terms of ex ante volatility, than EM as evidenced by fewer tail events and more accurate volatility forecasts. Our results suggest that CIOs should think structurally when evaluating the active risk-information ratio relationship.

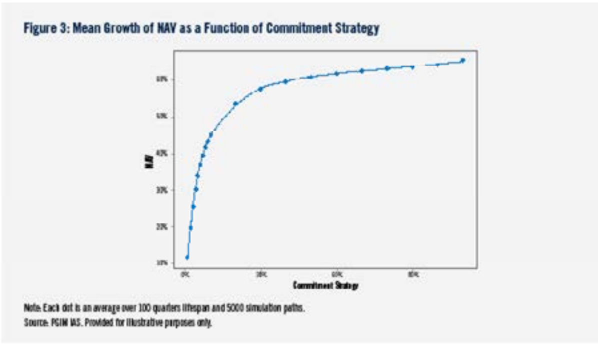


PORTFOLIO CONSTRUCTION

BUILDING AND MAINTAINING A DESIRED EXPOSURE TO PRIVATE MARKETS: COMMITMENT PACING, CASH FLOW MODELING, AND BEYOND

By **Vishv Jeet** - November 2020

Private assets are self-liquidating investments. Consequently, investors need to continuously make new commitments to keep their capital invested and to maintain a desired level of exposure. Ideally, CIOs would like a systematic way to pace commitments that will lead to a stable NAV and minimize the disruption to the rest of the portfolio. In fact, a good commitment pacing plan is often seen as the lynchpin of a private capital program. We present a simulation-based framework to show the tradeoff between the steady-state NAV and the speed with which it can be built using a simple, yet powerful, commitment strategy and a popular cash flow model.



Access Additional Insights →

WHAT WE'RE READING

Trending research and literature to add to your reading list, and some key takeaways.

EIGHT CENTURIES OF GLOBAL REAL INTEREST RATES, R-G, AND THE 'SUPRASECULAR' DECLINE, 1311-2018

Paul Schmelzing, Bank of England, January 2020

In recent years, pension CIOs have increasingly struggled to reach return targets. Perhaps contributing to this problem has been the persistence of ***negative, long-term, riskless real interest rates.*** 30y TIPS yields reached almost -0.5% in 2020 and almost -2.6% for 20y index-linked gilts. The BOE study puts long-term real interest rates in historical context. From 1311 to 2018, riskless real rates in developed economies declined at a remarkably stable trend rate of approximately 0.92bp/y. So stable has been the trend that an investor in the 17th c, based on the trend already established then, would have correctly expected negative long-term rates to appear around today. Although there have been deviations from this trend, and we may be a bit below trend today, the most recent significant deviation was 1984-2001 when real rates exceeded trend, making the more recent decline a return to trend, not an anomaly. The author shows there is limited evidence that the decline in real rates is due to slowing growth (g)/investment ("secular stagnation") or lower population growth. Remarkably, the negative trend has persisted irrespective of the monetary/fiscal policy regime, whether the economy was on a commodity or fiat monetary standard, the inflation level or the existence of a central bank. So, what could account for this negative trend? The author suspects that growing capital accumulation (*i.e., "savings"*) might be the explanation. Finally, since the real rate (r) is declining, r-g is becoming increasingly more negative which may allow advanced economies to sustain ever higher debt levels.

CIO Takeaway: Long-term real rates have been declining for centuries. This is "normal"! Investors should not expect a return to some long-term average real rate (say, 1-2%) because such a long-term average has never existed. Changes in fiscal and monetary policy are unlikely to affect this trend. Persistent negative real rates will complicate the lives of monetary policy makers, pension managers and fixed-income investors for years to come.

\- Bruce Phelps

EVIDENCE OF ACCELERATING MISMEASUREMENT OF GROWTH AND INFLATION IN THE U.S. IN THE 21ST CENTURY (WORKING PAPER)

Leonard Nakamura, Federal Reserve Bank of Philadelphia, October 2020

This paper makes an important contribution to a raging, market-critical, debate over the scope for recent technological progress to spur an extended period of robust economic growth. (T*wo good references are The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*, by McAfee and Brynjolfsson, with the affirmative argument and Gordon's *The Rise and Fall of Economic Growth*, for the negative.) This argument affects how to read economic statistics, how to conduct monetary and fiscal policy, and how to assess interest rate, inflation, and growth risks. The author argues that mismeasurement abounds, that official economic statistics, built to capture a very different economic reality, do an increasingly poor job of accounting for changes in the quality of technology goods, and that equity valuations are a more accurate representation of the true potential of the US economy. In this view, official statistics may be underestimating US economic growth and overestimating inflation, increasingly so in the 21st c, as technology advancements push output higher while alleviating price pressures. One possible counterargument is the lack of broad-based participation in an economy that, per the author, ought to be lifting all boats (unless current technological progress is decidedly biased, favoring specific skills, geographies and socio-economic characteristics – a proposition that, itself, is subject to a lively debate).

CIO Takeaway: Does the ongoing adoption of new technologies have the potential to boost long-term US productivity growth? This evolving debate is critical to understanding how financial markets may react to monetary and fiscal policy choices in the coming years. Although the evidence presented is not conclusive, the market risks from keeping policy rates "lower for longer" and from the increasing debt-to-GDP ratio could be mitigated if official statistics are understating growth and overstating inflation.

\- Noah Weisberger

HAS PERSISTENCE PERSISTED IN PRIVATE EQUITY: EVIDENCE FROM BUYOUT AND VENTURE CAPITAL FUNDS

Robert S. Harris, Tim Jenkinson, Steven N. Kaplan and Ruediger Stucke, University of Chicago Becker Friedman Institute for Economics, November 2020

Previous studies have found significant persistence in the performance of buyout funds. The authors agree that final performance of a manager's funds is persistent over time. However, for an investor in real time, *final* fund performance information is not always available to assess the manager, and investors must often evaluate manager performance when funds are mid-lifecycle. Looking only at information available to an investor in real time, much of the evidence of persistent *outperformance* fades, while evidence of persistent *underperformance* remains mostly intact. The authors conclude that their results "cast(s) doubt on the industry rule of thumb to invest only in funds that were previously in the top quartile. To the extent buyout investors use past performance, they should avoid bottom quartile performers." While a sober message, it is worth emphasizing that persistent manager outperformance does exist when looking at fully realized final fund performance, but investors cannot exploit that information. This apparent difference between final fund performance, which is persistent and does provide evidence of manager skill, and performance mid-way through a fund's life does seem to suggest that manager skill may relate to the timing of fund commitments, with backend-loaded fund performance a "feature" of a skilled manager, not a data "bug." Further exploration of this notion is warranted, which could provide investors with new insights regarding manager evaluation.

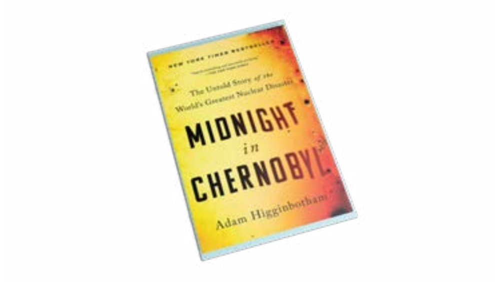
CIO Takeaway: The ability of a manager to deliver persistent outperformance is critical for investors regardless of asset class. With respect to private equity, the illusion of persistent outperformance (found by other researchers) is an artifact of looking at final fund performance, information that is not available to investors in real time. Critical for CIOs, this paper casts doubt on the prevailing orthodoxy that good managers can be identified in real time by their past performance. More subtly, performance persistence, which is **not** evident in mid-life fund performance but is evident in final-performance metrics, suggests that manager skill may relate to the ability to time fund investments.

\- Junying Shen

MIDNIGHT IN CHERNOBYL: THE UNTOLD STORY OF THE WORLD'S GREATEST NUCLEAR DISASTER

Adam Higginbotham, February 2019

This telling of the Chernobyl nuclear disaster puts the actions of the many individuals who were on stage that day into the institutional context of the Soviet Union during the Cold War. Heroes and anti-heroes abound, with individual decision making heavily influenced by the Byzantine and competing scientific, regulatory and political frameworks that were in place. Despite the best intentions and heroic actions of some, pre-existing conditions set in motion the events that, in hindsight, seem almost inevitable, and, at the very least, would have been very difficult to circumvent. Reading between the lines, Higginbotham seems to suggest a counterfactual: a different set of incentives and institutional frameworks could have led to a different outcome at almost any point in the timeline, from reactor design and construction, to the emergency response, to the lengthy cleanup.



CIO Takeaway: Nuclear risks are of a vastly different nature than financial market risks, yet there are elements of this morality tale that are worth heeding in our industry too; decision making under stress, and in the face of uncertainty, is heavily influenced by pre-existing incentives and institutional frameworks. While impossible to escape that reality, it is worthwhile to be reminded of it.

\- Noah Weisberger

MEET IAS

FEATURING JUNYING SHEN

VICE PRESIDENT, PGIM IAS

Junying Shen joined PGIM IAS in 2017 and was recently promoted to Vice President. Junying has a BA in Math and Finance from the University of Illinois and an MA in Math from New York University. Previously, she worked at Goldman Sachs analyzing market risk for alternative assets such as syndicated loans, private equity and real estate.

Q: Junying, what have you been working on at IAS?

I have spent the last few years researching the role of illiquid private assets in institutional portfolios. Institutions have greatly increased allocations to assets such as private equity, real estate and private credit, seeking better diversification and returns. However, as allocations to illiquid assets increase, the nature of the overall portfolio changes. Illiquid assets have fundamentally different cash flow properties, and traditional asset allocation frameworks such as mean-variance optimization or risk parity overlook this or treat it in a very *ad hoc* fashion. What institutions need is a multi-period allocation tool that explicitly recognizes the differences between liquid and illiquid assets. The market shock of last March has made this a critical issue for CIOs.

Importantly, large allocations to illiquid assets may make it difficult for CIOs to meet cash flow commitments or leave them without adequate dry power to capitalize on opportunities during market dislocations. Failing to have sufficient portfolio liquidity is likely a bigger portfolio threat than market volatility. While portfolios generally recover from volatility shocks, a liquidity shock can be a matter of survival. So, top of mind for many CIOs is: "What's the right amount of private assets to maximize portfolio performance without sacrificing too much liquidity?"

Q: How have you tried to answer this question?

We realized at the outset that we needed to bring liquidity to the forefront in portfolio construction, not as an afterthought. To help CIOs better understand their portfolio's liquidity they need to know how their portfolio's "top-down asset allocation" (*i.e.*, the mix of public stocks and bonds and private asset holdings) interacts with their portfolio's "bottom-up private market deal making activity" (*i.e.*, commitment pacing strategy and asset mix). With this information, we can generate an "efficient frontier" showing the tradeoff – for a set of portfolio allocations, pacing strategies, and views on private market performance and fund-selection skill – between the frequency and severity of liquidity events and expected portfolio performance.

Q: What is the optimal allocation to illiquid private assets?

There is no single right answer. Much depends on a portfolio's liquidity needs, the scope of their current private market activity, future asset allocation plans, potential corporate actions (*e.g.*, PRT) and, fundamentally, the plan's willingness to trade off greater expected performance for increased liquidity risk. It's ultimately the CIO's decision. As you might expect, no two investors will be the same!

Q: What else have you been working on?

I have been researching US stock-bond correlation over the past 70y and its empirical relationship with key macroeconomic indicators. Stock-bond correlation is key for portfolio construction and this analysis should be helpful as the world ventures into uncharted monetary and fiscal policy territory. I have also started analyzing the role of private infrastructure debt and equity in institutional portfolios.

Q: What skill set do you need for your role at IAS?

The role requires a broad skill set, from economics to optimization to programming and data science to written and verbal communication. Most importantly, you need to be a good listener to understand a CIO's concerns and questions so that we can conduct practical and impactful research.

Q: What do you do in your free time?

I like to be around nature and people, not necessarily at the same time. That means you will find me hiking some weekends and playing board games and taking CrossFit classes on other weekends. A new hobby I am excited to explore in 2021 is drawing.

For inquiries or to connect with PGIM IAS, contact us at IAS@PGIM.com.

THE PURSUIT OF OUTPERFORMANCE

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