INSTITUTIONAL ADVISORY & SOLUTIONS

PGIM

THE DIFFERENTIAL

New Developments in Portfolio Construction

March 2023 | Issue 8

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

To learn more about PGIM IAS, contact IAS@pgim.com or visit pgim.com/IAS.

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Dear Investor,

2023 began with IAS' **1st Annual North America Research Conference** at the Yale Club in New York on 12 January. The weather accommodated, allowing the IAS team and 19 CIOs, Heads of Asset Allocation and senior PMs from across North America to get together for a half-day conference on asset allocation.

Researcher	Topic
Noah Weisberger, PhD Managing Director, PGIM IAS	Portfolio Implications of a Positive Stock-Bond Correlation World: Macro Drivers, Global Linkages & Optimal Portfolio Construction
Michelle (Yu) Teng, PhD, CFA Vice President & Co-Head Private Assets Research Program, PGIM IAS	Portfolio Construction with Illiquid Private Assets: Methodology, Applications & Case Studies
Aili Chen, CFA Senior Associate, PGIM IAS **Junying Shen, CFA** Vice President & Co-Head Private Assets Research Program, PGIM IAS	Building Portfolios with Infrastructure: Performance, Cash Flows & Portfolio Construction
Xiang Xu, PhD Senior Associate, PGIM IAS	Reported and Real-World Performance of Illiquid Private Assets: A Fair Comparison Framework for Private and Public Investments
Lorne Johnson, PhD Managing Director, Head of Multi-Asset Portfolio Design PGIM Quantitative Solutions	Portfolio Implications of a Higher US Inflation Regime

The conference covered many areas of current IAS research:

- Stocks and bonds fell in tandem for much of 2022, damaging the performance of balanced portfolios. While simultaneous large declines are likely temporary, a positive stock-bond correlation regime may persist, presenting CIOs with portfolio challenges in a world unfamiliar to them. Ex-ante portfolio performance will deteriorate in a positive stock-bond correlation world, with higher volatility, worse long-term risk-adjusted returns and deeper drawdowns, yet the benefits of a balanced portfolio of stocks and bonds will likely endure.
- Institutional investors have increased allocations to illiquid private assets even as new liquidity demands have arisen. CIOs and regulators need to consider the portfolio management challenges posed by the confluence of these trends. We introduce an asset allocation framework (OASIS) that produces a comprehensive view of the tradeoff between expected portfolio performance and liquidity risk. Using real-world examples, we show how the framework addresses several portfolio and regulatory challenges.
- Unlisted infrastructure investments are considered valuable additions to investment portfolios due to their stable income and diversification benefits. We study the performance and cash flow characteristics of infrastructure investments - both at the fund and at the asset level - and their sensitivity to public equity and debt returns. We also measure how asset sector and age influence the variability of infrastructure investment cash flows. Importantly, we measure the degree of idiosyncratic cash flow risk and ask how best to minimize this uncompensated risk. We then develop cash flow models for infrastructure investments and show that adding to illiquid infrastructure, while reducing allocations to other illiquid assets, can reduce overall portfolio liquidity risk.
- Today, CIOs must decide how to allocate their marginal portfolio dollar not only between equity and credit, but also between public and private vehicles. The first step in this decision-making process is usually an analysis of historical performance. But how can a CIO fairly compare the performance of private and public investments? Traditional comparisons based on publicly-reported returns can be misleading because they do not reflect the real-world constraints faced by investors. To assist CIOs, we present our Fair Comparison framework to compare public and private asset returns and volatilities on a consistent, risk-adjusted basis.

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- While most professional forecasters anticipate a reversion by 2023 to the low inflation observed since the mid-1990s, there is a possibility that inflation could stay elevated for at least the next few years. If a relatively high-inflation environment were to persist, investors need to assess the dynamics higher inflation introduces into the broader economy and, ultimately, asset returns. We look at both historical and forward-looking portfolio outcomes, assuming inflation remains elevated for the next five years. Traditional allocations to equities and bonds in an environment of high inflation will likely perform poorly in nominal and particularly in real terms. We discuss how investors might be able to protect their portfolios.

The Conference lived up to its goal to be highly interactive. While each IAS researcher asked several polling questions to get and share views from the participants, there were also many questions from participants directed at both IAS researchers and other participants. A lively and productive day!

This quarter also featured the publication of two exciting new papers on portfolio construction that have received widespread attention:

"Is There a Need for a Chief Liquidity Officer?" – January 2023

For many institutional investors such as pension funds, sovereign wealth funds and defined contribution plans, volatility risk is rarely life-threatening. Volatility comes and goes. However, unlike volatility risk, liquidity risk forces the CIO to make unattractive and costly portfolio decisions. Given the potential greater severity of a liquidity event (versus a volatility event), the key question for a CIO is whether their organization has the skills and clearly defined responsibility to manage the fund's liquidity risk.

What makes fund liquidity management distinct from a typical CRO's portfolio or asset risk orientation are: (1) the need to integrate all aspects of a fund's liquidity demands and sources: top-down asset allocation, bottom-up private market deal-making activities, and internal and external operations and (2) the need for a long horizon in a world brimming with large and growing allocations to illiquid assets that can encumber investors for many years.

While a new and separate liquidity management function may generate cumbersome organizational overlaps and internal confusions within a fund, the long-term benefits may be worth the effort and stress. The ability to have a dedicated chief liquidity officer will likely depend on the type and the size of a specific institutional fund. For smaller funds, the CIO may select an existing officer and formalize their liquidity management coordinator role. Ultimately, it is the fund's decision whether now is the time to either appoint a chief liquidity officer, beef up liquidity management expertise and analytics, or confirm and validate that existing investment and risk management teams can adequately analyze monitor, and manage overall fund liquidity.

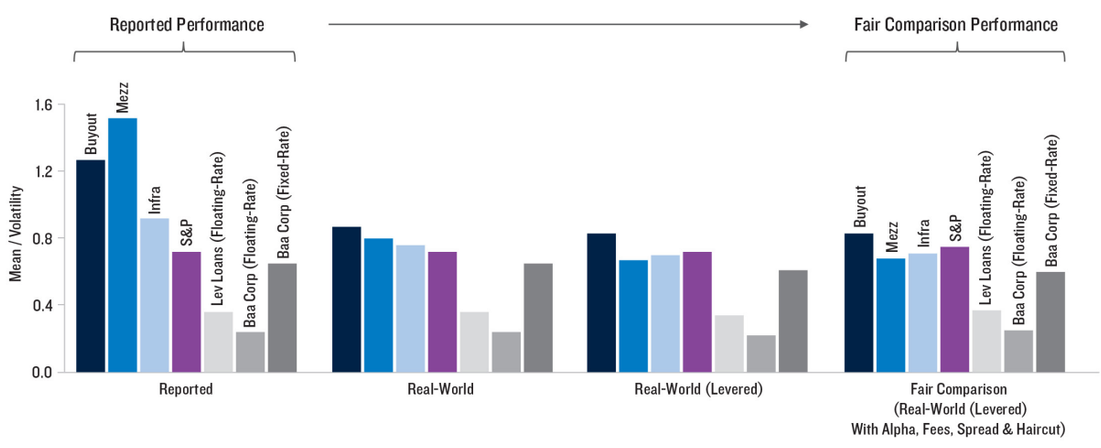
"Private vs. Public Investment Strategies: Reported and Real-World Performance" – May 2023

A CIO must follow an investment strategy to achieve their desired portfolio allocation to private assets. Such a strategy involves investing in only a subset of funds currently available (not the universe of funds), following a particular commitment pacing strategy, and temporarily holding uncalled and uncommitted capital in another asset class (say, a public market index or cash). The "real-world" performance of a private asset investment strategy is influenced by fund-selection, commitment pacing, and returns to the uncalled and uncommitted capital. Consequently, a CIO's private asset investment strategy is unlikely to deliver the same performance as is typically reported for the asset class as a whole.

Our Fair Comparison (FC) framework is a methodology for producing real-world performance measures for an investment strategy allowing CIOs to compare private and public investment strategies on a consistent, risk-adjusted basis and make better-informed asset allocation decisions.

For 2005-2021, we find that real-world means and volatilities for private investment strategies are significantly different from their reported values. Specifically, using real-world returns we find that a buyout investment strategy outperformed mezzanine and infrastructure investment strategies, which is not apparent from reported returns. Also, a strategy of investing in public 10y+, fixed-rate Baa-corporate bonds has been reasonably competitive with private investment strategies.

Fair Comparison of Private vs. Public Investment Strategy Performance; 2005-2021



Note: All return numbers are annualized. The default public market index is assumed to be the S&P 500 Index.
Source: Bloomberg, Burgiss, S&P and PGIM IAS. Provided for illustrative purposes only.

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We also have some exciting papers forthcoming this Spring & Summer:

- *"What to Expect When Expecting a Recession? A CIO's Guide to Interpreting the Probability of Recession" – Spring 2023, expected.*
- *"Selecting Interim Private Equity NAVs – a Study of LP Approaches" – Summer 2023, expected.*

A quick view of these papers is available in the next section.

Finally, the IAS team is hard at work preparing for two upcoming research conferences:

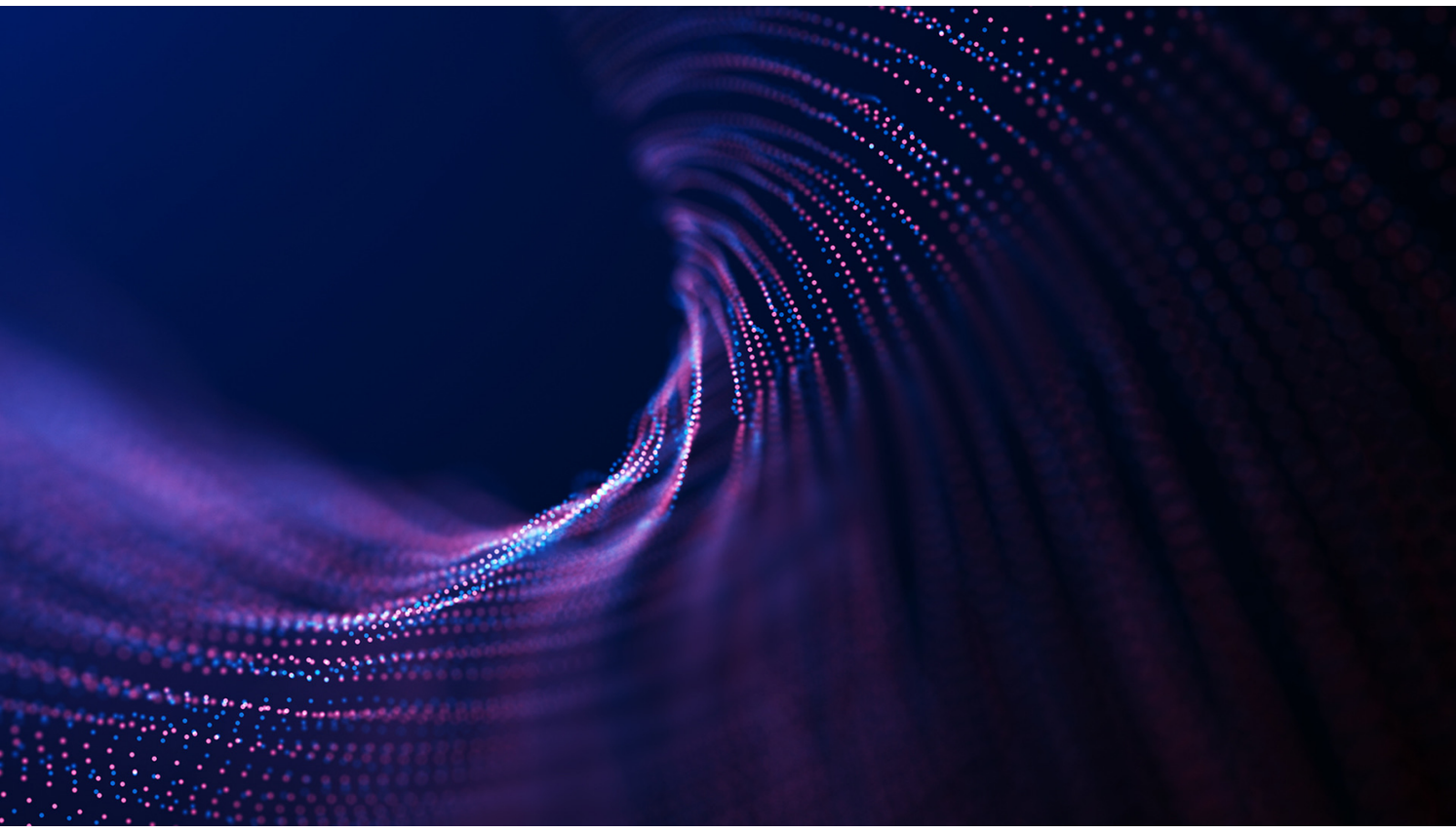
- The 2nd Annual IAS EMEA Research Conference in mid-September 2023 in London, and
- The 1st Annual IAS Asia Research Conference in mid-October 2023 in either Beijing or Shanghai.

These conferences are opportunities for us to discuss our latest and forthcoming research on portfolio construction with CIOs, Heads of Asset Allocation and senior PMs. Like all IAS get-togethers, these Conferences will be highly participatory, with numerous polling questions to solicit participant viewpoints and to highlight differences of opinion, and with plenty of back-and-forth between client participants and IAS presenters.

As always, IAS's goal is to deliver pragmatic and implementable research to help CIOs and their Investment Committees make better-informed portfolio management decisions.

Warm regards,

Bruce D. Phelps, PhD, CFA



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FORTHCOMING RESEARCH

PGIM IAS currently has four research streams: Real Assets, Strategic Portfolio Construction, Manager Allocation & Selection and Asset Allocation with Illiquid Private Assets. The common thread throughout is our focus on addressing new and emerging issues that CIOs and asset allocators are facing that could affect long-term portfolio risk and performance. As always, we attempt to offer pragmatic, data-driven, actionable answers to critical questions.

ILLIQUID PRIVATE ASSETS

Selecting Interim Private Equity NAVs: A Study of LP Approaches

By Aili Chen, CFA, Summer 2023

Private equity investments are illiquid and lack an actively traded secondary market, presenting challenges for limited partners (LPs) to determine a fair market value of their fund share net asset values (NAVs). Typically, LPs rely on NAVs provided by their general partners (GPs). However, GP-supplied NAVs are not usually available when LPs must report total portfolio valuations. Typically, at the time of portfolio reporting, LPs will have only the prior quarter's GP-supplied NAV. Therefore, LPs must estimate an up-to-date NAV for the current measurement date.

LPs have different methods for estimating an up-to-date NAV based on some combination of information provided by the GPs, third-party valuation firms, and their own assessments. This paper examines the different methodologies LPs use for estimating interim NAVs before receiving the GP-reported NAVs.

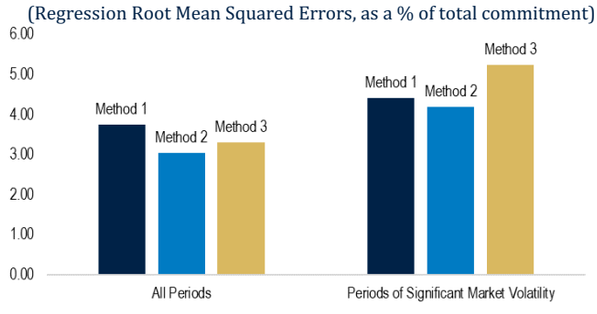
Using vintage-level US buyout data, we examine empirically how well these different methods predict actual GP-reported NAVs – at the vintage level – as they are subsequently reported:

Method 1: Using the latest quarter's GP-reported NAV only;
Method 2: Method 1 plus cash flow adjustments; and
Method 3: Method 1 plus cash flow and market adjustments.

We find that, all three methods can reasonably explain most of the variance in current NAVs. The predictions of Method 2 are the closest to the actual GP-reported NAVs, followed by Method 3 and then Method 1. This means that adjusting the previous quarter's NAV for intervening cash flows could improve the predictions, but further market adjustments may not necessarily improve prediction accuracy. In fact, during periods of significant public market volatility, using Method 3 and adjusting for public market price action leads to even larger deviations from GP-reported NAVs and is the least accurate of our three methods of prediction.

GP-Reported NAVs vs. LP-estimated NAVs

(Regression Root Mean Squared Errors, as a % of total commitment)



Source: Burgiss, Datastream and PGIM IAS. Data as of September 30, 2022. For illustrative purposes only.

STRATEGIC PORTFOLIO CONSTRUCTION

What to Expect When Expecting a Recession?

A CIO's Guide to Interpreting the Probability of Recession

By Noah Weisberger, PhD & Xiang Xu, PhD, Spring 2023

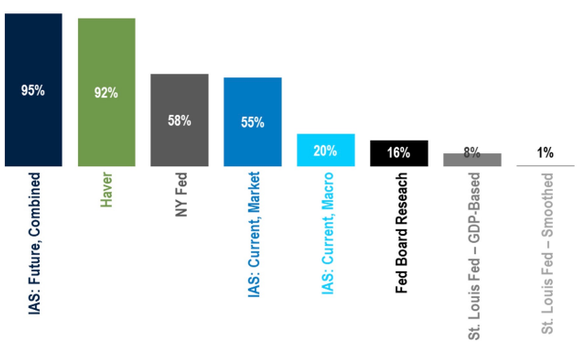
Recessions are a regularity of the economic landscape but are determined and announced with a lag. To provide a more up-to-date recession indicator, it is common use models that evaluate the probability of a current or a future recession.

However, interpreting these types of models is difficult. Recession-warning signals are inherently noisy and seemingly similar recession indicators can generate vastly different probabilities. As a case in point, in March 2023, recession probabilities from a variety of models ranged from 1% to over 90%. How can a CIO make sense of this?

Our research produced five important takeaways:

- Both market and macro inputs contribute to the estimated probability of recession. Recession signals that use both market and macro inputs are more dependable than signals that rely on only one set of inputs.
- Elevated recession probability readings are a reliable signal of both current and future US recessions. Probability readings above 60% tend to be associated with recessions, but false signals (both positive and negative) do occur.
- Market and macro inputs are often not aligned. Yet, signals that arise even when market and macro inputs disagree are still reliable.
- By the time recession probabilities are elevated, the stock market has generally already priced in much of the recession risk.
- A better indicator for forward stock returns is the change in recession probability, not the level. Excess stock returns are weakest when the probability of a recession is high & rising and are strongest when the probability of a recession is high & falling.

Estimated Probability of US Recession (as of March 2023)



Note: NY Fed recession probability estimates are not official forecasts of the Federal Reserve Bank of New York, its president, the Federal Reserve System, or the Federal Open Market Committee. Source: Bureau of Labor Statistics, Chauvet, Marcelle and Piger, Jeremy Max, Smoothed U.S. Recession Probabilities [RECPROUSM156N], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/RECPROUSM156N, April 26, 2023., Favara, Giovanni, Simon Gilchrist, Kurt F. Lewis, Egon Zakrajšek (2016). "Updating the Recession Risk and the Excess Bond Premium," FEDS Notes. Washington: Board of Governors of the Federal Reserve System, October 6, 2016, https://doi.org/10.17016/2380-7172.1836, Federal Reserve Bank of New York, "The Yield Curve as a Leading Indicator," https://www.newyorkfed.org/research/capital_markets/ycfaq.html, Federal Reserve Bank of St. Louis, Federal Reserve Board, Haver Analytics, NBER, Standard & Poor's and PGIM IAS. For illustrative purposes only.

IN CONVERSATION WITH IAS

IAS' Michelle Teng discusses recent trends in the commercial real estate market with PGIM Real Estate Head of Americas Investment Research, Lee Menifee

Lee Menifee
MD, Head of Americas Investment Research
PGIM Real Estate

Lee Menifee is a managing director at PGIM Real Estate and head of Americas Investment Research. Based in Los Angeles, Lee leads PGIM Real Estate's research, oversees the research teams supporting PGIM Real Estate's US and Latin America investment activities, and is a member of both Investment Committees. Prior to PGIM, Lee led American Realty Advisors' research capability, supporting portfolio, asset management, acquisitions, and marketing. Earlier, Lee was managing editor of Global Real Estate Strategy for BCA Research, a leading provider of global macro research, where he was responsible for product development, and spent 14y at CBRE Investors, holding various research roles, lastly as senior director of Global Strategy. Lee has a BS in Environmental Studies and Planning from UC Santa Barbara and a master's in Urban Planning from USC.

Michelle Teng, PhD, CFA
VP, Co-Head of Private Assets Research
PGIM IAS

Michelle is Vice President and Co-Head of the Private Assets Research Program in PGIM's Institutional Advisory & Solutions (IAS) group. She joined IAS from the Prudential Retirement's Investment & Pension Solutions team. Michelle is also author of the IAS "business-school" case study series tracking the transformation of the (hypothetical) Cenland Corporation's traditional DB plan to a DC plan from the perspective of the plan's CIO and portfolio managers. These case studies are available at www.PGIM.com/IAS. Michelle received a PhD in Electronic and Electrical Engineering from University College London (UCL) and an MBA from Tuck School of Business at Dartmouth. She holds the Chartered Financial Analyst® designation.

MT: In the current economic environment, we have heard that real estate transaction volumes have dropped significantly. Can you tell us what is going on with commercial real estate (CRE)?

LM: Transaction activities did briefly shut down in 2020. But, by early 2021 things were really coming back, and we saw a surge of transaction activities for more than a year. Going back to last year, Q1 2022, real estate was still cheap relative to other asset classes, such as corporate and high yield bonds even though prices had earlier enjoyed good appreciation. But then the Fed started raising interest rates and the transactions market started to slow down immediately. Nevertheless, through June 2022, there was still a fair amount of activity. When it became clear that the Fed was going to continue to hike rates, suddenly real estate did not look so attractive relative to other asset classes, especially fixed income, so transaction activities virtually stopped.

As a highly leveraged asset class, real estate is immediately impacted by declines in debt availability. At the same time interest rates started rising, the large banks came under regulatory encouragement to lighten up on their real estate exposures. They started pulling back from the lending market. Even though the sources of real estate credit are fairly diversified – banks account for a little less than half of the lending market – the pullback in lending was felt immediately. The other major source of real estate financing is the securitized CMBS market, which was hugely important before the GFC but more-or-less shut down for 5 years afterwards. More recently, the CMBS market was coming back but is still not close to where it was during the GFC, and has now once again essentially shut down.

So even though the United States has diversified sources of real estate credit, at this point almost all the sources are either pulling back or tightening their loan criteria. This is further reinforcing the freeze in transactions markets.

The situation in Europe is even more pronounced, since banks account for up to 90% of real estate lending. In some ways that's been helpful because it has caused buyers and sellers to understand that pricing between the two regions isn't the same, with Europe experiencing faster re-pricing, which should help to re-open those transactions markets more quickly.

MT: There is a big valuation gap between public and private real estate. Even though public markets are not necessarily a good predictor, do you think private valuations will catch up to the public market? How long will it take?

LM: During periods with very little liquidity, public markets always show a decline in values. It is true that private market valuation changes lag changes in public market valuations. But in many cases, private markets never reflect the volatility in the public markets. There must be some persistence in that valuation gap for the private market to reflect changes in public market valuation. We have had 3 or 4 significant REIT downturns since 2012 (for instance, U.S. REITs were down in 2020 by approximately 50%), but those downturns did not persist long enough for private valuations to adjust. Another thing that typically happens at the beginning of a recession is that equity values increase, which will also be true for REITs. It will take private markets a long time to catch up with REITs. There is a lag both on the way up and on the way down – not totally symmetric but fairly symmetric. The lag is typically 6 months to 1 year for a baseline. But right now, we still have a disconnect between public and private pricing that's not likely to resolve one way or the other for at least a few quarters.

MT: Thinking a bit about sectors, what is the nationwide condition of the office market? How likely will office be re-purposed to residential? Besides office, what other CRE sector should we be paying attention to?

LM: We need to think about office in the context of the entire private real estate universe. Office values have been falling since the pandemic. Even before the pandemic, there were concerns about office as a poor performing property type. In fact, the long-term performance of office is by far the worst of the major property types. One of the reasons is that they are very capital intensive. Owners need to put a lot of money into those buildings to maintain their rents.

When the markets are tight, owners don't have to invest as much money in the office buildings, but when the markets are weak, they have to put in more capital to attract tenants. Importantly, since the GFC, the additional capital needs for office buildings never stopped. Owners have had to continually put in capital even when the vacancy rates were coming down as supply and demand never became balanced.

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IN CONVERSATION WITH IAS

There are two forces driving this supply-demand imbalance in the sector. First, the market is overbuilt and, second, the traditional relationship between office-based jobs and office demand has broken down, as companies began to use space more efficiently, *e.g.,* remote working, which had already started before the pandemic. The office sector entered the pandemic in poor shape. Then the world shut down, and no one went to the office for 9 months. Now, even though people are coming back to the office, companies are looking at ways to save, including on occupancy costs, which is why we do not see any net demand for office in the near-term. There may be net negative demand, and this is outside of a recession scenario.

At the same time, we need to separate office from other real estate sectors due to the likelihood of foreclosures and the pressure on banks. Let's say banks own a lot of real estate loans and some percentage of those are fixed rate loans. Any loans originated in the past 2 years are now worth less because the loan coupons are very low. They have those loans on their books and they are worth less today than they were a year ago on mark-to-market basis. But banks do not have a credit issue with most of those loans because borrowers will be able to pay as scheduled and the loans will mature at par. There also should not be a lot of issues with loans originated years ago because there has been so much property appreciation since the loan origination. Office, unfortunately, in many cases will be an exception.

One big difference between the GFC and now is that loan-to-value ratios (LTVs) have remained low throughout this entire cycle. Prior to GFC, the average LTV was about 60%. Then it came down to about 50%. Since 2013, real estate values have doubled, on average, so loans originated at 50% or 65% LTV in 2013 should be about 35% LTV on maturity, suggesting no systematic refinancing risk.

But the problems will be around office. Office values are down by 20% since the beginning of the pandemic, with more to come. What is potentially alarming is the dispersion around that average drop. There will be many office assets with values less than the loan amount. That is the foreclosure situation where banks will sell the loans and take a loss. What is interesting is that the capital charges for banks for owning a real estate asset are much higher than holding the loan on that asset. So, if a bank has a $50m loan exposure, and the office is now worth only $50m, you would think the bank would be indifferent to taking over the property. Not so! What changes is that the capital charge for the bank to own the office is higher than to own the loan. So, the first thing we will start to see is banks selling loans at a discount. This has already started and there will be a lot more of it. In many other cases, banks have no reason to go the foreclosure route because the assets have leases in place with enough income to service the loan.

Overall, regarding discounted loan sales and foreclosures, we expect to see most of this activity in the office sector. For the other property types, property values are much higher than when the loans were originated. For example, since most banks loan 50-60% of the value for apartment properties, it is going to be very rare for an apartment building to fall in value that much. So that is a much more manageable risk for banks than office.

When we talk about office converting to residential, in many cases office buildings are not built to suit that need. Office buildings are too big and there are not enough windows. This presents a physical challenge.

The second challenge is the cost to rebuild the systems, complete plumbing work, etc. Also, you have zoning and political issues that will prevent the conversion. In many cases, it is cheaper to build a new apartment building than to convert an office building into one. Therefore, I do not expect to see a lot of office conversions.

MT: Over the decades, institutional investors have been through cycles and have seen several CRE downturns. Can you put the current downturn in perspective? What's different about today's market? Where do you see opportunities for institutional investors?

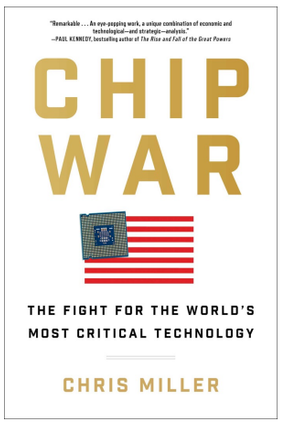
LM: The challenge for investors is that most of them are now overallocated to real estate versus what they intended. Modern institutional investment in real estate, which in the United States started around 1980, has followed a pattern during every single recession where interest rates were high in the beginning of the recession and then started to come down quickly during the recession. And structurally, interest rates fell from 1980 to 2022. Real estate values, like many other asset classes, benefitted from that structural drop of interest rates.

In a typical recession, when your loans mature you can refinance at a lower rate because interest rates drop. That is where our current downturn could be very different. Interest rates are still high and it is unclear whether they will continue to go higher. Regardless, rates are still much higher than where they were and they probably will not go back down to where they were during the mid-2010s to 2022. So, the key difference is that owners will not be able to refinance their loans at a lower rate and, in fact, they might have to refinance their loans at a higher rate which means they need to come up with additional equity to pay down the loan.

Additionally, real estate investors will experience pressure on values, but they can typically quickly find a valuation bottom. However, what has changed is how investors will value real estate relative to other asset classes. Real estate was relatively cheap versus most asset classes for most of the past couple of decades. But not any longer. This relative value loss must work itself through. Real estate values will continue to decline, but it will take some time to reach the bottom. Our expectation is that it will happen this year. Once we get to the valuation bottom, investors will no longer be overallocated to real estate and a risk premium will be re-established. Right now, there is no risk premium in real estate sufficient to compensate investors. At lower valuations, the risk premium will return, and, in turn, capital will come back into real estate.

For investors seeking real estate exposure right now, there are a few things I can recommend. We think the public equity side is priced appropriately for where we see valuations eventually going. Another potential area would be on the lending side, where the returns from debt are quite attractive on a risk-adjusted basis. In fact, debt returns are now higher than the equity returns we experienced a couple of years ago. This is the case across the board, from core to high yield. So, if investors want to get into real estate right now, I would recommend a focus on public securities and on debt. And, further out the risk spectrum, there will potentially be owners that need "rescue capital" to either refinance loans or deal with liquidity or solvency concerns.

WHAT WE'RE READING



Chip War: The Fight for the World's Most Critical Technology

By Chris Miller
Scribner, 2022

Chip War provides an excellent historical tour of the invention and production of the integrated circuit (or, "chip") – from the transistor, to the integrated circuit, to chip design software, to EUV lithography, and to chip foundries.

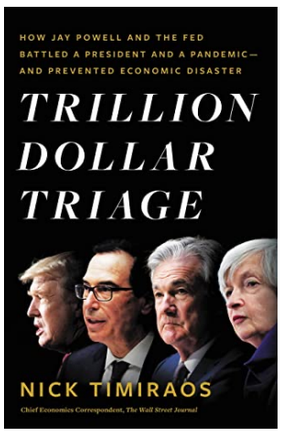
As Miller recounts, the value and potential of chip technology was recognized early on in the 1950s, with the Pentagon the largest initial customer. Although originally a US endeavor, other countries quickly saw the potential. While the Soviets were successful in stealing the technology, they followed a "copy it" strategy which left them permanently behind the technology curve. In contrast, the Japanese followed a "license it" strategy and lobbied US firms for the right to produce chips. It was the Japanese twin revolutions in manufacturing and consumer electronics that drove chip costs down and demand up. From the 1970s onwards, and especially after the US demonstrated the lethal power of chip technology during the 1991 Gulf War, countries have competed for technological leadership in chip design and production.

The book describes how in the early 1980s computer software allowed chip design to become separate from chip production. A firm in the US can design the latest custom chip which can then be fabricated elsewhere. Consequently, the industry is a highly interdependent web of firms (and countries) that specialize in the different stages of chip production: chip design software (*e.g.,* Nvidia – US), chip production machinery (AMSL – The Netherlands) and chip production foundries (TSMC – Taiwan). The "war" that is raging over control of these chip production choke points dominates global business and political discussions.

The sophistication and, hence, cost of chip production is astonishing. A new chip costs more than $100m to design and building a foundry to produce that chip is more expensive than two new aircraft carriers! No one company, or country, can go it alone and maintain dominance in this industry. Strategic partnerships will be key.

CIO Takeaway: Chip War succinctly and clearly describes the history, technology and significance of the ubiquitous "chip." The volume provides useful context for today's geopolitical, business and industrial policy debates that institutional investors need to follow.

--Bruce P.



Trillion Dollar Triage

By Nick Timiraos
Little Brown, 2022

By 2018, Jerome Powell had already had a stressful first two years as Fed Chair. Dealing with a mercurial President and a combative Congress tested Powell's efforts to preserve the Fed's hard-won independence. However, these problems would pale in comparison with the arrival of the Pandemic.

Timiraos, Wall Street Journal's chief economics correspondent, recounts in riveting detail the first few months of the government and Fed response to the economy-wide shut down. Although we all lived through these events (and many of us may have little interest in revisiting them!) Timiraos brings order to the chaos of those days and provides a behind-the-scenes look at how policy makers responded.

By mid-March 2020 there was a massive dash for cash – the selling of Treasuries and the drawdown of credit lines with banks and foreign swap lines with the Fed. Who was going to supply cash and credit to prevent an economic collapse? The book highlights how Powell, Treasury Secretary Mnuchin and Speaker Pelosi worked together to produce the CARES Act which, in addition to providing direct cash benefits to households, gave the Treasury $500b to backstop the Fed's extraordinary and novel array of lending programs to companies and municipalities and the Fed's purchase of heretofore ineligible securities (*e.g.,* corporate bonds). Given the mutual distrust in Washington and a rapidly expanding pandemic, this is a remarkable achievement.

Timiraos highlights Powell's pragmatism and leadership. Powell likened the situation facing the Fed to Dunkirk and the need to "Get in the boats and go." The Fed was in a triage situation and the priority was saving the economy – the details and consequences would be addressed later. Not a characteristic response for such a conservative organization!

Some point to inflation as one consequence of the Fed's aggressive pandemic response. Timiraos highlights another – a threat to the Fed's independence, for now Congress knows that the Fed can be used as a government lender.

CIO Takeaway: While mostly focused on providing a succinct review of the early days of the Pandemic and how policy makers grappled with the unfolding economic chaos, dislocation and uncertainty, Timiraos also peers into the future, hinting that a possible long-term consequence of Pandemic-era policy actions may be the emergence of a a new policy dynamic between the Fed and Congress – a shift to which CIOs ought to be attuned.

--Bruce P.

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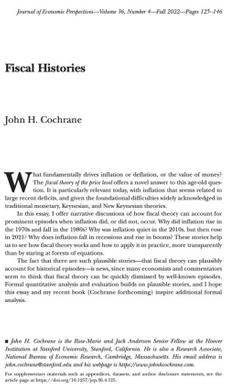

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Fiscal Histories

John H. Cochrane

What fundamentally drives inflation or deflation, or the value of money? The *fiscal theory of the price level* offers a novel answer to this age-old question. It is particularly relevant today, with inflation that seems related to large recent deficits, and given the foundational difficulties widely acknowledged in traditional monetary, Keynesian, and New Keynesian theories.

In this essay, I offer narrative discussions of how fiscal theory can account for prominent episodes when inflation did, or did not, occur. Why did inflation rise in the 1970s and fall in the 1980s? Why was inflation quiet in the 2010s, but then rose in 2021? Why does inflation fall in recessions and rise in booms? These stories help us to see how fiscal theory works and how to apply it in practice, more transparently than by staring at forests of equations.

The fact that there are such plausible stories—that fiscal theory can plausibly account for historical episodes—is news, since many economists and commentators seem to think that fiscal theory can be quickly dismissed by well-known episodes. Formal quantitative analysis and evaluation builds on plausible stories, and I hope this essay and my recent book (Cochrane forthcoming) inspire additional formal analysis.

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"Fiscal Histories"

by John Cochrane
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What lead to the relatively sudden increase in inflation and how best to bring it back down? The absence of a conclusive answer to these deceptively simple and straightforward questions highlights how little we understand about the drivers of inflation.

While many of us have been taught that "inflation is always and everywhere a monetary phenomenon," implying that monetary policy is both the cause and the solution to inflation, Cochrane, Senior Fellow at the Hoover Institution and previously Professor of Finance at the University of Chicago Booth School of Business, instead carefully argues that traditional monetary (and Keynesian) theories of inflation have a poor record of explaining past and current inflationary periods.

Cochrane offers a "fiscal theory of inflation" which states that inflation adjusts so that the real value of government money (*i.e.,* bonds + reserves + cash) equals the present value of government surpluses, much like a company's stock price equals the discounted value of its future dividends. If the stock of money increases (*e.g.,* government sends out checks) but the government promises future surpluses to offset, then inflation will not increase as the PV of outstanding money equals the PV future surpluses. In other words, there is no automatic link between current government deficits and inflation.

Cochrane examines several historical episodes to show that the fiscal theory offers compelling explanations. For example, there was no deflation after the 2008 GFC banking crisis because the government provided substantial fiscal stimulus whereas, in contrast, deflation emerged in the early 1930s as the government was constrained by the gold standard. The deflation of the 1930s abruptly ended once the US repudiated maintaining the gold price.

The recent rise in inflation in 2021, after the massive fiscal deficit shock from COVID relief, can be attributed to the lack of a repayment commitment to increase future budget surpluses. Importantly, the fiscal theory implies that monetary policy alone will not eliminate this fiscally-induced inflation. Open market operations – exchanging bonds for reserves – leaves the stock of government money unchanged. If the Fed were able to raise nominal interest rates, the ensuing slowdown may temporarily reduce inflation, but the lower tax receipts and higher nominal interest costs will reduce the PV of future surpluses. Fiscal and monetary policy will have to work together to contain inflation.

CIO Takeaway: The fiscal theory, while not formally tested, offers a plausible hypothesis that better explains past inflationary periods compared to conventional theories. Given how blurred the lines have become between the fiscal and monetary authorities, the fiscal theory may help CIOs better understand current and future inflationary dynamics.

--Bruce P.

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