Valuing Private Equity Investments Strip by Strip
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Executive Summary

Private equity assets have grown substantially in value relative to publicly traded assets, and now account for $4.7 trillion in assets under management. However, traditional asset-pricing methods are not able to value investments that do not trade on securities markets due to the absence of frequent price and return information. These limitations make it difficult for institutional investors to understand the risk and return characteristics of the private investments in their portfolios.

We propose a new valuation method for private equity investments involving two steps. In the first, we estimate a flexible no-arbitrage model of the stochastic discount factor, which accurately prices the term structure of interest rates, the aggregate stock market, and traded dividend strips; as well as the cross section of stocks in a variety of categories (small, growth, real estate, and infrastructure). This model prices claims to bonds and equity strips for various equity indices and numerous maturities.

Second, we construct replicating portfolios for the cash flows on private equity investments. Private equity cash flows at each horizon are modeled as a budget-feasible combination of zero-coupon bonds and equity strips on the various equity instruments, capturing the exposure to the sources of systematic risk at different horizons.

Using the rich dynamics of these resulting replicating portfolios, we find that different private equity categories have exposures to distinct systematic risk factors. For example, venture capital funds load on small and growth stocks, and real estate funds take on REIT-like exposure. Additionally, the pattern of risk exposure changes over fund life. Cash flows in years three to seven, the harvesting period, have higher exposure to the various equity factors, while cash flows toward the end of the fund's life, in years eight through 15, are more bond-like.

This approach enables novel measures of fund performance relative to the replicating portfolio, expressed as a risk-adjusted profit (RAP). This measure reflects managerial outperformance as well as additional compensation for the investor for locking up her money for an extended period, an illiquidity premium. RAP is positively correlated with existing IRR and Kaplan-Schoar PME measures but contains substantial independent information. We find that these RAPs are positive on average in every category, but with large differences across categories, across funds within a category, and across time. VC funds, for instance, have modest out-performance across the whole sample, which combines substantial outperformance among 1991-1998 vintage funds, and underperformance since 2005.

The replicating portfolio approach also delivers the expected returns on private equity investments; which average around 10-15 percent per year but also have substantial variation across fund categories and over time. Time variation in risk premia arises from two sources. The first is differences over time in the cost of the replicating portfolio, which in turn reflects time variation in risk premia on the stocks and bonds that make up the replicating portfolio. The second is time variation in the quantity of risk across private equity vintages, which we capture by allowing the private equity cash flow exposures to depend on the price-dividend ratio on the stock market.

This new method makes it possible to apply standard portfolio and risk management techniques when combining alternative investments with traditional investments in stocks and bonds; and can be used to value any privately held asset that generates cash flows, such as real estate assets, oil wells, or infrastructure projects.