



## Rewarding risk-taking or skill? The case of private equity fund managers<sup>☆</sup>



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### ABSTRACT

We examine whether typical private equity fund compensation contracts reward excessive risk-taking rather than managerial skill. Our analysis is based on a novel model of investment value, cash flows, and fee dynamics of private equity funds. Given the embedded option-like fee components, our results demonstrate that fund managers indeed have an incentive for excessive risk-taking when only fee income from the current fund is considered. However, when managers also consider potential compensation from follow-on funds, their risk-taking incentives depend on their individual skill levels, and skilled managers will have an incentive to reduce fund risk. We also show that managers must generate substantial abnormal returns in order to compensate investors for the given fee components.

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Compensation of funds managers increasingly involves elements of profit sharing. Contracts thereby entitle managers to option-like convex payoffs, which are contingent on the performance of the managed fund. An important example is the compensation of private equity fund managers, also called General Partners (GPs), which typically receive a fixed annual management fee, a performance-based incentive fee known as the carried interest, and, in case of buyout funds, also portfolio company fees.<sup>1</sup>

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<sup>1</sup> A detailed overview of the typical compensation structure of private equity funds is provided in Sahlman (1990), Fenn et al. (1997), Gompers and Lerner (1999), Litvak (2004), Metrick and Yasuda (2010), and Robinson and Sensoy (2013). The fixed management fee of private equity funds (typically 1.5–2.5% of the committed capital) resembles those of mutual and hedge funds. The performance related carried interest (typically 20% of profits) is mostly uncommon among mutual funds

Management fees resemble a fixed-income stream. Carried interest shares characteristics with a standard call option on the performance of the fund. Presumably, the carried interest is intended to reward managerial skill and to align the interests of the manager and the investors more closely than flat management fees do. However, incentive fees may also have unintended consequences as they tend to encourage excessive risk-taking. When a manager is compensated with convex option payoffs, i.e. rewarded for gains but not punished for losses, the given non-linearity implies that the manager will gain from increasing the volatility of the underlying fund assets.<sup>2</sup> Given the trillion-dollar size of the private equity asset class, it is crucial to understand the incentives generated by standard compensation contracts that are used in the industry. We are concerned with the question whether standard private equity compensation contracts reward excessive risk-taking rather than managerial skill.

and it also differs from the variable incentive fees of hedge funds (see Metrick and Yasuda, 2010). For an analysis of the typical compensation structure of mutual funds, refer to Chordia (1996), Christoffersen (2001), Cuoco and Kaniel (2011), or Hu et al. (2011), for example. For hedge funds refer e.g. to Goetzmann et al. (2003), Hodder and Jackwerth (2007), Agarwal et al. (2009), or Panageas and Westerfield (2009). Portfolio company fees typically include monitoring and transaction fees and are a unique feature of private equity funds (see Phalippou et al. (2016)).

<sup>2</sup> Risk-taking incentives that arise from convex compensation contracts are, for example, discussed in Carpenter (2000) and Ross (2004).

Valuing fee components and analyzing risk-taking incentives requires a careful modeling of fund dynamics. This paper provides a comprehensive model of the cash flow, investment value, and fee dynamics of private equity funds. Our model thereby considers the special features of private equity fund investments, such as multiple, staggered investments, stepwise liquidation of portfolio company investments, and the finite fund lifetime. The continuous-time model consists of four main components: the drawdowns from the committed capital paid into the fund, the performance of the investments of the fund, the distributions of dividends and proceeds taken out of the fund, and finally the different fee components paid to the GPs. Using this model, a risk-neutral valuation framework is applied to determine the present value of GPs' compensation. To implement the risk-neutral valuation, we assume an equilibrium framework in which the investors earn non-negative expected excess returns net of fees, which is consistent with recent empirical evidence showing that private equity funds have outperformed traded stocks on a risk-adjusted basis after fees (see e.g. Ang et al., 2013; Harris et al., 2014, and Higson and Stucke, 2014).

Our model contributes to the literature on private equity fund modeling and management compensation. The seminal work in the area of private equity fee valuation is Metrick and Yasuda (2010). Unlike Metrick and Yasuda (2010) who employ historical simulations to estimate fee values, the contribution of this paper is to develop a comprehensive formal model of the dynamics of private equity funds. This approach allows us to study the impact of different pricing terms on the present value of compensation and to analyze whether standard compensation contracts reward excessive risk-taking rather than managerial skill. In the numerical application of the model, we perform a calibration to buyout funds based on monthly fund-level cash flow data. Our baseline valuation results – with a typical fee structure containing an annual management fee of 2%, a carried interest rate of 20%, and an annual hurdle rate of 8% – show that the present value of GPs' compensation from management fees and carried interest of a single fund amounts to around 20% of committed capital. Management fees account for the largest portion of fee income and constitute around three quarters to the GPs' total compensation. The present value of the portfolio company fees paid to the GPs amounts to around 3.5% of committed capital and increases with the average leverage ratio of the portfolio companies of the fund. Our results further highlight that GPs must generate substantial value to compensate investors for the fees taken. Given the baseline fee structure, our results imply an annual break-even alpha of around 7%. In case portfolio company fees are also considered, the break-even alpha is slightly lower and amounts to around 6%.

We next employ our model to analyze the incentives generated by the typical compensation scheme of private equity funds. In the first step, we consider the case in which managers maximize fee income from a single fund only. Consistent with standard theory, our results suggest that the option-like compensation contract encourages excessive risk-taking. The incentive for excessive risk-taking arises as carried interest payments are contingent on the fund's internal rate of return exceeding the predefined hurdle rate. Given this absolute investment return benchmark, carried interest payments may result from high abnormal performance as well as high levels of risk-taking. Thus, in the single fund case, the standard compensation contract of private equity funds rewards both managerial skill and excessive risk-taking. In the second step, we extend the analysis to the setting in which managers also consider potential subsequent compensation from follow-on funds. Chung et al. (2012) show that lifetime incomes of GPs are affected by their current funds' performance not only directly, through carried interest payments, but also indirectly by the effect of the current fund's performance on the GPs' abilities to raise capital for future funds. In the base case, we model this indirect relationship

by assuming that compensation from follow-on funds is a simple binary option on the performance of the current fund. The GPs thereby receive the present value of fee income from all subsequent funds (with an equal size) in case the current fund exceeds some given return threshold. Kaplan and Schoar (2005) document that the relationship between current fund performance and the size of a follow-on fund is positive but concave.<sup>3</sup> Motivated by this finding, we also consider an extended model setting in which we allow for the size of the follow-on fund to increase monotonically with the performance of the current fund given that the threshold has been reached. We model this by assuming that the compensation from a potential follow-on fund is a combination of the binary option defined above and an additional call option with a payoff that is a concave function of the performance of the current fund. Overall, in our setting with multiple funds in sequence, GPs are rewarded for performance implicitly through the ability to raise (larger) follow-on funds, and explicitly through the performance-based carried interest payments. Our results highlight that this creates a unique incentive structure. We show that the risk-taking incentives then depend on the skill level of the GPs, i.e. their ability to generate abnormal returns. Low skilled GPs still have an incentive for excessive risk-taking, while high skilled GPs do not and may even have an incentive to decrease risk. The economic rationale behind this novel result is that skilled GPs do not want to jeopardize the possibility of managing future funds by taking excessive levels of risk. The existence of such separating equilibrium in manager type is a main contribution of our paper. Formally, our results follow as GPs are equipped with three different option-like contracts.

Finally, our results point out that risk-taking incentives may depend on the state of the private equity market. For example, when the return threshold is increasingly hard to reach, average risk-taking should increase as even high skilled GPs then have an incentive to take more risk. As increased risk-taking should go along with higher average fund returns, our model predicts a countercyclical investment performance of private equity funds. This prediction is consistent with studies that find empirical evidence of a countercyclical performance in both the buyout and venture capital market (see e.g. Kaplan and Stein, 1993 and Gompers and Lerner, 2000).

Our results contribute to the literature on management incentives which are generated by private equity fund structures and typical compensation contracts. Previous research in this area includes Gompers (1996), Ljungqvist et al. (2008), Brown et al. (2015), and Chakraborty and Ewens (2015). Ljungqvist et al. (2008) is the only paper we are aware of that also addresses risk-taking incentives. In their model, the GPs are always rewarded for risk-taking. This behavior follows as they model compensation from follow-on funds as a convex function of performance. Our model takes into account the empirically documented concave relationship between fund performance and the size of the follow-on fund, and demonstrates that risk-taking incentives in this case will depend on the managers' skill levels and that skilled managers may have an incentive to even reduce fund risk. Our results also add to the literature that tries to explain the financial structure of private equity funds (see Axelson et al., 2009). We show that a fund's finite lifetime may act as an institutional constraint which limits risk-taking. Our results further also add to the literature on incentive fees for managers in more general settings by studying risk-taking incentives in a multiple evaluation period setting.

<sup>3</sup> Note that this result differs from empirical findings for the mutual fund industry where researchers find a positive but convex relation between fund size and past performance (see, for example, Sirri and Tufano, 1998 and Chen et al., 2004).

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