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Replicating Private Equity

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Borrow and access small cap

Private Equity is illiquid and challenging to benchmark. Many investors use "S&P 500 +3%" in order to compare performance in the absence of an observable, investable asset.

This paper describes a methodology for creating a private equity proxy or replication strategy using derivatives. The strategy is based on the observation by L'Her, Stoyanova, Shaw, Scott, and Lai (2016) that the relatively higher returns of Private Equity have been substantially driven by the use of leverage and exposure to smaller companies. Such a replication strategy can be used as a benchmark, or as a liquid, transparent, and low cost replacement to a traditional Private Equity investment.

Private Equity Background

On average, private equity buyout funds have delivered returns significantly in excess of public equity markets since their inception in the 1980s. According to Harris, Jenkinson, and Kaplan (2013), the median private equity buyout fund has outperformed the S&P 500 by 20-27% over the life of the fund, or about 3% per year. The L'Her et al. (2016) paper from the Financial Analysis Journal (FAJ) states that 90% of private equity buyout investments are in companies with enterprise value comparable to the bottom 10% of a small cap index such as the Russell 2000.

Private equity fund managers borrow to fund their purchases. The debt-to-enterprise value at inception of a buyout averages 65%, and falls to 45% on exit or 55% on average through the life of fund. This ratio is 35% for comparable publically listed companies, or about 1/3 less. According to L'Her et al. (2016) 55% of the returns of the average private equity fund can be explained by exposure to small cap, sector weights, and the use of additional leverage.

Diller, Herger, and Wulff (2009) modelled the shape of cash flows in private equity and found that funds are typically invested over 2-5 years and investments are realized within 10-12 years. This provides a private equity fund with a degree of "time diversification". For example, a 2014 vintage fund will invest a portion of its capital each year over 2014, 2015, 2016, etc. and may not realize these investments until 2020-2026. Coupe (2016) showed that from a benchmarking perspective, this time diversification helps to smooth private equity returns.

Returns on individual private equity funds, when available, are usually reported as Internal Rates of Returns ("IRRs") net of fees which are not the same as the return a particular investor will actually receive. Investors commit to funding but years can pass before assets are fully called.

Finally, private equity fund investments are valued intermittently and there is a significant degree of latitude afforded private equity fund managers when valuing their portfolio companies. The use of non-market valuations is inherently less volatile than valuations that fluctuate daily for publicly listed companies. These smoothed valuations account for some of the appeal of private equity from a portfolio risk perspective.

The Private Equity Passive Replication ("PEPR") Strategy

A liquid, investable private equity proxy should provide investors with the same kinds of economic exposures as a private equity fund, while also providing for as much of the benefits of the fund structure as possible. It is possible to mostly replicate the smoothing benefit of time diversification, but not to smooth valuations in a liquid investment.

What returns do you actually get?

Private equity return statistics can be confusing for several reasons:

- **Internal Rate of Return - the timing of cash flows and distributions drive the IRR, which differs from the return investors actually receive.**
- **Dampened Volatility - intermittent valuations reduce volatility, and high performance fees lower betas to public equity markets**
- **Access to the Top - the wide dispersion of private equity returns leads to a small group of highly desirable funds that smaller investors may never be able to access. These funds may skew the performance of pooled indexes such as that of Cambridge** Associates

Most of the historical outperformance of the average private equity buyout fund over the S&P500 can be explained by exposure to small companies and the use of leverage. Therefore, creating a PEPR Index that invests in i) smaller public companies with ii) an adjustment made for leverage should produce similar performance.

To achieve i) we use the small cap Russell 2000 Index. The use of an index maintains transparency and exposure to the outperformance driver that is small cap, accepting that such a broad small cap index will not always capture the sector biases that may be present in private equity funds. To achieve ii) we use equity derivatives, specifically in-the-money call options purchased on the Russell 2000 index. Such call options can provide the right amount of leverage needed to replicate private equity fund leverage.

The specific tools we use to construct the proxy are in-the-money call options on the Russell 2000 struck at 40% of current price levels. Such options currently cost approximately 60% of the amount of exposure obtained (the "notional" amount). For example, we will pay $60 in premium for $100 in notional exposure. A 10% rise in the Russell 2000 would take the value of the option from $60 to $70 (+17%), so the initial leverage level is equivalent to x1.7. This 1.7x leverage multiple is similar to that of a private equity investment, adjusting for the average debt/equity ratio of the Russell 2000.

The PEPR strategy also addresses the issue of time diversification. We create a portfolio of five options, with maturities ranging from one to five years. Each year one option expires and is replaced by a new five-year option struck at 40% of the then-current Russell 2000 index level.

Performance Summary

The historic returns of the private equity universe, the Russell 2000, S&P 500 +3% and the private equity proxy strategy described above, are as follows:

	1 yr	3 yr	5 yr	10 yr	15 yr
PEPR Index	*25.7*	*16.1*	*18.1*	*13.2*	13.2
Cambridge PE	18.2	12.5	13.7	10.8	14.7
S&P +3%	*17.9*	*15.3*	*16.9*	*13.5*	12.6
Russell 2000	17.6	11.0	12.5	10.6	10.5

**All returns are as of June 2018, the last quarter for which Cambridge Associates has reported private equity universe data.*

The private equity passive replication strategy had average annual returns, net of expected fees, of 13.2% p.a over the 15 years to June 2018. This fell slightly

below the Cambridge Associates U.S Private Equity Index which generated 14.7% net of fees. However, the PEPR index outperformed the traditional S&P 500 +3% benchmark, which averaged returns of 12.6% per year over the same period.

The volatility of returns in the Cambridge Associates data is low. Returns are only available quarterly, and the valuations that drive returns are typically model-based and not considering actual secondary market transactions, as these are not generally available. In summary, the market value of underlying private equity assets may fluctuate, but these fluctuations are not reflected until cashflows are reported and updated, which happens periodically. The private equity proxy strategy has relatively high volatility, at 33% pa historically, due to the fact that an equity index is being leveraged.

Conclusion

Strategies using derivatives can replicate some of the key characteristics of private equity and form a liquid proxy. This can be used to access the higher long term expected returns that are associated with the asset class, albeit with greater volatility than both public and private equity returns historically. Such a strategy can also be used to better benchmark private equity portfolios compared to the "S&P500 + 3%" which is frequently used.

Do the illiquidity, high fees and opaque nature of private equity make the asset class unattractive? Not necessarily. We acknowledge that some individual managers excel and diversification into sectors and companies not otherwise available can add value. Some investors will also appreciate the inherent smoothing of returns that results from infrequent re-valuations of the underlying companies.

However, as with any investment, investors should understand what is actually driving the underlying performance and assess whether the resulting returns are attractive given other 'costs' such as illiquidity. The presence of investable proxies such as PEPR enables that evaluation. The PEPR strategy also represents an innovative way to replace part of a private equity target allocation on a "completion" basis, particularly if that allocation is in cash awaiting investment.

Methodology

Option pricing and data: Call options are priced using a Black-Scholes methodology with the following data inputs:

Spot prices and Volatility: Russell 2000 equity index from Bloomberg

Forward dividend rates: Dividend at data of calculation on Russell 2000 index.

Forward risk free rates: USD 3m Libor zero rates over the term of the option from Bloomberg

Sources

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