

# Working out where the value lies

Analysing the performance of private equity investments remains an imprecise science, with most institutional investors opting to use the long established return multiple (cash in versus cash out) and internal rate of return (IRR) calculations. But Oliver Gottschalg and Maurizio Zollo of INSEAD’s Buyout Research Group and Nicolaus Loos of JP Morgan suggest institutional investors could make their performance assessment more relevant by benchmarking them against the performance of alternative investment options.

**G**ottschalg, Loos and Zollo believe this can be done in three steps. First of all, by switching to the Profitability Index as a performance measure, performance across investments can be accurately compared and directly expressed relative to the returns to non-private equity investment alternatives. Second, returns to private equity fund investments can be decomposed into four performance drivers: revenue growth, efficiency enhancements, multiple expansion and leverage. And third, performance in each of these categories can be benchmarked against the figures from comparable public or private peers. This way, it becomes possible to identify areas in which the private equity fund managers were able to really add value through their investments.

The Profitability Index implicitly considers the expected return to the alternative investment opportunities (e.g. the public market index) as these returns can be used as the discount rate to calculate the present value, and thus helps investors compare investment options in a better way. Unlike the IRR, the Profitability Index also provides direct information about whether a given option is attractive compared to the default alternative investment opportunity. By design, a Profitability Index of greater than 1 indicates a given option is more attractive than the default option, a Profitability Index of less than 1 indicates the opposite. In our earlier example, the Profitability Index values would be as follows:

While these features make the Profitability Index a very

## The Profitability Index

The Profitability Index is designed to incorporate the dilemma posed by reinvestment of capital, as outlined in the IRR calculation (see boxed item) whereby, depending on institutional investors’ time horizon, and the actual investment period of private equity funds investments the highest IRR might not always be best.

The Profitability Index is the present value of all cash flows related to an investment using the appropriate discount rate(s) divided by the initial investment amount.

Average annualised returns over a 10 year horizon calculated with reference to the Profitability Index		
Option A: Invest in A, then place proceeds in public market index	->	PI=1.33
Option B: Invest in B, then place proceeds in public market index	->	PI=1.46
Option C: Invest in C,	->	PI=0.79
Option P: Place €100m in public market index	->	PI=1

Profitability Index

Profitability Index =  $\frac{NPV(\text{investment})}{\text{Investment}}$

Example  
We only have \$300,000 to invest. Which do we select?

Project	NPV	Investment	PI
A	230,000	200,000	1.15
B	141,250	125,000	1.13
C	194,250	175,000	1.11
D	162,000	150,000	1.08

Source: Principles of Corporate Finance, Seventh Edition, Richard A. Brealey, Stewart C. Myers

powerful performance measure for private equity fund investments, they come at a price: the calculation of the Profitability Index requires a decision about the appropriate discount rate to determine the net present value of investment cash flows. This is far from trivial because the expected returns of alternative investment opportunities with a comparable risk profile need to be estimated.

One may consider using different discount rates for cash inflows and cash outflows. Investors in private equity funds need to hold highly liquid positions to be able to respond to capital calls on short notice, and the discount factor of these cash flows should reflect this. Thus the returns to liquid public market positions or short-term money market rates seem appropriate in this case. Cash distributions by the private equity fund back to its investors, on the other hand, can be reinvested

## Staple methodologies: Return Multiples and IRR

### The Return Multiple

The Return Multiple is probably the most popular, and certainly the simplest way to assess the performance of a private equity fund investment: simply divide the value of the returns from the investment (cash or stock distributions for realised investments and residual values for unrealised ones) by the amount of money the fund invested in a given deal.

$$\text{Return Multiple} = \text{Investment Proceeds} / \text{Initial Investment}$$

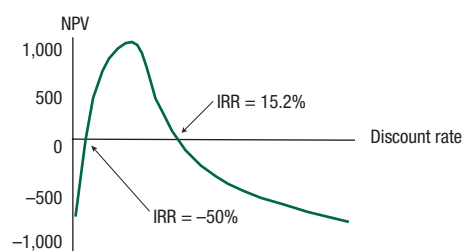
This ratio of "proceeds over investment" is simple to calculate and easy to interpret: if the fund doubles the investor's money on a deal, this corresponds to a return multiple of 2.0. However, this performance measure neglects the time dimension. In other words, a return multiple of 2.0 does not capture the difference between an investment that took 10 years to double the investor's money and a deal that did the same in only one year. In the former case, the investor might have been better off with a stock market index fund, whereas in the latter, the performance was clearly outstanding. Consequently, and despite the intuitive appeal of the Return Multiple as a performance measure, it is too simplistic to accurately assess the performance of a private equity fund investment.

### Internal Rate of Return (IRR)

Mathematically, the IRR number corresponds to the annually compounded discount rate that would make the net present value of all cash flows related to a given investment equal to zero. As it considers the time dimension, the IRR has a clear advantage over the Return Multiple. In the previous example of two investments

The following cash flow generates NPV = 0 at both (-50%) and 15.2%.

C <sub>0</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>	C <sub>5</sub>	C <sub>6</sub>
-1,000	+800	+150	+150	+150	+150	-150



Source: *Principles of Corporate Finance, Seventh Edition*, Richard A. Brealey, Stewart C. Myers

that double the investor's money in either 10 years or one year, the corresponding IRRs are 7.2% and 100%, respectively. (This assumes both investments have only two cash flows: one taken down at the beginning and one distribution at the end.) However, the IRR has a number of shortcomings. Some of them are of mathematical origin: in cases in which investments have a mix of positive and negative cash flows over time, there can be multiple discount rates that makes the net present value of these cash flows equal to zero.

Whenever investors rely exclusively on IRR to assess and compare performance, they implicitly make the assumption that after one investment is over, another equally profitable opportunity to place their money can be found. This so-called reinvestment hypothesis is questionable, especially in the private equity sector. After all, some investments have extraordinarily high IRRs, but there is no guarantee the private equity fund manager can identify similarly profitable investment opportunities in the future.

This then poses a different problem: an investor will prefer a short investment with a high IRR only if the proceeds can be reinvested at attractive returns. If this is not the case, a longer investment with a lower IRR may actually be preferable. The following example illustrates that, depending on the alternative investment opportunities, the investment with the greatest IRR is not always the most attractive option.

### Three (mutually exclusive) possibilities to invest €100m

A: 1 Year	Multiple 1,5	IRR= 50%
B: 3 Year	Multiple 2	IRR= 26%
C: 10 Year	Multiple 2	IRR= 7.2%

The only alternative investment is a public market index with yearly returns of 10%. For the sake of simplicity, ignore the different characteristics in terms of risk and liquidity of the various options. The investor has an investment horizon of 10 years.

### Average annualised returns over a 10-year horizon

Option A: Invest in A, then place proceeds in public market index	->	13.5% IRR
Option B: Invest in B, then place proceeds in public market index	->	14.8% IRR
Option C: Invest in C	->	7.2% IRR
Option D: Place €100m in public market index	->	10% IRR

Option B, i.e. an investment with a lower IRR than option A, is preferable for an investor with a 10-year investment horizon.

in a variety of ways, potentially in less liquid assets with higher returns that thus need to be used to discount these cash flows.

Between Year 0 and 1, the LPs place the committed capital in

Calculation of a Profitability Index for a private equity fund investment with different discount rates
Year 0: LPs commits €100m to Fund X.
Year 1: Fund X calls €100m to make investment B;
Year 4: Fund X distributes cash proceeds from the realization of investment B of €200m to the LPs

a short-term money market account at an interest rate of 3%. The only other alternative investment is a public market index with yearly returns of 10%.

$$PV = 200/(1,10)^4 = 136,6$$

$$\text{Initial investment (in year 0)} = 100/(1,03)^1 = 97,1$$

$$PI = 136,6/97,1 = 1,41$$

For simplicity's sake this example ignores the role of the interest on the committed capital between year 0 and 1. Strictly speaking, this interest needs to be compared to the lost opportunity cost of not having invested in the alternative public market investment at yearly returns of 12% over that time period, which illustrates the cost of holding committed capital in highly liquid positions.

### Where do returns come from

The accurate measurement of the performance of private equity investments is an important first step to understand whether and how private equity fund managers create value for their investors. It is interesting, however, to go one level deeper and ask, 'what ultimately drives the performance of a given private equity fund investment?' To this end it is helpful to disaggregate private equity investment performance into its various components and to analyse whether each of them contributes to value creation.

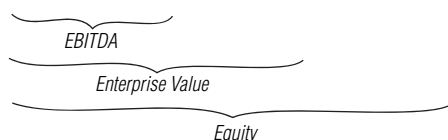
Following simple accounting principles, the equity value of a business can be broken down into the following four determinants: revenues, (EBITDA) margin, (EBITDA) valuation multiple and net debt. Changes in equity value consequently have to be linked to a change in at least one of these four components.

$$\text{From Enterprise Value (EV) = Equity (E) + Net Debt (ND)}$$

$$\text{We receive } E = EV - ND$$

$$\text{Which is } E = \text{Revenues} \times \text{EBITDA margin} \times \text{EBITDA multiple} - \text{Net Debt}$$

Since investors are most interested in changes in the equity



value of a business a private equity fund invested in, the equity value appreciation between entry and exit of a given investment needs to be determined. Despite the shortcomings of the IRR measure described earlier, this is the basis for the above analysis because IRR remains one of the most widely used performance measures. Using compounded annual growth rates (CAGRs) of all four components, the IRR (as the CAGR of the equity value) can be expressed as below:

with  $(1+CAGR(E))$  being equivalent to  $1+IRR(\text{Equity})$ . To understand what portion of the overall IRR is determined by

$$(1+CAGR(E)) = (1+CAGR(\text{Rev})) \left(1+CAGR\left(\frac{\text{EBITDA}}{\text{Rev}}\right)\right) \left(1+CAGR\left(\frac{\text{EV}}{\text{EBITDA}}\right)\right) \left(1+CAGR\left(\frac{E}{\text{EV}}\right)\right)$$

each of these components, we can calculate:

Each bracket now represents the relative contribution of revenues growth, margin improvement, multiple expansion and

$$100\% = \left(\frac{\ln(1+CAGR(\text{Rev}))}{\ln(1+CAGR(E))}\right) + \left(\frac{\ln(1+CAGR\left(\frac{\text{EBITDA}}{\text{Rev}}\right))}{\ln(1+CAGR(E))}\right) + \left(\frac{\ln(1+CAGR\left(\frac{\text{EV}}{\text{EBITDA}}\right))}{\ln(1+CAGR(E))}\right) + \left(\frac{\ln(1+CAGR\left(\frac{E}{\text{EV}}\right))}{\ln(1+CAGR(E))}\right)$$

leverage to IRR, adding up to 100%. By multiplying both sides with the equity IRR, we find each factor's absolute contribution to the level of IRR, hence

These values can be interpreted in the following way:

$$\begin{aligned} \text{IRR (Equity)} &= \text{IRR Equity} \left(\frac{\ln(1+CAGR(\text{Rev}))}{\ln(1+CAGR(E))}\right) + \text{IRR (Equity)} \left(\frac{\ln(1+CAGR\left(\frac{\text{EBITDA}}{\text{Rev}}\right))}{\ln(1+CAGR(E))}\right) \\ &+ \text{IRR (Equity)} \left(\frac{\ln(1+CAGR\left(\frac{\text{EV}}{\text{EBITDA}}\right))}{\ln(1+CAGR(E))}\right) + \text{IRR (Equity)} \left(\frac{\ln(1+CAGR\left(\frac{E}{\text{EV}}\right))}{\ln(1+CAGR(E))}\right) \end{aligned}$$

IRR (Equity) = Revenue growth effect (on IRR) + EBITDA margin effect (on IRR) + Multiple expansion effect (on IRR) + Leverage Effect (on IRR).

### Benchmarking performance drivers

Having accurately measured the performance of a private equity fund investment and identified to which extent the different factors; revenue growth, efficiency enhancements, multiple expansion and leverage, contribute to overall performance the performance of the investment can be evaluated not only on absolute, but also on a relative basis. This also provides insights into the degree to which the private equity fund manager played a role in the value creation process.

The basis for this exercise is a detailed benchmark of investment performance in its different components against comparable values for both public and private companies according to a methodology jointly developed by the INSEAD buyout research group and consulting firm PERACS.

The first step of the benchmark exercise constitutes the simple comparison between the overall return (IRR) of a given private equity fund investment with the returns of;

- a broad stock market index (S&P 500, Euro Stoxx 50 etc.),
- an industry- and country-matched peer group of publicly traded companies and
- comparable private equity fund investments.

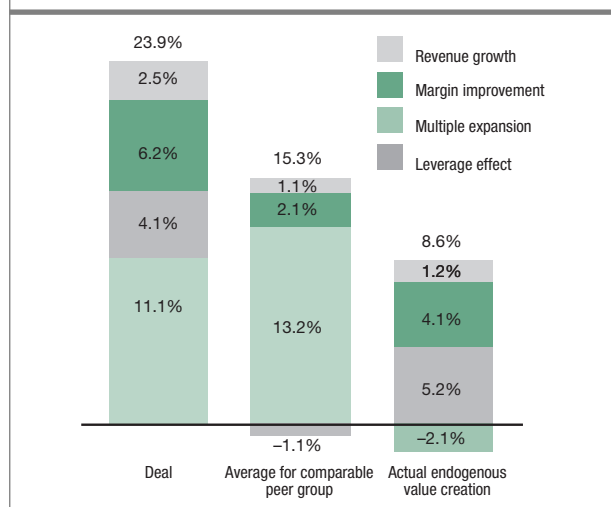
Timing of entry and exit (and ideally intermediate) cash flows has to be matched. For example, in the case of the stock market index, the returns to an investment in the stock market index need to be calculated on the date of the private equity fund investment that was realised on the day of the exit of the private equity fund investment.

This analysis provides, at the aggregate level, information about whether and to what extent a given private equity fund investment was able to create value beyond the value appreciation of the overall public equity market in general, or in the same sector, and whether this investment was particularly successful or unsuccessful relative to comparable private equity fund investments.

Following the same logic, a given private equity fund investment can be compared to comparable public and private investments not only in terms of the overall return (IRR), but also in each of the value creation components identified earlier. To this end, the corresponding values (average revenue CAGR, average EBITDA margin CAGR, average EBITDA multiple CAGR and annualized leverage effect) need to be calculated over the investment horizon for a group of (public or private) comparable companies. The following graph illustrates this detailed performance benchmark for a hypothetical example:

This analysis provides detailed insights into the value

### Detailed value creation benchmark Total IRR in % (hypothetical example)



creation mechanics of the given private equity fund investment. For example, the degree to which performance was to be driven by external factors, such as an increase in trading multiples in a given sector, sector-wide revenue growth or efficiency increases or to which extent the particular company that has received private equity financing has outperformed the industry in each of these factors.

Simultaneously, this analysis contains important information about the quality of private equity fund managers. It shows, for example, to what extent they were able to identify industry sectors for their investment in which value was created either through revenue growth, efficiency enhancements or multiple increases. At the same time, and to the extent private equity fund managers can credibly claim credit for these improvements, it shows to what extent the fund managers were able to actively create value. This can happen either through fundamental performance improvements of the target company (revenue growth or margin improvements) or through a multiple increase in excess of the overall industry trend.

*If you have comments or questions about this article please direct them to: [lbo-research.fb@insead.edu](mailto:lbo-research.fb@insead.edu) or consult [www.buyoutresearch.org](http://www.buyoutresearch.org)*

## PEBenchmark (tm): The INSEAD Performance Benchmark Report for Private Equity Fund Investments - in cooperation with Thomson Venture Economics

This report offers the first-ever possibility to compare the performance of PE fund investments according to a variety of deal-level characteristics. Based on an analysis of data from Thomson Venture Economics on the performance of 707 PE funds from vintage years prior to 1998 and characteristics of the 41,606 investments they made in 10,255 companies, researchers from the INSEAD Buyout Research Team have calculated average IRRs and Profitability Indices as a function of investment years, exit years and industry sectors.

These performance benchmarks can be compared for sub-classes of the PE fund universe of different geography, stage focus, fund size, vintage years etc. This report is a must-have for all those who want to benchmark PE fund investments according to a more fine-grained comparison than aggregate vintage year performance.

Information on ordering is available at [www.PEBenchmark.com](http://www.PEBenchmark.com)