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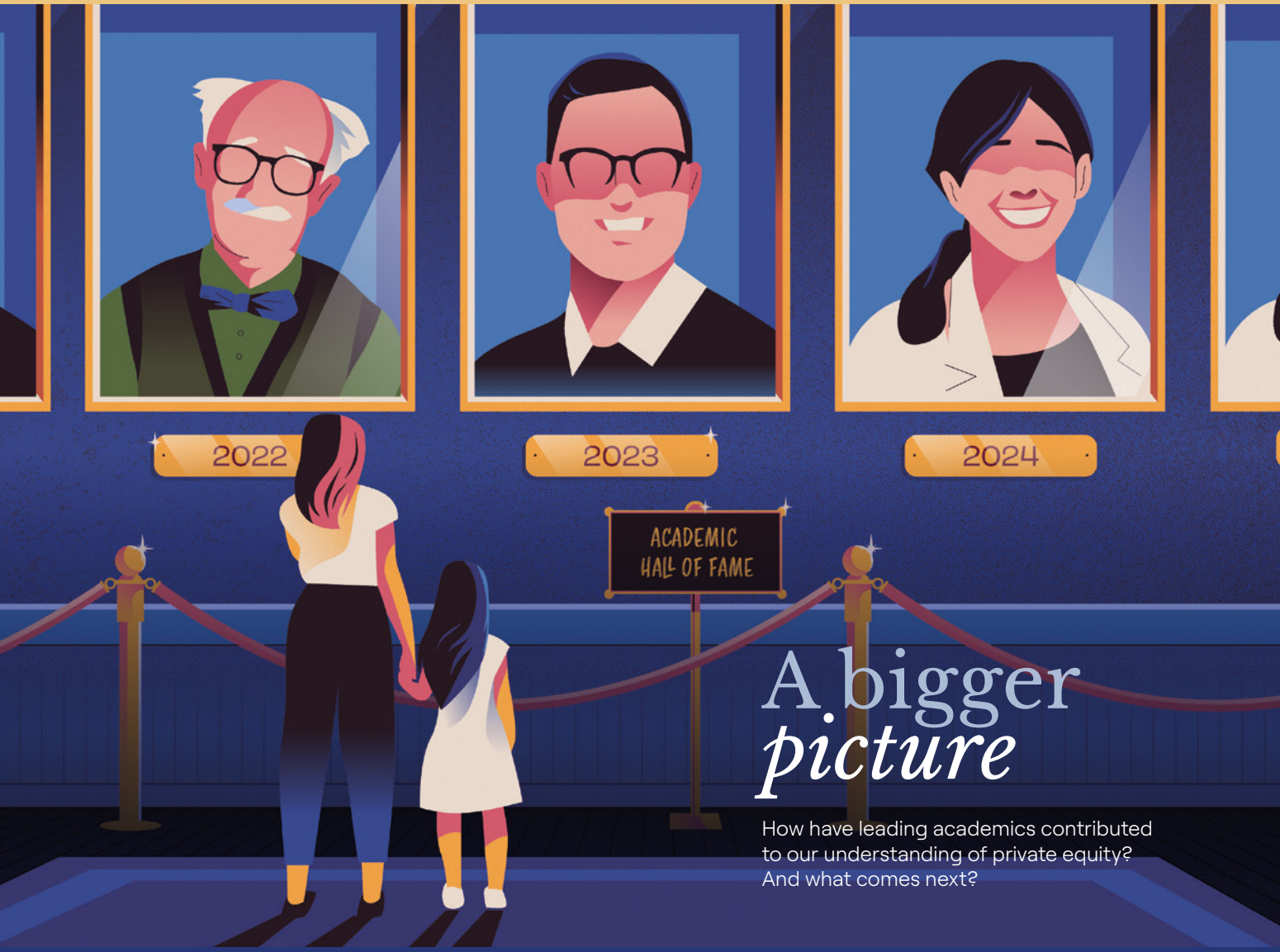

A bigger *picture*

How have leading academics contributed to our understanding of private equity? And what comes next?

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Time for *a new model?*

What if the data available today, combined with advanced computing power, could help limited partners manage their private equity portfolios more easily? That was the challenge a group of researchers set for themselves in a bid to help investors understand the asset class's inherently unpredictable cash flows. Here, one of the researchers outlines the new approach, while a seasoned investor offers his response.

Alex Billias

Alex Billias is chief operating officer at Bella Private Markets, where he has worked on a wide variety of research and strategic consulting projects. He also leads the development of quantitative tools for simulating portfolio cash flows and benchmarking performance. Prior to Bella, he conducted physics research for the ISOLDE facility at CERN in Geneva.

For new and existing fund investors alike, PE is complex to navigate. With a wide dispersion of returns, a need to manage capital that will fund commitments over time, chunky, unpredictable distributions, and a decline in the persistence of returns from managers, the asset class can pose difficulties for LPs seeking to reach and maintain target allocations and predict the risk-return profiles of their investments.

These conundrums were what originally drove Yale University endowment investment officers Dean Takahashi and Seth Alexander in 2001 to create an approach that provides point estimates of cash flows and net asset values (NAVs) for a portfolio of PE funds. The model is still used by many LPs today, but its accuracy relies on an investor having enough sophistication to derive a set of assumptions to feed into the model.

Of course, the industry has moved on significantly since the early 2000s. Not only has it grown, but it has evolved to include structured financial products backed by PE, such as collateralised fund obligations and retail offerings, among others. The need to analyse new, more complex investment products, combined with an increase in historical data and computing power, led a group of researchers at Bella Private Markets, including Harvard Business School professor Josh Lerner, to revisit the Yale model.

"We wanted to keep the original model's criteria – that it should be simple, capable of incorporating and responding to real data and of analysing the impact of various scenarios, and that it should be useful for a variety of asset types," explains Bella's chief operating officer, Alex Billias. "But we also wanted to solve some of its limitations. One issue is that even if LPs have data, they need to make assumptions, and the other is that you only get one outcome. The simplicity of the original model is therefore a double-edged sword because an inaccurate assumption could lead to a false outcome."

The researchers developed a new simulation-based model that uses historical fund-level cash flow data. The model does not require users to derive assumptions as inputs; it requires only known cash flows and current valuations from the user's portfolio of funds.

"Using this portfolio data as a starting point, our model then picks similar historical funds and traces what would have happened if the LP's funds had evolved along the same trajectories as the historical funds," explains Billias. "So, if you have a portfolio in 2023 with funds that are between three and eight years' old, our model will 'shift' the portfolio back in time to, for example, 2011, and pick out three-to eight-year-old funds as of 2011 to match the vintage profile of the actual portfolio. It then traces the evolution of the historical funds' cash flows and valuations. By repeating this process many times over many historical periods, you can capture a range of outcomes that are mapped and scaled to the size and make-up of your own portfolio."

Users can then consider a range of scenarios, such as how funds following a certain strategy might perform if they are hit by a downturn or shock. It can also help investors to see the effect of rebalancing their portfolios or making other adjustments. "It's a probabilistic model as opposed to the deterministic approach taken by Takahashi and Alexander," says Billias. "So rather than providing single point estimates, we can provide a range of outcomes with probabilities of 10%, 20%, 30% and so on, based on the trajectories of similar funds in the past."

The researchers say the model can be used in a variety of ways – to build LP portfolios, manage liquidity, develop funds of funds, in securitisation and structured finance and, potentially, in other private markets, such as infrastructure and real estate.

So what are its limitations? "One drawback is that, because it is using historical data, it can't account for new developments we haven't seen before," says Billias. "So, it can't tell us with historical certainty what effect using subscription lines of credit would have on capital calls, or how NAV lending might affect the portfolio's return profile, because these are relatively new innovations. But, using the historical output as a baseline, you can layer on different assumptions and adjustments to account for these." However, he adds, there are likely to be refinements to the model over time as more data becomes available and these market changes can be quantified.

"It could be a really useful tool for making something that is otherwise very difficult in PE and venture capital much more accessible," concludes Billias. "After all, going back in time to see what happened in the past seems to resonate more with LPs than a multifactor regression model."

The research

In *Takahashi-Alexander Revisited: Modelling Private Equity Portfolio Outcomes Using Historical Simulations*, a group of researchers at Bella Private Markets (Dawson Beutler, Alex Billias, Sam Holt and TzuHwan Seet) led by Harvard Business School professor Josh Lerner, outline a new model that uses simulations to help LPs forecast cash flows and valuations in their PE portfolios.

The new model preserves the simplicity and intuition of the Takahashi-Alexander model developed in 2001, but addresses what the authors say are its limitations – that it requires users to create and input assumptions, and that it provides only a single estimate for a period's expected capital calls, distributions, and net asset values.

The new model uses information from an existing portfolio and matches its funds to historical funds across a range of time periods to create thousands of simulated portfolios that structurally mirror the existing one. It matches funds according to criteria such as vintage year, geography, fund strategy and size. The model then weights and rescales the sampled funds' cash flows and valuations to match the exposures in the real portfolio.

By running simulations across historical periods and funds, the model offers a range of performance, cash flow and NAV forecasts for the real portfolio. The authors say this approach allows the model to be customised in order to understand the effect of market conditions, for instance by restricting the model to crisis periods such as the dotcom bubble to see the impact of a similar crash on a portfolio of VC funds.

Patrick Sherwood

Patrick Sherwood is a principal at GroveStreet, focusing on fund and direct investment activities across sectors. He is also involved in analysing and managing client portfolios. Before GroveStreet, he was managing director of investments at the Wallace Foundation, having previously worked for the Yale Investments Office.

Users of the Takahashi-Alexander model or a variation of it have tended to be more sophisticated LPs, according to Patrick Sherwood, principal at GroveStreet and a former investment professional at the Yale Investment Office, where he worked alongside Takahashi. "Many others have tended to use a rule of thumb, where they assume that the capital will be called over the next five years," he says. "Other teams will attempt to generate a bottom-up forecast based on input from GPs, but that is quite labour-intensive and relies on the investor being in close contact with the fund manager – that's not always possible and it's also subject to human bias."

Takahashi-Alexander, therefore, has been "the best approach available", adds Sherwood. "The challenge is not to treat it as 100% correct. It's more of a general guide to cash flows, yet there can be a temptation to assume that the number it produces is a prediction of what is going to happen." This is particularly true, he says, when the results are shared with audiences across or outside an organisation, as they may not know the model's limits and may become attached to a particular forecast number.

As a result, Sherwood agrees with the paper's assessment that Takahashi-Alexander's main limitations are that it requires assumptions as inputs and that it produces a single outcome. "It's not clear that everyone always understands the inputs used for the model," he says. "When Yale first adopted this, it was looking back 20 years to the 1980s – that's very different to today. The market has evolved and changed so much over the past 10 to 20 years – it has grown and there are many different types of funds. You can't use this blindly."

So what about the new model put forward by the researchers at Bella? "It's a tremendous improvement to be able to ground the future in a range of possibilities based on real data – it's a true advance," he says. One of the biggest advantages is that it could help to change the way investors consider potential outcomes from PE portfolios. "If you present the outcomes as a range,it really helps people think more probabilistically, as opposed to assuming what you are presenting is a prediction," he says.

However, in practice, even the new model has limitations. "Data can be a big limiting factor," explains Sherwood. "An investor like Yale or GroveStreet could use this because it has been a consistent investor with decades of good-quality cash flow data to draw on. However, others might have to rely on externally sourced data and there are currently very few clean, high-quality market or industry-wide cash flow datasets available commercially that stack up to those from groups like Yale or GroveStreet. So, you may still have the problem of garbage in, garbage out, and I would be concerned if investors used this naively."

The other issue is to do with history having a habit of not quite repeating itself, as Billias also outlines. "Like all models, you are relying on historical data and things change in a way that history can't capture," says Sherwood. "The dotcom bust was very different from the recent rout in technology stocks and VC portfolios because this time around, these were real companies. It's also the case that PE is now in its first true inflationary environment since becoming a ubiquitous asset class – it hasn't had to cope with such rapidly increasing interest rates before."

All of this means that the new model still requires a level of sophistication among LPs. However, Sherwood says it could be valuable to LPs for forecasting cash flows and in making asset allocation decisions. "It can help investors understand the liquidity profile of a given portfolio," he says. "It could be powerful in helping investors understand, for example, how much they should commit today if they have a target allocation of a certain level within a certain time frame. And, as investors are dealing with slower distributions today, it could help them understand what the impact might be of using the secondaries market to gain liquidity." He adds that it is also a useful tool for helping PE teams to communicate to others the possible year-to-year variations in the asset class.

Overall, he says, the new model is "a great improvement; it just needs to be used responsibly."