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INVESTMENT MANAGEMENT

Understanding Fee Netting; Does It Always Pay Off?

PORTFOLIO SOLUTIONS GROUP | September 2025

Performance fee netting[1] across private investments is a concept which has not been researched substantially. According to conventional wisdom, netting of fees is unambiguously a good thing for investors while non-netted fees are better for investment managers. But is that conventional wisdom actually the case? In this paper we show that performance fee netting in private investments does not necessary benefit investors. We show that due to the presence of catch-up performance, fee netting sometimes is negative for investors.

To illustrate our observations, we developed a model that allows us to measure the impact of fee netting under various scenarios. The model shows a number of outcomes, some of which make investors better off while others, contrary to conventional wisdom, increase the fee burden of investors.

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Introduction

Principal-agent problems are ever-present in all facets of the investment management industry, and nowhere more pronounced than in the relationship between investors and the managers of both public and private investment funds. To align the interests of principals (i.e., the owners of capital) and agents (i.e., fund managers), a range of incentive structures have been employed. Incentive fees are typically created on a one-on-one basis—investors pay fees based on the performance of each individual fund they invest in. Given the asymmetric structure of most fees (i.e., managers do not pay investors if they have negative performance), it is perceived that investors end up paying a disproportionate amount of fees relative to the performance they receive. To mitigate this issue, fee netting at the portfolio level has been proposed.

[1] Offsetting the returns of multiple funds and paying fees on the netted return. This is different from fee netting at the asset level which offsets returns of multiple investments within a fund and pays fees on the netted returns of these investments.

In this paper, we analyze the monetary benefits of fee netting for investors in the private investments as it is important to understand whether clients can be better served by a potential new fee structure. This paper begins by introducing private market fee structures before examining the concept of fee netting. We first analyze a base case without catch-up fees to establish the foundation of the conventional wisdom that fee netting benefits private market investors by allowing weaker performing funds to dilute the aggregate gross return, thereby reducing the total performance fee paid by LPs. However, when a catch-up provision is introduced, the impact of netting changes. If the catch-up is steep, netting can actually increase overall fees by lifting weaker performing funds into the catch-up zone, where performance fees accumulate more rapidly. This happens because the performance fee function, rather than being uniformly structured, can develop a concave region where netting has an adverse effect on LPs. In particular, when one or more of the netted funds generate positive returns but remain below their hurdle IRR, they enter the catch-up phase, leading to higher overall fees instead of the expected reduction. Finally, before concluding, we analyze the impact of return distributions to determine when fee netting is beneficial and identify key factors—such as expected returns, volatility and correlation between individual funds—that drive this outcome. This is achieved by implementing a modified Black-Scholes option pricing model to quantify the implications of different return dynamics on fee netting outcomes.

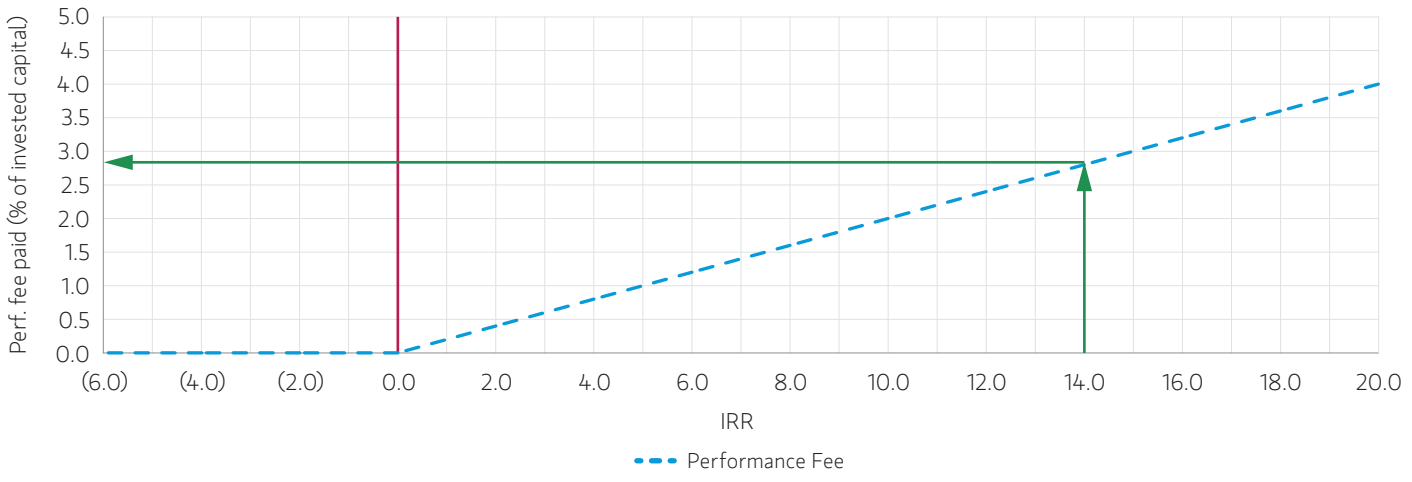
Problem Setup: Private Markets Fee Structure

Before we drill into the details, it's worth spending time to define the terms and fee structure we use throughout the paper. Private investments, such as Buyout funds, have both management and performance fees. During the investment period, the **management fee** is typically charged on committed capital, regardless of whether it has been drawn or not. After this, it is typically charged on invested capital.

The **performance fee**, which is referred to as carried interest, is calculated based on the IRR of the fund. The distribution waterfall describes how capital is allocated between the GP and the LP; in addition to the fees described previously, it also specifies other provisions which are typical for private markets, such as the preferred return, catch-up rate and claw-back provisions. *Display 1* illustrates how a simple performance fee schedule works in a single period setup. The blue dashed line in the chart illustrates how a 20% performance fee is charged to an investor based on the fund's performance net of the management fee. On the left side of the vertical red line, the GP will get nothing since IRR is below zero. On the right-hand side of the vertical red line, the GP will take a cut of 20% on any gains as the fund's IRR is above zero. For example, as illustrated by the green line, when the fund returns 14%, the GP can take a 20% cut, which results in a 2.8% performance fee (14% x 20%), charged on the invested capital.

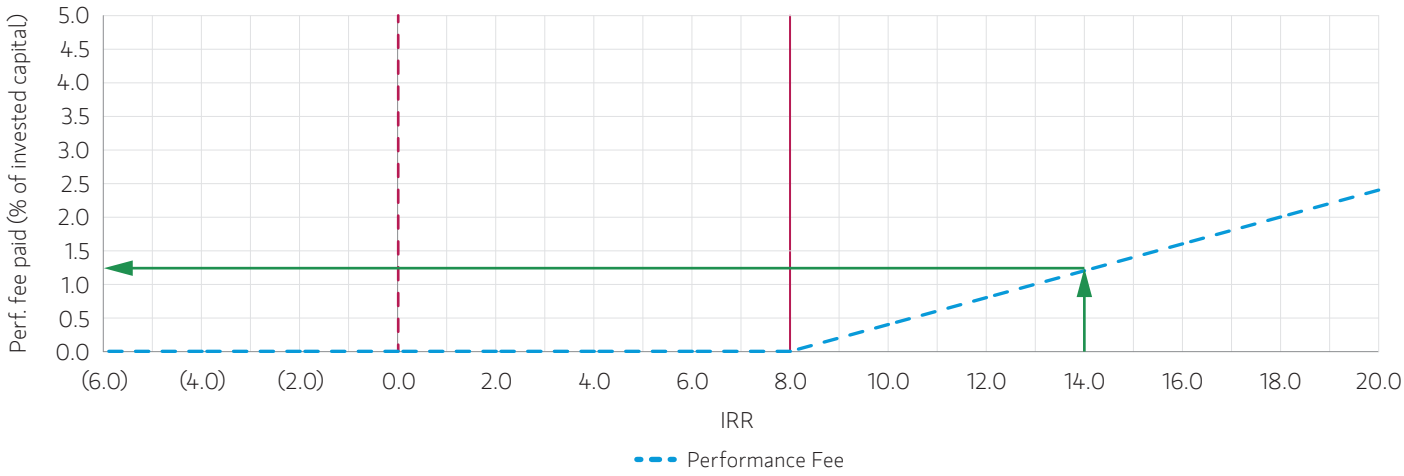
DISPLAY 1

Performance fee vs. IRR, assuming a 20% performance fee.



DISPLAY 2

Performance fee vs. IRR, assuming a 20% performance fee and 8% hurdle rate.

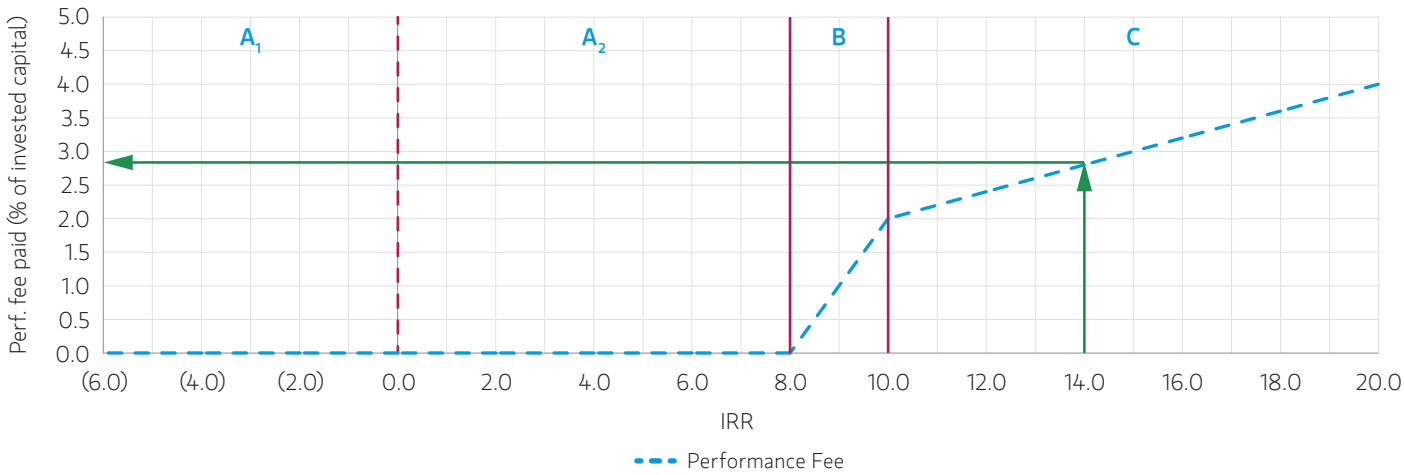


The **hurdle rate**, or preferred return, refers to the minimum level of distributions[2] that a GP needs to surpass in order to start receiving compensation; it acts as an incentive for managers to target returns that are in keeping with the fund's objectives. *Display 2* illustrates how an 8% hurdle rate works. As seen in *Display 2*, the vertical red line, which decides the IRR cut-off, now goes from zero to 8%. In this example, a 14% IRR means the GP will collect 1.2% performance fee, calculated as (14% - 8%) x 20% (assuming a 20% performance fee).

As the carried interest is generally paid on the absolute return of the fund, and not on relative performance to the preferred rate, a **catch-up** mechanism[3] is put in place with the aim of paying managers larger proportions of subsequent distributions until they receive their entitlement of total distributions (i.e., the performance fee times the total gains). Once this level is achieved, any remaining distributions are split based on the value of carried interest. *Display 3* shows how catch-up works. In the chart we assume a 20%

DISPLAY 3

Performance fee vs. IRR, 20% performance fee, 8% hurdle rate and 100% catch-up rates.



[2] This is most commonly 8% for buyout funds. For this paper, we assume this value to be universal.

[3] This ranges from 0-100%; however, in a majority of cases, it will be in the higher part of the range, typically 75-100%. For this paper, we assume the level to be 100%.

performance fee, 8% hurdle rate and 100% catch-up rate. If an IRR falls below 0% (Zone A1), investors will not have to pay the GP any performance fee. For an IRR between 0% and 8% (Zone A2), investors also won't need to pay any performance fee but will owe the GP the performance fee if the performance crosses the hurdle rate at 8%. For an IRR between 8% to 10% (Zone B), the GP will collect every dollar made until what is owed up to this point is paid off. Lastly, if the IRR is above 10% (Zone C), the GP and LP will split the gains 20-80 as the performance fee is stated at 20%. So, as an example, If the fund has a 14% IRR as shown by the green line in *Display 3*, the GP will collect (10% - 8%) x 100% + (14% - 10%) x 20% = 2.8%. The first term, (10% - 8%) x 100%, represents the performance fee in the catch-up zone, where the GP is entitled to 100% until what they are owed is paid up. The second term, (14% - 10%) x 20%, represents the 20-80 split between the GP and LP after catch-up is satisfied.

Last, the **clawback** provision gives the LP the right to take back part of the GP's carried interest if subsequent losses reduce the IRR such that GPs are paid excessive compensation (relative to the entitled carried interest level).

Fee Netting

To demonstrate how fee netting works, take a simple example where an investor invests equal proportions ($100 each) in two funds: one has an IRR of 10%, while the second IRR is -10% with a similar time horizon; the carried interest (or performance fee) is 20%. The gross netted return for the two investments is 0%; as such, the investors would expect to pay zero performance fees in this scenario. In most of cases, however, given the absence of performance fee netting, there is a payment of $2 to the first manager, and thus the LP pays $2 even though they have not benefitted from netted positive returns.

At first glance, fee netting seems to be a straightforward mechanism for reducing costs for LPs. The underlying intuition, which aligns with conventional wisdom, is that netting fees across investments allows underperforming funds to offset the fee burden of more successful ones. In a netted structure, weaker performing funds dilute the aggregated gross return (before performance fees) of the combined portfolio, therefore lowering the total performance fee paid by the LP. This approach ensures that carried interest is only paid on the true net gains of the overall investment rather than on isolated high-performing funds, potentially preventing scenarios where LPs pay performance fees on some investments despite experiencing moderate or even negative overall portfolio returns. However, given the different fee structures described previously, the question arises, if this is always the case? We will closely look at the impacts of catch-up to demonstrate that performance fee netting is far more complicated than this intuition and warrants a deeper thinking.

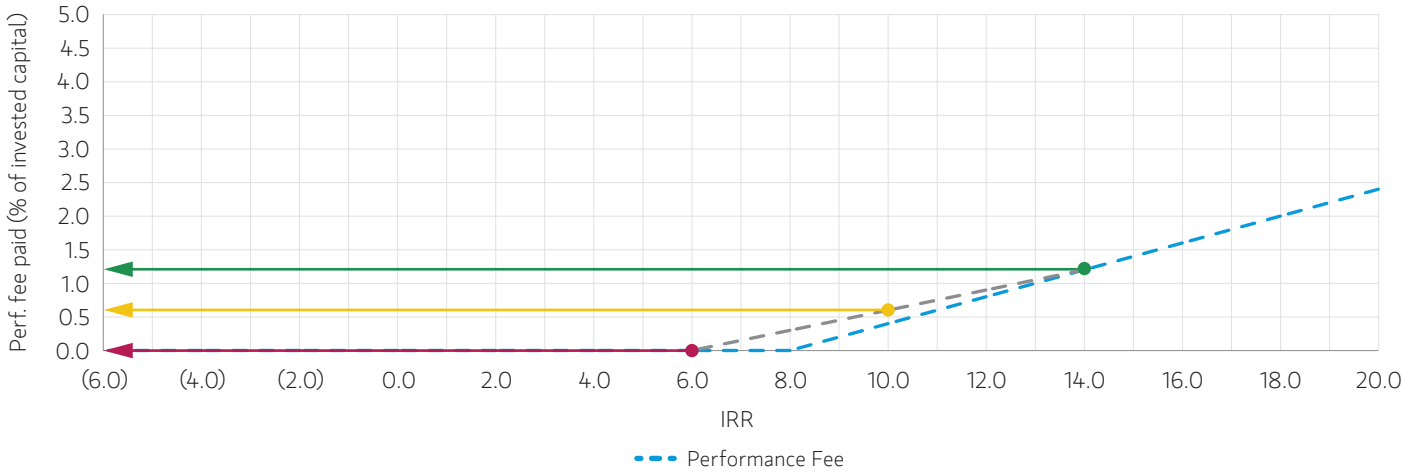
1. EFFECT OF CATCH-UP

NO CATCH-UP

We first look at the examples in *Displays* 4 and 5, where we assume there is no catch-up. The performance fee is set at 20% while the hurdle rate is 8%—both are industry standards for PE. There are two funds in the example, Fund 1 has a 6%

DISPLAY 4

Performance fee vs. IRR without fee netting. 20% performance fee, 8% hurdle rate, no catch-up.



IRR (represented by the red dot) and Fund 2 has a 14% IRR (represented by the green dot). For simplicity, we assume that an LP invests identical amounts in each fund and the investment is only for a single period. Note that the proportion invested will not matter in the end as the conclusion will be the same as we get to the end. The combined portfolio based on this 50-50 allocation assumption will have an IRR of 10% and is represented by the yellow dot.

Display 4 shows the case where there is no performance fee netting. By looking at the y-axis, we can observe that Fund 1 pays no fees as it is below the hurdle of 8%, while Fund 2 pays 1.2%.[4] By averaging the total amount of fees paid (i.e., without netting), the investor would pay 0.6% of the total invested amount. In *Display* 4, this value is represented by the yellow dot on the grey dotted line connecting the red and green dots. The yellow dot will move up or down this line, depending on the proportion invested in each fund (i.e., if more is invested in Fund 1, the yellow dot is closer to the red one, and vice-versa).

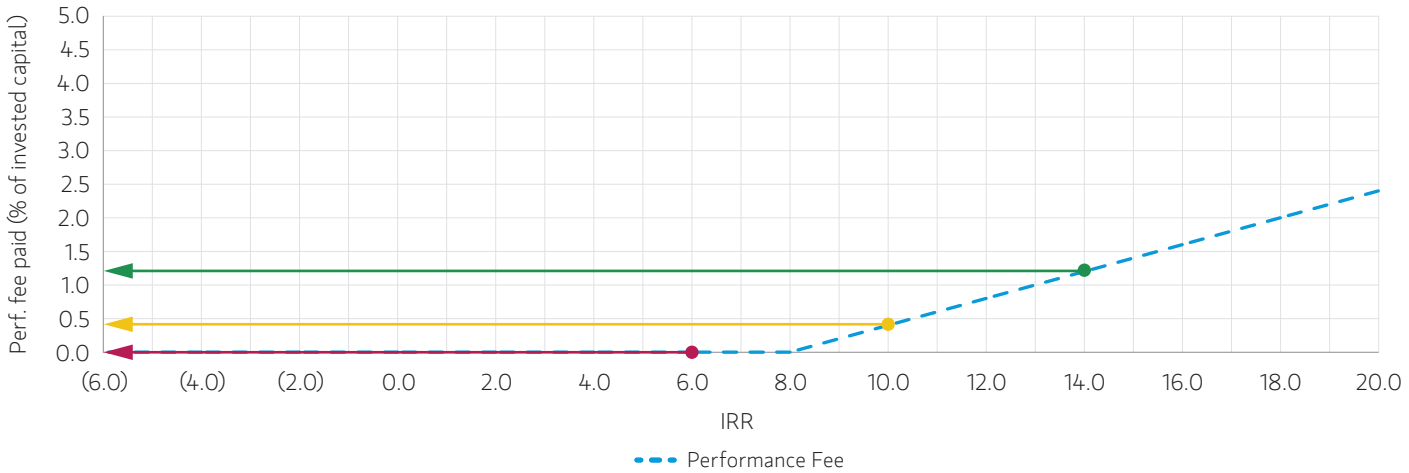
Display 5 shows the case with performance fee netting. To calculate the amount of fees paid when implementing fee netting, we must first obtain the weighted average return of the two funds; again, in our example this is 10%. By plotting the yellow dot on the blue line, we can observe that 0.4% performance fee would be paid for these fund returns. By changing the proportion invested in each fund, the yellow dot will either move closer to the red or green, while always remaining on the blue dotted line. What can be observed is that, regardless of proportion, the dotted blue line is always below the grey line between the red and green dots in *Display* 4, which represent the minimum and maximum values of the two combinations.[5] In other words, and importantly, due to the convex nature of the performance fee function when there is no catch-up, one could easily see that fee netting will always be beneficial to investors. This is the case when performance fee netting is employed in hedge fund investing, as hedge funds don't normally have a catch-up feature in their fee structures.

WITH CATCH-UP

Now let's turn our focus to cases where two funds are combined when a catch-up exists. Let's borrow the setup from the no-catch-up case: 20% performance fee and 8% hurdle rate. In addition, there is a catch-up rate of 100%. Same as the examples in the no-catch-up case, there are two funds, Fund 1 with a 6% IRR (represented by the red dot) and Fund 2 with a 14% IRR (represented by the green dot). The LP invests identical amounts in each fund and the investment is only for a single period. The combined portfolio based on this 50-50 allocation assumption will have an IRR of 10% and is represented by the yellow dot.

DISPLAY 5

Performance fee vs. IRR with fee netting. 20% performance fee, 8% hurdle rate, no catch-up.

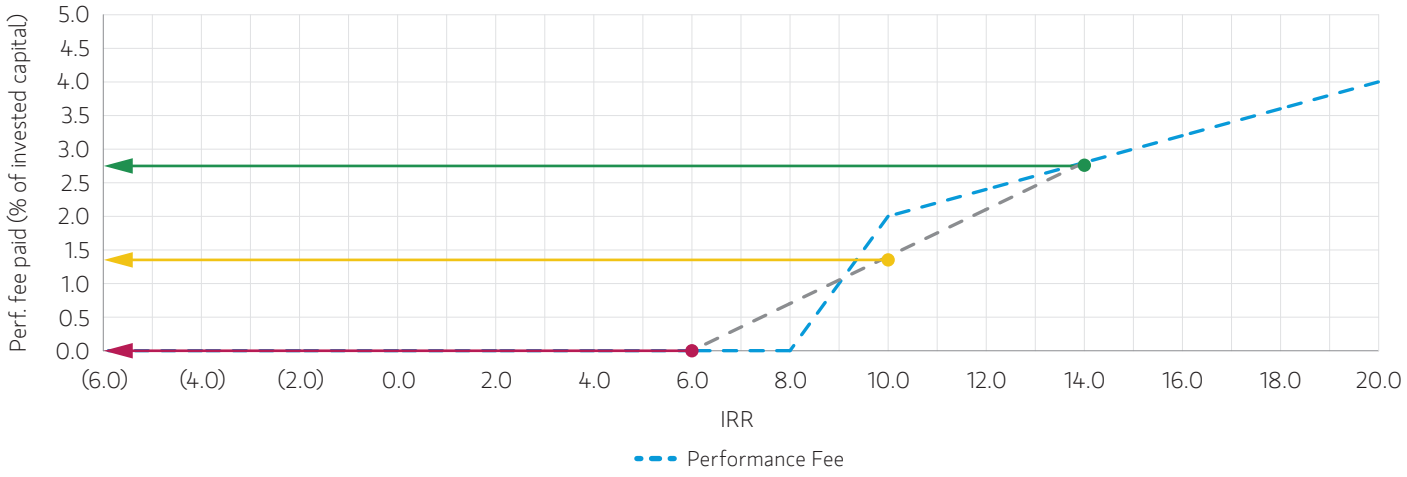


[4] As the preferred return is 8%, the investors will have to pay (14%-8%) x 20% = 1.2%.

[5] The lines intersect at the dots, which makes sense as this means that an investor would invest in only one fund, thus fee netting would have no impact.

DISPLAY 6

Performance fee vs. IRR without fee netting. 20% performance fee, 8% hurdle rate,with catch-up.



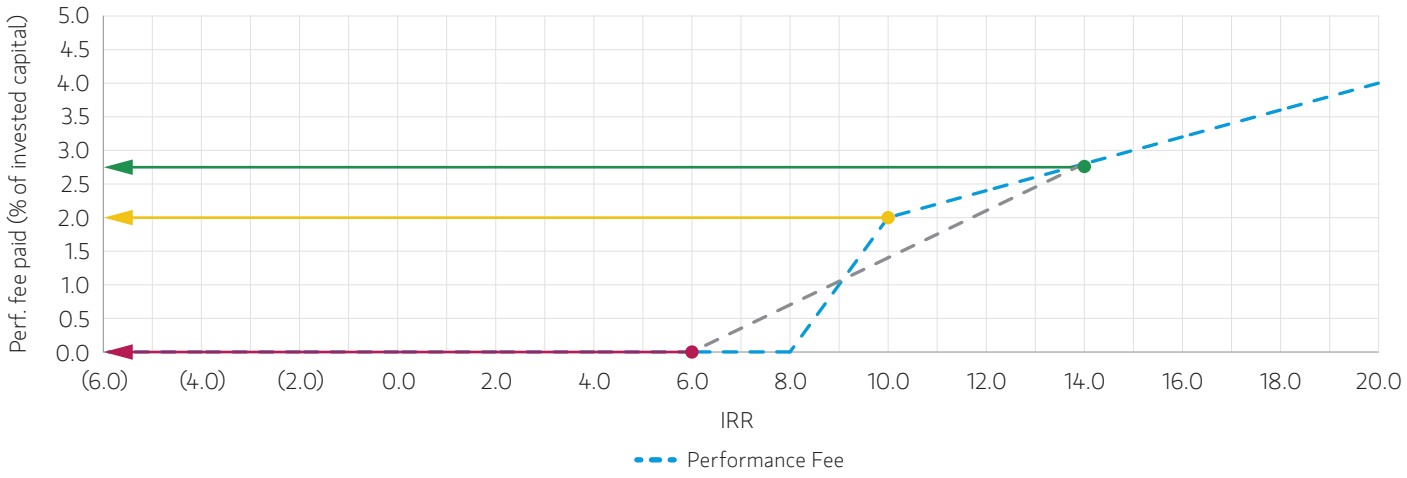
Display 6 illustrates an example where two funds are combined without performance fee netting. When no netting occurs, Fund 1 pays 0% fees, while Fund 2 pays 2.8%,[6] thus averaging 1.4%.

Display 7 illustrates an example where two funds are combined with performance fee netting. When netting fees, the combined portfolio returns 10%, meaning a performance fee of 2%, which is higher than what would have been paid without netting (i.e., 1.4%). This occurs as the catch-up, which in this case is 100% and must always be larger than the carried interest, causes the red fund to incur additional fees that are five times greater than the fee benefit accrued to the green fund.

Intuitively, netting is often seen as beneficial to LPs because the weaker performing fund drags down the stronger performing one, reducing the overall fee burden. This logic holds when no catch-up exists. However, when a steep catch-up provision is in place, netting can have the opposite effect by lifting a weaker performing fund into the catch-up

DISPLAY 7

Performance fee vs. IRR with fee netting. 20% performance fee, 8% hurdle rate, with catch-up.



[6] As the preferred return is 8%, the investors will have to pay 0% on the first 8% of IRR, then 100% (the catch-up) of IRR between 8% and 10% (i.e., 2%), then 20% (the carried interest) on IRR between 10% and 14% (i.e., 0.8%).

zone, increasing overall fees rather than reducing them. In other words, due to the steepness of the catch-up feature, the performance fee function now has a concave area where performance fee netting will have negative impact to LPs. This means that in catch-up fee structures in private markets, netting can increase overall fees, particularly when one or more of the netted funds generate positive returns but remain below their hurdle IRR, causing them to enter the expensive catch-up zone.

2. IMPACT OF RETURN DISTRIBUTION

With the examples above, readers now have a basic idea of why performance fee netting may not be beneficial to asset owners. The question to be answered now is under what conditions netting is harmful to investors and when it is beneficial. If one observes carefully, this depends on how much individual funds' returns affect where the combined portfolio sits along the performance fee function and, hence, causes different fee netting outcomes. In other words, if returns of both funds are far above or below the hurdle rate, then fee netting obviously will have no impact on total performance fee payments. On the other hand, if the combined portfolio's return falls into the convex/concave regions of the fee function, then performance fee netting will be beneficial/harmful to investor.

This observation can be simplified into three main drivers that will cause different outcomes: expected returns, expected volatilities and correlation of individual funds. The three parameters determine where the combined portfolio's return is more likely to locate on the fee function and will help investors decide on whether to pursue performance fee netting. To further explain this, we draw on and adopt an option pricing framework to help investors understand the characteristics of these parameters.[7,8]

If readers closely look at the "hockey stick" charts above, one may recognize that the performance fee functions can be modeled as a portfolio of call options. Using options to model the true relationship inherently follows from the nature of incentive fee structures. In the no-catch-up scenario, the expected performance fee can be modeled as buying a fraction of a call option where the number of shares to buy is just the performance fee ratio. For example, a 20% performance no-catch-up performance fee structure can be modeled as buying a one-fifth share (or 20%) of a call option that has the hurdle as the strike. When there is catch-up, the expected performance fee modeling will involve buying a fraction of a call option and selling a fraction of another call option. The strike price of the long position will be the hurdle rate while the number of shares to buy depends on the performance fee ratio. The strike price of the short position will be the point where the catch-up is 100% paid off and the number of sharers to sell will be catch-up rate minus performance fee ratio.

The Black-Scholes option pricing model is a widely used mathematical formula to price European-style options. It requires five input parameters, namely strike price, the current price of the underlying asset, time to expiration, risk-free rate and volatility. Moreover, it requires that the option's payoff can be dynamically replicated in the market with a combination of the underlying security and a risk-free bond. This implies the underlying security needs to have liquidity to satisfy the dynamic hedging need, and obviously the private investments in discussion cannot satisfy this condition. To make the model work, the analytical framework we borrow makes an important but imperfect assumption that a private investment can be replicated with a public market exposure and a deterministic alpha. Under this assumption, the Black-Scholes model can be modified to model private investment performance fee by including the alpha term in the discount rate and to allow us a reasonable enough model to observe fee-netting impact on private investments. Details of this adjustment can be found in *Appendix A*.

[7] Finnerty, John D. and R.W. Park. "Valuing a Private Equity Carried Interest as a Call Option on Fund Performance." The Journal of Private Equity, SPRING 2018, Vol. 21, No. 2 (SPRING 2018), pp. 14-30.

[8] Sorensen, M., N. Wang, and J. Yang. "Valuing Private Equity." The Review of Financial Studies, Vol. 27, No. 7 (July 2014), pp. 1977-2021.

We can use the analytical formula to study the impacts of an investment's return distribution and understand under what conditions netting is harmful to investors and when it is beneficial. To simplify the example, we assume there are two funds, Fund A and B, and they have the same distribution and fee structure, given as below:

Committed Capital	$100
Average Time to Invest	2.09
Average Time to Exit	8.66
Weighted Holding Period	6.57[9]
Risk-Free Rate	2.0%
Current Value of Mgmt Fee	15.63
Catch-up Rate	100%
Carry Ratio	20%
Hurdle Rate	8%

IMPACT OF RETURNS

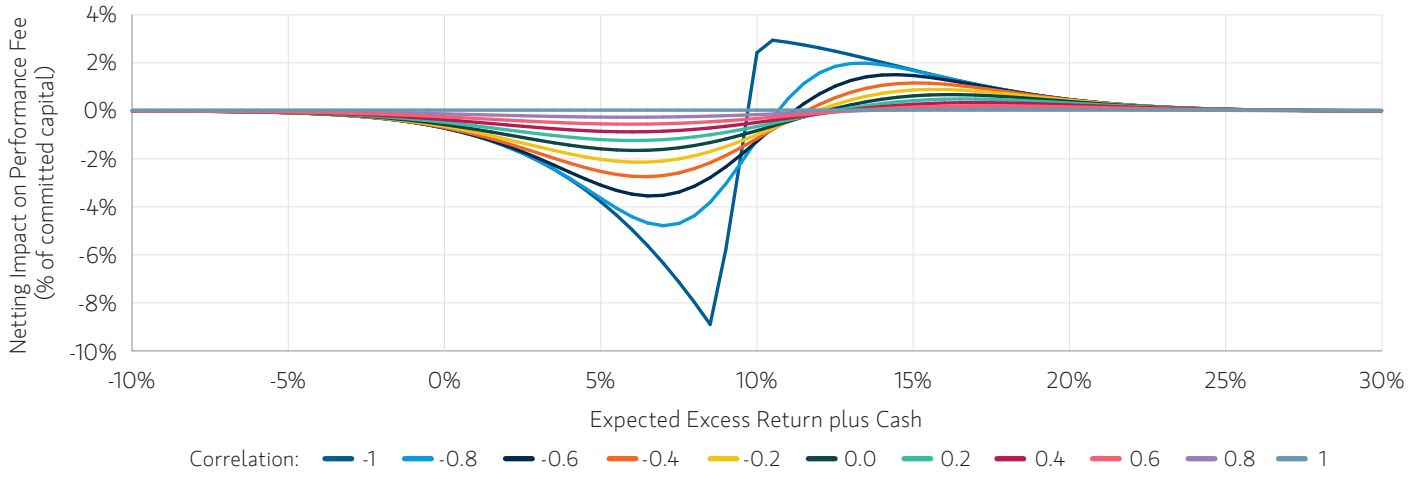
As explained in the previous section, systematic return that can be hedged away does not play a role in the price of the performance fee structure. As a result, only the excess return (or alpha) and cash rate matters. From *Display 8* one can see that when expected excess return plus cash is far below or above the hurdle point, fee netting will have no impact, as extremely low/high expected excess returns for both funds make the combination of the two funds more likely to stay in the same regime on the fee function. On the other hand, fee netting shows positive results to LPs when expected excess returns are around the hurdle rate (8%), as this means probability mass will concentrate around the convex area of the performance fee function and, as discussed previously, this reduces the fee burden for LPs. Finally, if expected excess return plus cash is around the end of the catch-up zone, it means probability mass will concentrate around the concave area and, as a result, fee netting will result in paying higher fees by LPs.

IMPACT OF CORRELATION

From *Display 8* we can also examine the impact of correlation between two funds. When correlation of two funds is high, the combined portfolio will have a higher volatility, which means the probability mass of the combined portfolio will be widely dispersed and dilute the impacts of fee netting, whether it's negative or positive. In the extreme case when correlation is one, the two funds move together and sit on the same point on the fee function, so whether there is performance fee netting doesn't matter as LPs will just be paying the same fees to GPs. *Display 9* below illustrates this well. The expected excess return shown here is 5%, and there is netting benefit around it. As we move from left to right of the chart, the benefit of fee netting becomes less and less, as we discussed.

DISPLAY 8

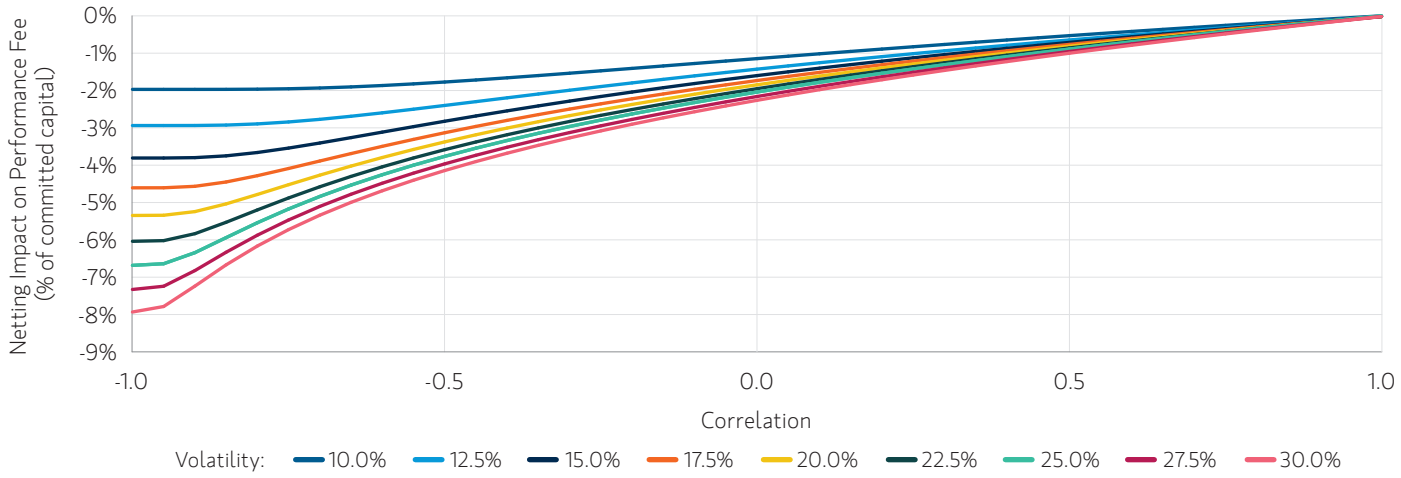
Performance fee saving as a function of expected excess return to public market (alpha): Expected Volatilities = 15%



[9] Weighted holding period is the difference between average time to exit and average time to invest: 8.66 - 2.09 = 6.57.

DISPLAY 9

Performance fee saving as a function of correlation: Expected Excess Return = 5%

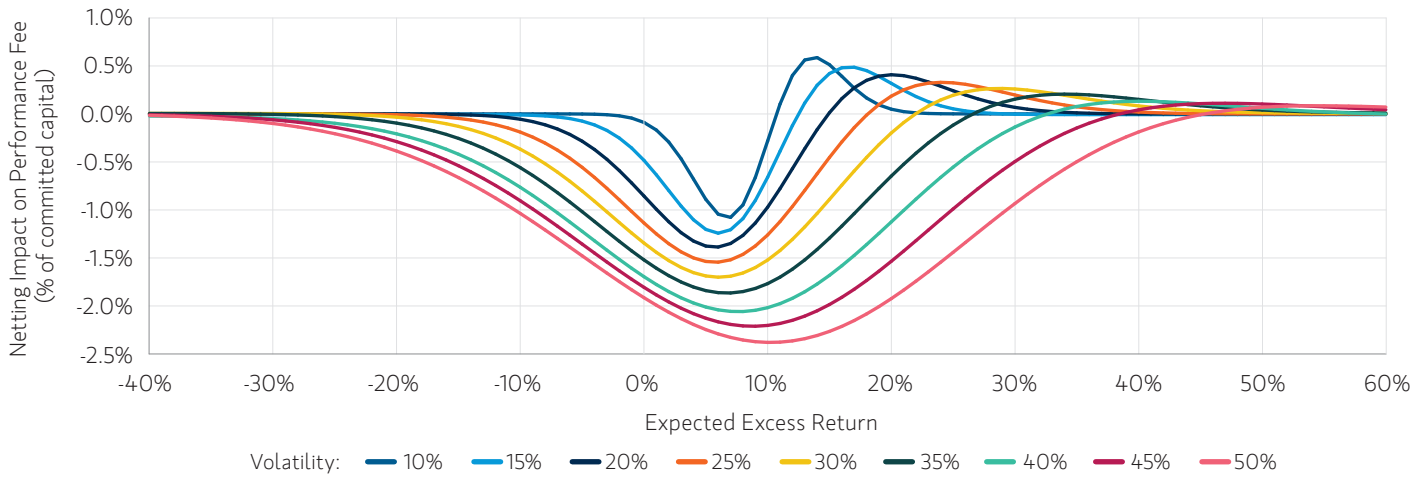


IMPACT OF VOLATILITIES

Generally speaking, higher fund volatility tends to benefit LPs compared to lower volatility. The nuance arises when expected excess returns are moderately higher than the upper bound of the catch-up zone (10%). For example, when the expected excess return is at 20%, the impact of netting is close to zero when volatility is small as the returns of both funds will mostly fall in the area of 10%+ where the netting doesn't have an impact. However, as volatility increases, there are more scenarios in which one of the fund's returns will fall into the area of below 10% while the other fund still stays in the 10%+ area. In this case, netting can increase fees, as the stronger performing fund pulls the lower returning fund into the steep catch-up area, amplifying performance fee payments. As volatility continues to increase, it becomes more likely that one fund will return less than 8%, in which case the lower-returning fund offsets carry-through netting, reducing overall fees for the LP.

DISPLAY 10

Performance fee saving as a function of expected excess return to public market (alpha): correlation = 0.2



Conclusion

Performance fee netting has been proposed based on the idea that netting positive and negative returns would reduce the total amount of fees paid by investors. Although research has shown that this would benefit investors in certain asset classes such as hedge funds, the investor experience of fee netting in private markets is not guaranteed to be positive. This is due to the inclusion of hurdle rate and catch-up features, which lead to varying outcomes depending on the distribution of underlying fund returns. Based on their expected characteristics of investments under consideration, investors should be careful about determining whether performance fee netting can produce favorable outcomes to them when investing in private investments.

Appendix A:
Call options on the PE asset under full-spanning

First of all, without loss of generality, we can write the dynamic of PE asset A_t as:

$$\frac{dA_t}{A_t} = \mu_A dt + \sigma_A \left(\rho dB_t^S + \sqrt{1-\rho^2}\, dB_t^{S'} \right) \tag{A.1}$$

where $B^{S'}$ is a standard Brownian motion representing the idiosyncratic risk orthogonal to systematic risk of public equity captured by B^S. The expected growth rate of tradable asset S_t' is the risk-free rate as it carries no risk premium.

Thus, we have:

$$\frac{dS_t'}{S_t'} = r_f dt + \sigma_{S'} dB_t^{S'} \tag{A.2}$$

$$\frac{dS_t}{S_t} = \mu_S dt + \sigma_S dB_t^S \tag{A.3}$$

For the derivation of call options on the PE asset shown below, it's assumed the risk of the PE asset and the LP's partnership interest are fully spanned by the public equity. Under the full-spanning case, $\rho = 1$ and thus the dynamic of PE asset A_t can be simplified as:

$$\frac{dA_t}{A_t} = \mu_A dt + \sigma_A dB_t^S \tag{A.4}$$

In full spanning case, the risks of the PE assets can be perfectly hedged by owning public equity and risk fee assets. In order to dynamically replicate the PE assets, we define Δ_t as the number of shares owned for public asset S_t, and define Θ_t as the dollar amount invested in the risk-free asset. Thus we have portfolio value $P_t = \Delta_t S_t + \Theta_t$ and the dynamic of the portfolio is:

$$\begin{aligned} dP_t &= \Delta_t dS_t + d\Theta_t \\ &= r_f P_t d_t + \Delta_t S_t (\mu_S - r_f)\, d_t + \Delta_t S_t \sigma_S dB_t^S \end{aligned} \tag{A.5}$$

We denote $G(A_t, t)$ as the carried interest for GP and LP above hurdle from owning the PE asset. By applying Ito's Lemma, the dynamic of $G(A_t, t)$ can be written as:

$$dG(A_t, t) = \left(G_t(A_t, t) + \mu_A G_A(A_t, t) A_t + \frac{\sigma_A^2 A_t^2}{2} G_{AA}(A_t, t) \right) d_t + \sigma_A G_A(A_t, t) A_t dB_t^S \tag{A.6}$$

To have the self-financing portfolio replicate the risk profile of $G(A_t, t)$, we need to have:

$$\Delta_t S_t \sigma_S = \sigma_A G_A(A_t, t) A_t \tag{A.7}$$

$$r_f G(A_t, t) + \Delta_t S_t (\mu_S - r_f) = G_t(A_t, t) + \mu_A G_A(A_t, t) A_t + \frac{\sigma_A^2 A_t^2}{2} G_{AA}(A_t, t) \tag{A.8}$$

By simplifying Δ_t, we get:

$$\Delta_t = \frac{\sigma_A G_A(A_t, t) A_t}{S^t \sigma_S} \tag{A.9}$$

Then simplify A.8 by substitute in A.9 and get the following PDE:

$$r_f G(A_t, t) = G_t(A_t, t) + (r_f + \alpha) A_t G_A(A_t, t) + \frac{\sigma_A^2 A_t^2}{2} G_{AA}(A_t, t) \tag{A.11}$$

where:

$$\alpha = \mu_A - r_f - \beta(\mu_s - r_f) \tag{A.12}$$

$$\beta = \frac{\sigma_A}{\sigma_S} \tag{A.13}$$

The obtained PDE is an initial value problem with the terminal boundary condition $G(A_t, t) = \max\{A_T - K, 0\}$.

With full-spanning assumption, we can define:

$$d\widetilde{B}_t^A = dB_t^A + \eta d_t \tag{A.14}$$

where $\eta = \frac{\mu_s - r_f}{\sigma_S}$.

And under the new measure, dA_t can be written as:

$$\begin{aligned} dA_t &= \mu_A A_t d_t + \sigma_A A_t dB_t^A \\ &= \mu_A A_t d_t + \sigma_A A_t (d\widetilde{B}_t^A - \eta d_t) \\ &= (\mu_A - \beta(\mu_s - r_f)) A_t d_t + \sigma_A A_t d\widetilde{B}_t^A \\ &= (\alpha + r_f) A_t d_t + \sigma_A A_t d\widetilde{B}_t^A \end{aligned} \tag{A.15}$$

Under the new risk measure, A_t now has a drift of $\alpha + r_f$. And because the systematic risk is fully captured by the change of measure, the payoffs can be discounted by the risk-free rate.

By solving the PDE A.11 under the new risk-adjusted probability measure, the option value with strike price K thus can be written as below:

$$\begin{aligned} Call(A_t, t; \alpha, K) &= \widetilde{E}_t[e^{-rf(T-t)} \max\{A_t - K, 0\}] \\ &= e^{\alpha(T-t)} \widetilde{E}_t[e^{-(rf+\alpha)(T-t)} \max\{A_t - K, 0\}] \\ &= e^{\alpha(T-t)}[A_t N(d_1) - Ke^{-(rf+\alpha)(T-t)} N(d_2)] \\ &= A_t e^{\alpha(T-t)} N(d_1) - Ke^{-rf(T-t)} N(d_2) \end{aligned} \tag{A.16}$$

where

$$d_1 = \frac{ln\left(\frac{A_t}{K}\right) + \left(r_f + \alpha + \frac{\sigma_A^2}{2}\right)(T-t)}{\sigma_A \sqrt{(T-t)}} \tag{A.17}$$

$$d_2 = \frac{ln\left(\frac{A_t}{K}\right) + \left(r_f + \alpha - \frac{\sigma_A^2}{2}\right)(T-t)}{\sigma_A \sqrt{(T-t)}} \tag{A.18}$$

Following the above steps, we can use call option to represents the value of PE asset.

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