

Strategic Capital Deployment in Private Equity

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ABSTRACT

Private equity fund general partners (GPs) adjust their investment strategies in response to early returns rather than following a prespecified plan. Funds experiencing higher early returns in the fund life cycle subsequently shift away from riskier investments in later years and experience lower returns. Funds with early success also reduce exposure to higher risk sectors and increase their sector and geographical concentration as well as increase the fraction of the fund invested in later deals and hold onto these deals longer. In contrast, funds with low early returns do the opposite. Despite a lack of within fund persistence, funds with strong early returns still outperform in final fund-level returns and raise their next fund faster. These findings are consistent with GPs using early success in a fund to raise a next fund sooner and then turning their attention to this next fund.

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I. Introduction

Private equity (PE) fund general partners (GPs) act as financial intermediaries by exercising control over capital deployment and investment selection on behalf of passive limited partners (LPs). Although both GPs and LPs benefit from strong fund performance, the contractual and economic structure of PE funds creates agency frictions that can drive a wedge between the two parties' interests. These frictions arise because maximizing GP utility – driven by performance-based carried interest, management fees, and the ability to raise future funds – is not necessarily aligned with maximizing LPs' risk-adjusted returns within a single fund. Crucially, these agency costs are dynamic. GPs make a series of interrelated decisions across the fund life cycle: which deals to pursue, how quickly to deploy capital, how much attention to devote to existing versus new investments, and when to begin fundraising for the next vehicle. These choices are shaped not only by market conditions and the performance of current investments, but also by the GP's evolving incentives as they transition from managing the present fund to securing their long-run franchise value through future funds. While prior work has examined aspects of GP compensation and fundraising behavior (e.g., Metrick and Yasuda (2010), Chung et al. (2012), Barber and Yasuda (2017)), much remains unexplored in regards to how fundraising incentives shape GP behavior within the fund during the critical investment period when decisions have both immediate and forward-looking consequences. How GPs make decisions during this initial stage of the fund is one important way agency conflicts may arise and has been the subject of much speculation by industry participants, especially regarding when fundraising begins for a next fund and what happens to the attention and incentives of GPs once the next fund is raised.

The institutional details of the PE fund structure provides a unique setting to understand how agency conflicts present themselves. Most PE funds are organized as closed-end limited partnerships, with a fixed life span, often ten years, and a defined investment period of roughly four to five years. LPs commit capital upfront, which is not collected immediately but rather drawn down, or “called”, over time by the GP as individual investment opportunities are identified. During this investment window, the GP exercises broad discretion over which deals to pursue, how much capital to allocate, and how quickly to deploy it. Compensation consists of an annual management fee, typically a fixed percentage of committed or invested capital, and carried interest, a share of

the profits above a hurdle return. A typical fee structure consists of a 2% management fee and 20% carried interest, with a 8% hurdle rate. As such, GPs benefit both from the size of the fund under management as well as the performance of the investments in portfolio companies. These investments are typically held for three to five years prior to exit in order to allow time for potential returns to realize. Importantly, GPs often begin raising a successor fund before the current fund is fully invested or exited, creating overlapping fund cycles and potential intertemporal conflicts of interest.

The two primary sources of income for PE fund GPs consists both of the management fee and carried interest in the current fund as well as the potential combined fees in future funds. Furthermore, these sources of income are very much interconnected. The GP's ability raise a future fund is highly dependent on the performance of the current fund (Chung et al. (2012)). This potential future income is important to GPs both from the large windfall in the carried interest but also in the on-going management fees (Metrick and Yasuda (2010)), which increase with fund size, giving GPs the incentive to ensure they do not jeopardize this lucrative future revenue stream. As such, GPs must decide how to balance risk in order to obtain the returns needed to maximize the probability of raising the next fund, while at the same time trying to maximize carry of the current fund. Higher returns earlier in a fund life cycle can alleviate some of the pressure points of this trade off as this creates the positive signaling that potential future LPs need to participate in follow-on funds (Lerner et al. (2007), Hochberg et al. (2013)). These early high returns however may change the incentives for GPs around the capital deployment in the funds' subsequent investments. In this paper, I evaluate the impact of early investments returns in a fund on the subsequent risk selection choices by GPs in later deals.

I start by proposing a simple model to aid the intuition and to motivate the empirical analysis. Given a GP's desire to raise a future fund, it follows that a GP also prefers to fundraise and start the next fund sooner rather than later in order to start collecting the additional management fee. The larger the follow-on fund, the larger the management fee. Limited Partner Agreements (LPAs) may stipulate requirements the GP must meet before raising the next fund, such as a minimum portion of committed capital invested ($\approx 70\%$, Hüther (2023)) or minimum rate of return. These factors potentially change the GP's incentives around the risk profile of early investments (Brown et al. (2023)) and when to realize (Barber and Yasuda (2017), Chakraborty and Ewens (2017)).

The model assumes asymmetric information between the GP and LP around the GP's skill where the GP knows their own value of skill, but the LP can only infer a noisy estimate of the GP's skill based on fund returns. As such, the GP needs to create high enough returns to cross a vintage-specific threshold, such as the average return for a fund vintage. The GP is tasked with choosing the optimal level of risk to take, on a holding by holding basis. In this setting, the model predicts that GPs for which LPs estimate a level of skill below the threshold to raise a next fund will increase risk in order to reach for return to create a positive signal in the next update. Likewise, GPs for which LPs estimate a level of skill above the threshold will decrease risk in order to not risk any possible reduction in the probability of raising a future fund. Essentially, GPs will try to achieve higher returns earlier in fund to lock-in the ability to raise another fund and then subsequently reduce risk in later deals. These effects should be magnified for funds of young GPs, in that no prior track record or reputation capital is available.

Using fund-level and holdings-level data on PE buyout funds provided by MSCI-Burgiss, I take the model predictions to the data. I find evidence that GPs preference is to invest in higher risk investments at the start of a fund, as represented by the higher standard deviation of early successful funds. Following higher than average returns on early investments, GPs will subsequently reduce risk. The opposite relationship holds for funds with poor early performance. These funds will increase risk over the fund's investment period in an attempt to reach for higher returns. These effects are strongest for funds with early successful exits, as these are funds that are able to market favorably to future LPs earlier in the fund life cycle. In the course of this risk selection, GPs of early successful funds increase both sector concentration and geographical concentration in later deals. In addition, GPs also increasing the fraction of the fund invested in holdings and hold on to these deals longer following early higher returns. Together, these results show that the risk selection by GPs over the fund's life can help explain the lack of performance persistence in buyout funds.

I find funds with high early returns generally hold on to their early fund-level success and outperform in regards to the final fund-level return. They also raise their next fund faster, but not necessarily for a larger fund size, relative to funds with low early returns, but on average larger than their current fund. Taken together, it appears high early return funds may be deploying capital in order to build a large enough lead on peers. These GPs subsequently shift how they invest in order to focus on their next fund and start collecting an additional management fee sooner, while

giving up on potential higher returns for the existing fund LPs in the later part of the fund. Using back-of-the-envelope calculations, and assuming early high return funds are able to maintain the same level of performance, trading-off additional current performance fees for sooner management fees in the next fund is worthwhile for the GP. These actions put the brunt of the opportunity cost on the LPs, potentially leaving a considerable amount of money on the table. However, further consideration is needed on the ultimate effects and impact on agency conflicts which should be reduced given the fund structure, as per Axelson et al. (2009).

A central challenge in studying private equity investment behavior is disentangling whether early fund performance influences subsequent investment decisions, or whether both are jointly driven by underlying GP skill or market conditions. To address this concern, I develop an instrumental variables strategy that isolates exogenous variation in early fund performance driven by sector-specific public market return shocks. Specifically, I interact the public equity returns of the GP's prior fund's dominant sector with the two-year period of the current fund to construct a Bartik-style instrument for interim performance. This approach exploits the fact that interim private equity valuations are partially marked to public market comparables and thus sensitive to sector-level movements (e.g., Brown et al. (2019)). Under this specification, I find evidence that funds with higher early returns subsequently invest in lower risk deals, that are larger, shorter duration, and more industry concentrated. The IV estimates allow me to identify whether early performance - when driven by factors external to GP skill - causally impacts how managers deploy capital, take risk, and construct portfolios in the later stages of the fund's life cycle.

Another question pertains to the issue of timing and persistence as GP's adjust their investment strategies in response to early performance signals. I study this by tracking how funds change their risk exposure following the realization of early returns. To capture the timing of these shifts, I implement a quarterly event-study difference-in-differences design that compares funds with strong early returns to those without, at the end of the second year of the funds' investment period. This approach allows the observation not just whether GPs respond to early success, but when those adjustments occur, how persistent they are, and whether any differences emerge even before the milestone. I find that within a year of high early returns, funds tend to deploy capital faster than their low return counterparts, with more smaller deals. These GPs likewise begin exiting more deals and are more likely to have raised their funds within two years. I find evidence that these

deals entered into after high early returns reduce the return of active deals for a given quarter with corresponding lower standard deviations. I find GPs adjust their investment strategies in response to early returns rather than following a prespecified plan. The results provide new evidence on how interim performance feeds into dynamic capital deployment decisions within private equity, with implications for both agency dynamics between GPs and LPs and the broader question of how private capital is allocated over time.

This paper contributes to a growing body of literature around the investment choice of PE GPs and the incentives of GPs around fundraising. GPs want to put their best foot forward in order to encourage participation from LPs in future fundraising. Brown et al. (2019) argue that while GPs may try to manipulate NAVs or returns close to fundraising, that these efforts are generally unsuccessful and LPs can distinguish the high quality from the poor. Other papers also study the important role of signaling around fundraising (Hüther (2023), Chakraborty and Ewens (2017), Barber and Yasuda (2017), Hochberg et al. (2013), Chung et al. (2012), Metrick and Yasuda (2010), Bhardwaj et al. (2024)). My paper adds to these findings by suggesting the GPs attempt to increase returns prior to fundraising with increased risk selection rather than through manipulation. I also contribute to the literature around PE portfolio construction, e.g. Brown et al. (2023), and expand on a few key takeaways around early returns. In addition, I add to the conversation around PE performance and persistence (Kaplan and Schoar (2005), Harris et al. (2023), Cong and Xiao (2021), Nanda et al. (2020)) by providing another potential channel to explain the lack of within fund persistence for buyouts funds.

Understanding the impacts of high returns on early investments in a fund bares important consequences. A relationship between the performance of the first investment(s) of a fund and subsequent holdings risk selection and performance reveals information about the GPs preferences to both LPs and entrepreneurs/firms. Essentially, high vs low early performance in a fund can act as a signaling effect, such as in the traditional sense of Ross (1977) and Myers and Majluf (1984), around GP incentives that are essential for LPs and entrepreneurs/firms to incorporate. Current LPs can better understand the expected returns and potential risk profile of the later part of the fund, which can have implications in their allocation choices both in returns and as it relates to

the denominator effect.¹ Additionally, there may be implications for the availability of capital for innovative firms which may be aided or hindered by changing risk selection strategies by GPs with higher early returns. Also, as the secondary market for private funds becomes more liquid, LPs that attempt to buy into early successful funds, believing these returns to predict higher fund-level returns, will find themselves exposed to the general underperformance of high early return funds in later years of the fund life cycle.

The paper continues as follows, Section II outlines the model and discuss revenant predictions to be tested, Section III describes the MSCI-Burgiss Holdings data used in the analysis, Section IV provides the empirical analysis results, and Section V concludes.

II. Model

In this section I present a stylized model of GP investment behavior to aid the intuition and motivate the empirical analysis. A private equity (PE) general partner (GP) gains utility from the returns of the current fund and future funds. There is a tension between wanting to maximize current fund returns and the chance at future returns with the next fund. The GP wants higher returns early in the fund life to aid the fundraising efforts of the next fund (Chung et al. (2012)), which occurs in the middle of the current fund. It follows that a GP wants to fundraise and start the next fund sooner to start collecting additional management fees and potential carry. The larger the follow-on fund, the larger the baseline management fee. Limited Partner Agreements (LPAs) may stipulate requirements the GP must meet before raising the next fund, such as a minimum portion of committed capital invested ($\approx 70\%$, Hüther (2023)) or minimum rate of return. These factors potentially change the GP’s incentives around the risk profile of early investments (Brown et al. (2023)) and when to realize (Barber and Yasuda (2017), Chakraborty and Ewens (2017)).

¹The denominator effect in investment management occurs when the portfolio allocation of one asset class mechanically increases or decreases in response to changes in the value of another asset class. For example, if the public stock market experiences a downturn the value of the public stocks in a portfolio will decrease, leading to a decrease in overall portfolio value, or smaller denominator when measuring portfolio allocations. If private equity valuations remain unchanged, the portion allocated to private equity in a portfolio will increase and may push the allocation above some established threshold. This results in the portfolio being over-allocated to private equity and can create a re-balancing need for the portfolio.

The model assumes a GP raises capital from LPs to invest in holdings through a fund at $t = 0$. The fund has a finite life, T periods, until the GP must close the fund and fully distribute value back to the LPs. The GP is paid under a standard payment structure where the GP receives a management fee, which is a fixed percentage of the total size of the fund, and a performance fee or carried interest, a portion of the fund's returns over a determined hurdle rate. The GP wants to maximize its expected utility, which depends on the current fund's returns and the probability of raising the next fund. The probability of raising the next fund is a function of the returns of the current fund, which is determined by the returns of the portfolio companies. Fundraising for the next fund occurs in the middle of the current fund's life. The GP needs higher returns early in the fund to increase the chance of successfully raising the next fund. The GP chooses in each t , between higher risk investments or lower risk. The model assumes two potential outcome states, a good state and a bad state, and the expected return of the investment is determined below:

$$E[r] = \rho(X + \gamma\theta + \epsilon) + (1 - \rho)(X + \gamma(\theta - Z) + \epsilon) \quad (1)$$

Where θ is a measure of the GPs skill and is only known by the GP, γ is the choice of how the GP capitalizes on skill or essentially the risk driver, Z is the down-state payoff penalty, ρ is the probability of up-state payoff, X is the average return. Notice that increasing γ increases expected return and riskiness of investment. I assume $\theta \sim N(0, \tau^{-1})$ and $\epsilon \sim N(0, \tau_\epsilon^{-1})$. A probability tree and other equation derivations are provided in [Appendix B](#).

In the model, LPs rely solely on observed returns to update their beliefs about the manager's skill. For example, if we let $\gamma = 0$, then the expected return simplifies to $X + \epsilon$. Recall that $X + \epsilon$ is the portion of the return not attributable to GP skill. Therefore when $\gamma = 0$, LPs cannot update beliefs on the GPs type or skill level.

Now consider what occurs as γ increases. First, this will result in an increased impact of GPs skill on return and thus increasing the informativeness of return about GPs skill. Likewise, a good return increases the chance the GP is skilled, while a bad return does the opposite. Therefore, in the context of the model, increasing risk is potentially good because if things go well, the LP will attribute it to the GP, but with the cost that if it goes poorly, they will do the same.

I assume that LPs will only allow a GP to raise the next fund if their belief about the GP

skill is above a certain threshold, such as the average PME of the vintage. LPs can calculate the likelihood of the skill crossing a threshold given their understanding of (i) the return distribution and (ii) the GPs choice of γ . Given this updating process, I solve for the probability the GP is able to raise their next fund as a function of their choice of γ :

$$\begin{aligned} \mathbb{P} [E[\theta|r] > \bar{\theta}] = & \rho \cdot \mathbb{P} \left[\epsilon > \frac{\tau[\bar{\theta} - \hat{\theta}]}{\gamma\tau_\epsilon} + \gamma[\bar{\theta} - \theta] - \gamma(1 - \rho)Z \right] \\ & + (1 - \rho) \cdot \mathbb{P} \left[\epsilon > \frac{\tau[\bar{\theta} - \hat{\theta}]}{a\tau_\epsilon} + \gamma[\bar{\theta} - \theta] + \gamma\rho Z \right] \end{aligned} \quad (2)$$

where $\hat{\theta}$ is the current estimate of θ based on priors and $\bar{\theta}$ is the minimum required θ to raise next fund. I assume that $\bar{\theta}$ is not static across vintages, but rather established anew after each fundraise. Therefore with each subsequent fund, and especially for young GP funds, GPs understand that while LPs had high enough estimates of GP skill to allow the current fund to be raised, the ability to raise the next fund will be determined by the current funds returns.

Setting values for $\tau, \tau_\epsilon, \rho$, and Z creates 6 cases for the potential relationship between $\bar{\theta}, \hat{\theta}, \theta$. A GP will choose a value of γ to increase the chance the next update on skill hits above the threshold. Numerical estimations for the optimal γ as presented in Figure 1.

For Case 1 ($\bar{\theta} < \hat{\theta} < \theta$) and Case 2 ($\bar{\theta} < \theta < \hat{\theta}$) LPs correctly believe the GP's skill is high enough to raise next fund. As demonstrated in the top right and top left charts in Figure 1, If current estimates of skill are above the threshold for raising next fund, the GP wants to avoid updating and therefore will set $\gamma = 0$, even if the GP's true skill is above what LPs think. The middle left chart presents Case 3 where $\theta < \bar{\theta} < \hat{\theta}$. In this situation LPs mistakenly believe the GP's skill is high enough to raise next fund. Given that LPs think the GP is better than the threshold, despite being actually worse, and as such the GP will want to avoid any chance at updating, thereby moving $\gamma = 0$.

In Case 4 ($\theta < \hat{\theta} < \bar{\theta}$) and Case 5 ($\hat{\theta} < \theta < \bar{\theta}$) LPs correctly believe the GP's skill is too low to raise next fund. Shown in in the middle right and bottom left charts in Figure 1, we find that when both the LP's estimate of the GP's skill and the true value of the GP's skill are below the threshold to raise the next fund, GP's will monotonically increase γ . While similar in ultimate

prediction, Case 4 does require slightly higher levels of γ in order to approach the maximum possible probability.

Case 6 is unique in that a clear internal solution is demonstrated. This case is where $\hat{\theta} < \bar{\theta} < \theta$ and thus LPs mistakenly believe GP skill is too low to raise next fund. As the bottom right chart shows, a GP in this situation will choose to increase γ , but only up to a certain point, in order to utilize the next updating on skill to move LPs' estimates above the threshold.

These model predictions lead to the following hypotheses:

HYPOTHESIS 1: Funds with high returns on early investments will subsequently reduce risk in later investments, and vice versa.

HYPOTHESIS 2: Funds early in a GP's series of funds will demonstrate a stronger effect in modifying risk between early and later deals in a fund.

As noted above, the current model is most relevant for funds of young GPs. These funds will be those without a prior track record or reputation capital and as such, the ability to raise the next will rely heavily on the current fund's performance. I propose that these young GP funds will most likely fall under Cases 4, 5, or 6 where LPs' estimate of skill will initially fall below the threshold, thereby giving GPs the incentive to have high early returns in the current fund, to maximize the chance of raising the next fund. In the event that returns on these early investments in the fund are high enough, shifting the GP into one of Cases 1, 2, or 3, the model then predicts a GP will reduce γ in later deals, in order to remove the threat of losing the ability to raise the next fund if future updating would change LPs' estimation of the GP's skill. Thus the model predicts GPs facing the need to improve LPs' estimation of their skill, especially true for young GP funds, will deploy capital into higher risk (allowing γ to proxy a holding's risk level) in first / early investments, then shift to lower risk investments following high early returns, or continue to increase risk following low early returns.

III. Data

In order to test the model's predictions, I utilize fund-level and holdings-level datasets on private equity buyout funds provided by MSCI-Burgiss, with performance data through 2023:Q4.

This dataset is relatively novel in the current private capital literature and can provide new detailed insights into both old and new research questions. A general overview of the MSCI-Burgiss holding dataset was performed around the initial creation of the dataset, see Brown et al. (2020).

Determining the sequencing of holding within a fund is critical for my analysis. As such I restrict the sample to only include holdings that contain a fund identifier. After restricting holdings to those with fund identifiers and valid investment dates, I obtain a base sample of over 16,000 holdings. I restrict the sample to only include buyout funds that are located in North America in order to maintain similar incentives of fund managers and understand risk-taking more appropriately. These funds still invest globally and 10% of holdings are outside of North America. Furthermore, I only include funds with vintages between the years 1999 and 2018 as this allows me to explore the contrast between the first two years of a fund and subsequent parts of the fund life, removing funds which are still in the investment stage. I also exclude funds that have invested in less than three or more than 50 holdings.

Holding-level and fund performance is measured using either the internal rate of return (IRR) or the Kaplan-Schoar public market equivalent (PME), as developed in Kaplan and Schoar (2005). As discussed in Harris et al. (2014), the choice of relevant benchmark can greatly impact the measures of PME performance. In order to more closely match the performance of private markets, I measure holding performance by benchmarks that are relevant to equity investments within a geography. Specifically, I use the MSCI USA Net Total Return Index for holdings located in North America and the MSCI World ex USA Net Total Return Index for holdings outside North America.

As part of the filtering process I remove funds that are missing deal size or PME for any holding within the fund. In order to not overly reduce the sample size, I assume that for funds only missing holding size or PME information for one or two Holdings can be safely estimated using the following methods: 1) total deal size is assumed to be the difference between the total fund committed capital minus the observed deal sizes of the fund divided by the total number of missing deals in the fund and 2) holding PME equal is set to be equal to the vintage mean PME. These assumptions impact only 2% of the sample of holdings, and prevent the exclusion of nearly 2,000 holdings for funds that would have been otherwise dropped. I also only include funds that have invested more than 25% and less than 200% of their total committed capital. Overall, this leaves a final sample of 6,010 Holdings for 432 funds. From this I create a subsample of funds designated as “young GPs funds”

which represent the funds with a fund series number equal to three or less, essentially funds of less established GPs, as determined using the observations for a fund manager within the fund-level dataset. One caveat to this sample is that the holdings-level dataset may not contain information on all funds within the MSCI-Burgiss Universe and as such may contain a sample of early funds and not necessarily all the early funds of a fund manager. However, it is reasonable to assume that this implies the following analysis may be overly conservative in its findings. These young GP funds include 3,168 holdings across 251 funds. Table I provides summary statics for the two samples.

Variables are defined as follows:² Deal Duration is measured as the difference in the years between the entry year and exit year. Deal Year groups the holdings of a fund by the fund-life year, e.g. deals invested in the 2nd year of a fund will have a Deal Year value of 2. For the analysis I collapse the deal years and re-designate all holdings with a Deal Year value of 5 or greater as equal to 5. Deal Fraction of Fund is the total deal size of a hold divided by the sum of observed deal sizes of the fund’s holdings.

Early Winner, Early Loser, Early Success are dummy variables equal to 0 or 1. A holding receives an Early Winner equal to 1 if it belongs to a fund in which the maximum PME of deals made in the first two years of the fund is above the 75%-tile of holding PMEs of all early deals (first two year) within the fund’s vintage. Likewise, a holding receives an Early Loser equal to 1 if it belongs to a fund in which the maximum PME of deals made in the first two years of the fund is below the 25%-tile of holding PMEs of all early deals within the fund’s vintage. A holding receives an Early Success equal to 1 if it belongs to a fund in which the average PME of all holdings made in the first two years of the fund is above the mean of early deals within a fund’s vintage. Early Top and Early Bottom are dummy variables equal to 0 or 1 and characterize the distribution of average holdings returns for a fund. Early Top funds are so designated as the funds that have an average return of all holdings during the first two years in the top quartile, while Early Bottom funds are the funds that have an average return of all holdings during the first two years in the bottom quartile.

While not described in Table I, I here define other measures of early returns. One evaluates Distributions to Paid-in Capital (DPI) for a fund. Early High DPI and Early Low DPI are dummy

²As an item of note, the terms “deal” and “holding” are used interchangeably throughout.

variables equal to 0 or 1. Early High DPI funds are those that are in the top quartile of DPI at the end of year 2, while Early Low DPI funds are those in the bottom quartile of DPI at the end of year 2. I likewise define interim return variables using the interim fund-level PME at end of fund-year 2. These variables are as follows: Interim Success, Interim Top, and Interim Bottom, and are created in similar manner to their “early” return counterparts.

High Risk Sector is a dummy variable equal to 0 or 1 determined by the holding’s industry sector as determined by the MSCI-Burgiss categorization and as such belongs to one of 12 sector. A holding is given a High Risk Sector flag equal to 1 if it belongs to one of the 5 sectors, accounting for 50% of total deals, with the highest combination of returns and standard deviations of holding TPVI for the full sample, including “Health Care”, “Information Technology”, “Materials”, “Financials”, and “Consumer Staples”. These sectors have an average TPVI of 2.71 and range between 2.59-2.82, with average standard deviations of 2.41 and range between 2.26-2.54, as compared to the other 7 sectors with an average TPVI of 2.05 and average standard deviation of 1.98. In addition, I use the Herfindahl-Hirschman index (HHI) to determine the sector concentration – Sector HHI – and geography (U.S. State) concentration – Geography HHI – of holdings within a fund, both for all deals and those made before or after year 2.

Panel B presents fund-level variables and variables are described, as needed, as follows. Fraction Invested is the sum of the size of all a fund’s deals divided by the total committed capital for the fund. Fund Duration is the value-weighted sum of the Deal Durations in a fund. Fund PME is the value-weighted sum of the Holding PMEs within a fund. Time to Next Fund is the number of days between the start of the GP’s current fund and and a GP’s next fund, as defined by the fund inception date in the MSCI-Burgiss fund-level data. Next Fund Size is measured in \$B and is the total committed capital of a GP’s next fund as defined by the fund sequencing in the fund-level dataset. All N. America is a dummy variable, 0 or 1, which is equal to 1 if the all deals made in a fund are designated as begin located in North America.

IV. Empirical Analysis

I next turn to the empirical analysis and bring the model predictions to the real fund decisions, utilizing the MSCI-Burgiss holdings-level dataset, as described in Section III. As discussed in Section

II, the model predicts that GPs will react to increased pressure to achieve high returns early in the fund by implementing a higher risk capital deployment strategy in early investments. When early returns are high, the GP will shift to lower risk investments in the later part of the fund life cycle. When early returns are low, the GP will maintain the higher risk approach and may even increase the exposure to higher risk.

If the model holds, the effect should be strongest for young GP funds. Brown et al. (2023) examine the portfolio management of a fund and find that returns are highest for deals made earlier in a fund and these returns decline over the fund life cycle. Likewise, the standard deviations of these returns also are largest for early deals subsequently decline with later deals. Figure 2 presents the distribution of the performance of deals made within the same holding year, or entry year in a fund. I also find a similar pattern of generally decreasing returns and standard deviations across the holding year for the full sample. In addition, I find that while the median holding PME are similar between young GP funds and all funds, the standard deviations is higher for young GP funds for each entry year in the holdings sequence. Interestingly, the highest median holding PME occurs in year 3 both for young GP funds and all funds, but is most stark for young GP funds, indicating a potential change in capital deployment strategy around this time in the fund life cycle. This change between year 2 and year 3 provide some suggestive evidence that perhaps some funds are reducing risk, while others are reaching for higher returns, and supports the decision to evaluate early returns based on investments made in years 1 and 2 of the fund.

While viewing the general distribution of holding returns across all holdings provides some initial insight to the analysis, the next natural step is to differentiated between funds on their early returns. Figure 3 presents the standard deviation of holding PME by entry year for four measures of early fund success as described in Section III. I find that fund with with higher early returns are associated with a downward trend in the standard deviations in subsequent years. Likewise, I find the standard deviation of later deal returns for funds with low early returns to increase.

Closer examination of the statistically significance of these changes in risk is done in Table II. In this table, each row represents a separate regression for each measure of interim performance and it's effect on the average final PME (columns 1-2, 5-6) and semi-standard deviation of the final PMEs (columns 3-4, 7-8) for both early deals and late deals. I find that in all case the level of risk, as measured by the semi-standard deviation of returns, moves in the direction as predicted by the

hypotheses. Funds with early high returns exhibit a reduction in the risk of later investments, while funds with low early returns show an increase in risk in later deals. For example for *Interim Success* funds have an semi-standard deviation of returns of 0.211 for early deals, statically significant at the 1% level, and this values is reduced to -0.026 for later deals. The effect is stronger for young GP funds, with a reduction from 0.245 to -0.048.

A. Regression Analysis on GP Risk Selection

The ideal dataset to test my hypothesis would include a perfect measure for both the skill of the GP and the GP’s risk assessment of each holding. While these measures do not exist, I utilize the following proxies using variables provided in the MSCI-Burgiss fund-level and holdings-level datasets. Evaluating the funds of younger GPs allows the comparison of firms that are on the same relative in terms of reputation and I additionally include a control for the fund size, such that higher skilled GPs be have access to raising larger funds, as suggested by Chung et al. (2012). As a first approach, I utilize the following difference-in-difference design to test the risk choices of GP’s following early return, namely:

$$\begin{aligned} \text{RiskFactor}_{ij} = & \beta_0 + \beta_1 \text{EarlyReturn}_j + \beta_2 \text{AfterYear2}_{ij} + \beta_3 (\text{EarlyReturn}_j \times \text{AfterYear2}_{ij}) \\ & + \gamma X_{ij} + \alpha_i + \delta_j + \theta_j + \varepsilon_{ij} \end{aligned} \quad (3)$$

where RiskFactor_{ij} denotes the risk characteristic of deal i made by fund j . The variable EarlyReturn_j is an indicator equal to 1 if fund j is categorized in relevant early return measure as described in III, and 0 otherwise. AfterYear2_{ij} is an indicator equal to 1 if the deal occurred after year 2 of fund j ’s life, and 0 otherwise. The interaction term $\text{EarlyReturn}_j \times \text{AfterYear2}_{ij}$ captures the difference-in-differences estimate of interest, with β_3 measuring the effect of strong early fund performance on subsequent deal-level risk-taking. The model includes deal-level or fund-level controls X_{ij} , as well as fixed effects for deal geography (α_i), fund vintage year (δ_j), and general partner (θ_j) to account for unobserved heterogeneity across these dimensions. Standard errors are clustered at the GP level.

To proxy the GP’s choice of risk in the selection of holdings, the analysis takes advantage of

different aspects of the MSCI-Burgiss data including industry sector classifications. As described in Section III, higher risk sectors are defined as sectors who have above average standard deviation in holding PME's. A GP who desires to increase the risk in the early stage of the fund may decide to invest more heavily in riskier sectors, or sectors that are known for providing the possibility of higher returns, along with higher standard deviations of said returns.

To further test this relationship between early returns and changes in risk taking, I estimate regressions to determine the impact of the interaction of early holding returns on the propensity to invest in higher risk sectors. Table III reports the results both for all funds across the characterization of early returns of Early DPI columns (1)-(2), Early maximum return, columns (3)-(4), and Early average returns, columns (5)-(7). I find that funds that experience higher early return do subsequently reduce overall fund risk by moving away from higher risk sectors. Column (1) reports that holdings in Early High DPI funds are 8.9% less likely to be in higher risk sectors, even after accounting for geography, fund vintage, and GP fixed effects and including controls for Deal Size, Fund Size, Deal Duration, and a Exit dummy variable to account for those deals that are fully exited. While I do find negative loadings on the other measure of high early returns, columns (3), (4), and (5), these loadings are not significant. I likewise find positive loadings, yet statistically insignificant, for the measures of two of the three low early returns, columns (2) and (7). These findings give directional evidence that funds with early high returns will subsequently reduce risk in later deals and funds with low early returns will increase risk exposure in later deals, at least in terms of sector selection. One notable exception is found in column (4), the Early Loser funds. These funds appear to also move away from higher risk sectors after having low early returns, suggesting the possibility of heterogeneous incentives along the distribution and type of early returns. I find the results to hold for young GP funds as well, with larger magnitudes on the coefficients, not reported here.

I dive deeper into the investment choice of GPs following outcome from early investments by exploring the level of sector concentration of deals made after year 2 in the fund life cycle. To do so I calculate a Sector HHI measure which accounts for the number of holdings investments made across the available sectors relative to the total number of deals done after year 2. Table IV reports the results both for all funds, columns (1)-(4), and young GP funds, columns (5)-(8). This setup shows the comparison between those with early high returns and early low returns for each measure

of early returns. I find funds with Early High DPI tend to increase the Sector HHI of subsequent investments, while Early Low DPI funds tend to reduce the Sector HHI of subsequent investments, shown in Column (1) as a 6.9% higher concentration. The relation holds for early winner funds, as they show a 8.9% greater sector concentration as compared to early loser funds. These findings hold and are stronger in magnitude for young GP funds. All four of the estimates on the interaction term are statistically significant at the 5% level. I find no statistical relationship for early success funds and when comparing early top and early bottom funds. This finding gives rise to a potential avenue for GPs behavior contrary to a reduction in risk following early returns. Brown et al. (2023) find that increased sector concentration is correlated with higher levels of semi-standard deviation of holding PME's, thus increasing downside risk. One explanation may be that GPs with early high returns want to stick with the what is working and as such become more concentrated, which may appear to be the less risky move than branching out to other sectors. However this approach may ultimately lead to a potential for larger losses in the second part of the fund.

Table V reports findings along the U.S. State concentration of later deals following early returns. Similar to the sector HHI, I find funds with higher early returns are more likely to later make investments in portfolio companies in similar states. I find positive loadings of an increase of 5.1 percentage points in concentration for Early High DPI funds over Early Low DPI funds, statistically significant at the 5% level. Early Winner funds are found to have an increase of 10.6 percentage points over Early Loser funds, statistically significant at the 1% level. Given a median of 0.28 in Geography HHI in deals after year 2, these represent sizable increases over the average fund, of 18% and 38% respectively. Early Success funds and Early Top vs Early Bottom funds also have positive loadings, though neither are statistically significant. Once again the findings for young GP funds follows as well, with larger magnitudes on the coefficients.

Another lever a GP can potentially use to change the risk of holdings is the fraction of the fund invested in each deal. Brown et al. (2023) find that the largest deals in a fund are the safest deals. If funds with higher early returns are trying to mitigate risk in the last years of the funds, then these fund should increase the fraction of the fund invested in subsequent deals while the opposite should be true for funds with lower early returns. I test this hypothesis and report the results in Table VI. In this regression I test the interaction of early returns on companies invested in after year two of a fund life. I find that in general funds with early high returns do tend to make larger deals in the

later part of the fund. When comparing early high return funds to early low return funds, I find a range of increase of 0.2%-0.9% for all funds and 0.8%-1.3% for young GP funds. Early winner funds show an statically significant increase of 0.7% over early lose funds, and the same holds for early success funds vs non-early success funds. Funds with the highest average holding returns, top funds, find an increase of 0.9%, the largest for across all funds, which holds true for young GP funds as well. Thus I find suggestive evidence supporting the above hypothesis which may point to GPs giving an larger portion of the fund to investments deemed less risky after early high returns.

A GP may likewise strategically choose when to exit a holding in a way that is adventurous to the fund. In Table VII I report the impact of early returns on the duration of deals made in the later part of the fund life cycle. I find for all measure of early returns that those funds with early high returns subsequently invest in longer duration deals. This may either be the case that GPs are selecting deals that take longer to reach fruition, or they are choosing to not exit these deals too early, and thus pushing back the incorporation of these later deal returns into the total fund returns, in a similar notion as found in Chakraborty and Ewens (2017). I find statistical significance across all interaction loadings and larger magnitudes for young GP funds.

One area of potential expansion for future research is to incorporate GP investment selection on portfolio company level data, utilizing the MSCI-Burgiss Holdings Fundamentals dataset. This dataset contains company level information for Buyout and VC holdings, such as revenue and EBITDA. The dataset is still very new and still under development and as such future exploration will be needed to ensure the validity of any results. Although a regression output table is not presented here, one such preliminary finding that I will mention is that Early high return funds appear to have higher leverage ratios in holdings after year 2 as compared to non-early high return funds. While this result needs to be analyzed further it would suggest that GP are chose to put more leverage on less risky assets (Bhardwaj et al. (2024), Myers (2001)), weighting the final fund return towards these returns.

B. Impact on Holding Performance in Later Years

Prior literature has found that interim fund performance does not persist for buyout funds (see Bhardwaj et al. (2024), Brown et al. (2023), Harris et al. (2023)). I also examine the impact on high early returns on the the holding performance of subsequent deals and report the regression output

in Table VIII. These results concur with previous findings in that funds with higher early returns do not necessarily continue to outperform. I also find that funds with lower early returns tend to outperform in later deals. Most notably, the effects are stronger for young GP funds, potentially suggesting that the GP risk selection into safer, yet lower returning investments creates weaker performance after high early returns. I find statistical significance for all estimated coefficient as the 1% level, with a notable exception being for the Early High DPI compared to the Early Low DPI, while the loading is negative, suggesting a possible deviation in investment choice that prevents noticeable under-performance. Overall, the sign and magnitude of the loadings, coupled with the findings above may give insight into the lack of within-fund performance persistence.

C. Fund Level Outcomes

In Table IX I present fund-level outcomes for each of the four measures of early returns. The signs of the coefficients, suggest that despite the lack of within-fund performance persistence, as found in Table VIII, funds with high early returns ultimately hold on to outperform in overall fund PME while also raising a larger next fund faster than funds with low early returns, both across all funds and for young GP funds. However, paying attention to the statistical significance provides important differences that suggest more nuanced outcomes.

Panel A in Table IX presents findings on the final fund PME. I find strong statistical significance, at the 1% level, for three out of four early return measures, namely Early Winner vs Early Loser, Early Success, and Early Top vs Early Bottom, presented in columns (2)-(4). Outperformance by the high early return funds in the range of 0.365-0.529 in the final fund-level PME suggests a shift from low early returns to higher early returns corresponds to an approximate one standard deviation (0.45) increase in final fund PME. The combination of outperformance in the fund-level PME and underperformance in deal-level PME of deals done later in the fund life, suggests that, in these case, funds with higher early returns are successfully deploying capital in a strategic manner in order to coast to the finish and providing their LPs with higher returns on average. However, LPs invested in these high early return funds may feel slighted out of even higher returns, had the GP not made such moves following a successful start to the fund. These findings hold for young GP funds as well, with increased magnitudes on the coefficient loadings, except for Early Winners vs Early Loser. For the fourth measure of early returns, Early high DPI vs Early Low DPI, I find

both a drop in statistical significance and magnitude as shown in column (1) for all funds and in column (5) for young GP funds. This suggests that the ability to return more of the fund to their LPs early in the fund-life cycle, while seen as a positive sign of performance, is not indicative of final fund performance.

High early return funds use the early fund success in order to return to the fund-raising market sooner, but not necessarily for a larger fund, relative to low early return funds. Panels B and C in Table IX show the findings in regards to the timing and size of a GP's next fund. I find that Early Winner, Early Success, and Early Top funds are able to raise their next fund over 7-9 months sooner on average relative to their respective low early return counterparts, which is significant at the 1% - 5% level. While I do find a negative loading for Early High DPI vs Early Low DPI funds in column (1) in Panel B, the magnitude is reduced by over half of those found in columns (2)-(4) and is not statistically distinguishable from zero. These results are magnified in young GP funds in columns (5)-(8) with the range of statistically significant reduced time in raising a next fund to be over 9-12 months. In the case of Early Winner and Early Top funds, these funds with early high returns are able to raise their next fund over a year sooner than funds with low early returns. Assuming a 2% management fee and a median next fund size of \$1.13 billion across all funds and \$0.71 billion for young GP funds (see Table I), using a back-of-the-envelope calculation, this equates to additional fees of approximately \$14-\$20 million in present value dollars. Additionally, taking Early Winner funds as an example, if I take the median fund size of \$750 million and the portion of deals done after year two of 0.59, then if these funds were able to maintain their early deal median PME of 1.435, not reported here, for deals made in the later years of the fund, this would translate into roughly \$12.75 million in performance fees (20%) for the GP and approximately \$140 million of additional cash returned to LPs. While the trade-off may serve advantageous to GPs, the LPs bear the brunt of that choice, especially if they are unable to participate in the GP's next fund. However, further consideration is needed on the ultimate effects and impact on agency conflicts which should be reduced given the fund structure, as per Axelson et al. (2009)

I find in panel C that Early High DPI funds raise statistically larger next funds, at the 10% level, compared to its low early return counterpart, while the other measures of early returns generally do not, at least not in terms of statistical significance. The loadings across the board are positive, suggesting at least some level of positive correlation, with the magnitudes being smaller for young

GP funds. In column (7) I find evidence that Early Success young GP funds raise an average of \$260.2 million more in their next fund relative to non-early success young GP funds. If a fund has a 2% management fee, this difference creates an additional \$5.2 million annually in a GP’s next fund. Given the point estimates in column (1) and (5), these equates to additional fees of \$13.2 and \$8.6 million annually, respectively, on average in a GP’s next fund despite the lack of outperformance in the current fund.

D. Instrumental Variables Approach

While the prior difference-in-difference analysis provides a first approach in establishing how early fund performance relates to the capital deployment in later deals, these estimates may not be fully disentangled from the underlying GP skill or unobserved deal quality, and as such may not reflect the causal impact of early returns. In order to address this issue, I implement a Bartik-style instrumentals variables approach to isolate exogenous variation in a fund’s early returns as determined by a fund’s exposure to sector-specific public market returns during the first two years of a fund’s life.

Given that no individual GP can meaningfully control the returns to public-sector markets, but rather private market returns are highly sensitive to changes in public markets (Brown et al. (2019), Axelson et al. (2009)), the movements in the public market sector indices provide a exogenous catalyst for changes in a fund’s early return. I instrument a fund’s interim performance, in the first two years, with the public market index for a GP’s prior fund’s predominate sector. For example, if the investments in a GP’s prior fund were focused in the healthcare sector, the current fund would be assumed to be more likely exposed to the cumulative returns in the public healthcare sector during the first two years of the current fund. The sector-specific public markets indices are measure as sector-wide performance using CRSP and Compustat, see Brown et al. (2025). The key identifying assumption is that the public sector returns influence the post-year 2 investments only through the channel of the early fund returns and not directly. This is in part supported by estimating the exposure using the GP’s prior fund strategy, rather than with the fund’s current investments. I find strong first-stage results, reported in conjunction with the full results below, that concur with previous literature findings that the sector-specific public market conditions in a fund’s early life do influence a fund’s early performance.

I utilize IV regressions in estimating the effects of the interim fund returns on the fund-level characteristics and performance of later deals using the following specification:

$$\text{InterimPerf}_j = \pi_0 + \pi_1 \cdot \text{SectorReturn}_j + \pi_2 \cdot X_j + u_j \quad (4)$$

$$\text{Outcome}_j = \alpha + \beta \cdot \widehat{\text{InterimPerf}}_j + \gamma \cdot X_j + \varepsilon_j \quad (5)$$

where InterimPerf_j is the actual (observed) fund performance at the end of year fund-life 2, SectorReturn_j is the instrument as the public sector index return of the classified sector for fund j 's prior fund, Outcome_j is the post-year 2 outcome for fund j , such as performance or risk-characteristics, $\widehat{\text{InterimPerf}}_j$ is the instrumented interim performance, X_j are controls such as fund size, and u_j and ε_j are error terms. Standard errors are clustered at the GP level to take into account that funds managed by the same GP may have unobservable correlations.

Table X presents the IV regression estimates for the performance metrics of later deals. For this analysis I utilize the interim IRR as this unit of measurement provides a direct relation to the percentage return of the public markets. As such the main independent variable $\widehat{\text{InterimIRR}}$ is the instrumented interim fund IRR, or the fund IRR at the end of year 2 in the fund's life as estimated by the first stage regression. The performance metrics of later deals are the dependent variables and include *IRR mean*, *IRR Std Dev*, and *IRR Semi-Std Dev*. The *IRR mean* is the fund-level mean IRR of later deals and is reported in columns (1-2). *IRR Std Dev* is reported in columns (3-4) and is the fund-level standard deviation of later deals IRR. *IRR Semi-Std Dev* in columns (5-6) is the fund-level semi-standard deviation of later deals IRR. These analysis show that following higher early returns, fund's subsequently make investments in deals with returns statistically indistinguishable from their lower early return fund counterparts. These later deals are also found to have lower risk, as measured by both the standard deviation and semi-standard deviation, or down-side risk, statistically significant at the 1% level. Taken together, an exogenous shock to early return impacts fund manager capital deployment strategy by shifting away from risk in the collective group of later deals.

I now use the same IV approach on the interim fund IRR to estimate the deal characteristics of later deals for fund with higher early returns. These estimates are provided in Table XI and

again $\widehat{InterimIRR}$ is the main independent variables. Columns (1)-(2) show the impact of higher fund returns on mean deal size as measure as a fraction of the fund size. I find a positive loadings for *Frac of Fund*, statistically significant at the 1% level, suggesting that funds invest in slightly larger deals following higher early returns. These deals are also more concentrated within industry sectors, as demonstrated by the statistically significant coefficient estimates in columns (5) and (6) for the *Sector HHI*. *U.S. State HHI* also receives marginally positive loadings, although these fall outside the range of statistical significance.

As for how long portfolio companies are held in later deals, columns (3)-(4) in Table [XI](#) suggest a one unit increase in the instrumented fund interim IRR entices a GP to invest in deals that exited approximately a month sooner on average. In the prior difference-in-difference analysis we found that funds with higher early returns invested in longer-term deals than their lower early return counterparts. It may be the case that fund with early high returns experience different incentives at different parts in fund-life cycle, suggesting the need to further analysis into the dynamics of change in later deals, which I explore below.

Overall, the IV results build upon the prior difference-in-difference findings. While the DiD analysis captures the average differences across higher and lower early returns funds in the later deals, the IV analysis isolates potentially exogenous variation in the interim returns suggesting the early returns in a fund casually influence a fund manger’s subsequent capital deployment.

E. Quarterly Difference-in-Difference Approach

I further explore the impacts of early fund returns on later deal investment behavior by implementing a dynamic difference-in-difference analysis using quarterly fund observation, with deal characteristics aggregated to the fund-level. While the prior tests of pre- vs. post-period averages provide a foundation on which to build, this quarterly approach allows for uncovering the dynamic evolution of the capital deployment by observing the timing and persistence of effects following higher early returns. I run the analysis under the the following specification:

$$\begin{aligned} \text{Outcome}_{jq} = & \sum_{k \neq 0} \beta_k (\text{EarlyReturn}_j \cdot \mathbf{1}\{\text{RelQtr}_{jq} = k\}) \\ & + \sum_{k \neq 0} \lambda_k \mathbf{1}\{\text{RelQtr}_{jq} = k\} + \gamma X_{jq} + \delta_j + \varepsilon_{jq} \end{aligned} \quad (6)$$

where the dependent variable Outcome_{jq} denotes the outcome characteristic of fund j in relative quarter q , aggregated from the characteristics of deals executed in that period. The variable EarlyReturn_j is an indicator equal to one for the early return characterization of fund j , and zero otherwise. The variable RelQtr_{jq} represents the number of quarters relative to the end of year two in fund j 's life, where $q = 1$ indicates the first post-treatment quarter, and negative values represent pre-treatment quarters. I omit quarter $q = 0$ as the baseline.

The coefficients β_k capture the difference in fund-level risk between early-winning and non-early-winning funds in each relative quarter k , relative to the baseline quarter $q = 0$. The coefficients λ_k control for time dynamics common across all funds in each relative quarter. The specification also includes a vector of fund-level controls X_{jq} , as well as fixed effects for fund vintage year and GP (δ_j) to account for time-invariant heterogeneity. Standard errors are clustered at the GP level.

Figure 4 presents a visual representation of the quarterly regression estimates for fund investment characteristics following early returns. In all four charts the pre-period coefficients are statistically indistinguishable from zero, aiding in the parallel trends assumption. The top left chart depicts *After Next Fund* and is a dummy variable (0/1) if the quarter comes after the fund manager's next fund, therefore represents the likelihood the GP has already successfully raised another fund. I find that after 8 quarters, or after fund-year 4, following early high returns, the fund's GP is more likely to have raise another fund, which is consistent with averages of when the next fund is raised, suggested that the statistics are driven by those early successful GPs that have the ability to fundraise off their early wins. Likewise we see that these funds start to enter into more deals 3 to 4 quarters after high interim returns, pushing the cumulative fraction of the fund higher than its counterparts, as evidenced in the top right and bottom left charts. Here we have *Deal Entry Total* which is the cumulative number of deals entered in the fund through the specified quarter and *Cumulative Fraction of Fund Invested*, the sum of deal size of entered deals trough the quarter

divided by the fund size. The bottom right chart shows *Deal Exit Total*, the cumulative number of deals exited by the fund through the specified quarter, and shows that higher early return funds begin the harvest their deals sooner, locking in the early success, a few quarters before their next fund, potentially providing marketing material to aid in fundraising.

Figure 5 provides evidence of the changes implemented by funds with high early. In these charts I find a change from pre- to post-period strategy implementation. Notably, while early return funds are markedly more less concentrated in industry and geography, this concentration becomes statistically insignificant following early returns, suggesting fund managers are enticed to increase concentration relative to prior deals. Likewise we find deal durations become longer and increasing in size. The timing also corresponds with the earlier charts of when fund’s are seeking to shift, around the quarters of fundraising for the next fund.

I next turn to the dynamic trend in performance for deals around early returns, reported in Figure 6. The dependent variables *Final Holding PME* is the mean final PME of deals currently active in a respective quarter and *Holding PME Semi-Std Dev* the semi-standard deviation of a funds active holdings, as described in Section III. I find that relative to quarter 0, the deals that are active in a fund’s portfolio in each subsequent quarter monotonically decreases in both PME and standard deviation. Following the early success, funds seemingly shift away from riskier investments, as earlier high-risk high-return deals are exited and replaces with new lower-risk lower-return deals. Interestingly, I find the early winner fund’s active deal final PME losses its statistical difference from the lower early return funds around the same quarter as the next fund is raised.

Overall, I find GPs adjust their investment strategies in response to early returns rather than following a prespecified plan. The results provide new evidence on how interim performance feeds into dynamic capital deployment decisions within private equity, with implications for both agency dynamics between GPs and LPs and the broader question of how private capital is allocated over time.

V. Conclusion

In this study I evaluate the impact of early returns on GPs incentives around risk taking and capital deployment. GPs face the optionality of current fund high returns, resulting in higher

amounts of carried interest or performance fees, while risking the probability of raising future funds. GPs also desire higher current fund performance earlier in the fund in order to lock in a positive signal on their skill, which is magnified for young GP funds in that only a limited prior track record or reputation is available. I find evidence that GPs preference is to invest in higher risk at the start of a fund, as represented by the higher standard deviation of early successful funds. Following higher than average return on early investments, GPs will subsequently reduce risk. The opposite relationship holds for funds that poor early performance. These funds will increase risk over the fund life cycle in an attempt to reach for higher returns. In the course of this risk selection, GPs of early success funds stick to their knitting by increasing sector and geography concentration in later deals. GPs may also attempt to reduce risk by increasing the fraction of the fund invested in holdings following early higher returns. I find evidence that GPs are confident in these lower risk larger deals by using more leverage. I find high early return funds do generally hold-on the early success and outperform at the final fund-level PME, and they also raise their next fund faster, but not necessarily for a larger size relative to low early returns funds. These effects are evidently dynamic in the quarters around the fundraising of a GP's next fund. Taken together, it appears high early return funds may be deploying capital in order to build a large enough lead on peers, in order to coast to the finish and start collecting an additional management fee sooner, while giving up on potential higher returns, possibly tens of millions of dollars, for their LPs in the later part of the fund. Ultimately, The risk selection by GPs across the fund life cycle may help explain the lack of performance persistence in buyout funds.

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Appendix A. Tables and Figures

Table I. Summary Statistics

This table presents a summary statistics for both all funds and young GP funds in the sample of North American private equity buyout funds with vintages from 1999 to 2018, utilizing performance data through 2023:Q4. Variables are described in Section III. Data from MSCI-Burgiss Manager Universe.

	All Funds				Young GP Funds			
	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>SD</i>	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>SD</i>
<i>Panel A: Holding-level</i>								
Entry Year	6010	2013	2014	5.76	3166	2012	2013	6.13
Deal Duration	6010	5.50	5.00	3.09	3166	5.56	5.00	3.24
Deal Year	6010	2.93	3.00	1.42	3168	2.92	3.00	1.45
Deal Year (raw)	6010	3.08	3.00	1.71	3166	3.08	3.00	1.76
After Year 2 (0/1)	6010	0.59	1.00	0.49	3168	0.59	1.00	0.49
Holding PME	6010	1.56	1.27	1.54	3168	1.60	1.25	1.64
Deal Size (\$B)	6010	0.13	0.06	0.23	3168	0.06	0.03	0.11
Deal Fraction of Fund	6010	0.07	0.06	0.05	3168	0.07	0.06	0.06
Early Winner (0/1)	6010	0.21	0.00	0.41	3168	0.24	0.00	0.43
Early Loser (0/1)	6010	0.28	0.00	0.45	3168	0.30	0.00	0.46
Early Success (0/1)	6010	0.45	0.00	0.50	3168	0.45	0.00	0.50
Early Top (0/1)	6010	0.22	0.00	0.41	3168	0.24	0.00	0.43
Early Bottom (0/1)	6010	0.28	0.00	0.45	3168	0.26	0.00	0.44
Exit (0/1)	6010	0.66	1.00	0.47	3168	0.70	1.00	0.46
After Next Fund (0/1)	6010	0.27	0.00	0.44	3168	0.18	0.00	0.38
High Risk Sector (0/1)	6010	0.51	1.00	0.50	3168	0.50	0.50	0.50
<i>Panel B: Fund-level</i>								
Fund Vintage	432	2012	2013	5.39	251	2011	2013	5.60
Fund Total Deals	432	13.92	12.00	7.56	251	12.62	11.00	7.12
Fraction Invested	432	0.95	0.93	0.17	251	0.93	0.91	0.18
Fund Duration	432	5.66	5.51	1.89	251	5.70	5.66	1.96
Fund PME (val-wtd)	432	1.32	1.27	0.45	251	1.32	1.29	0.47
Fund IRR	432	1.73	0.75	2.68	251	0.82	0.49	1.01
Fund Size (\$B)	432	1.73	0.75	2.68	251	0.82	0.49	1.01
HHI Sector	432	0.38	0.31	0.22	251	0.41	0.34	0.22
HHI Sector After Yr 2	432	0.50	0.44	0.26	251	0.55	0.50	0.27
HHI Geography	387	0.17	0.15	0.10	226	0.19	0.16	0.11
HHI Geo After Yr 2	387	0.35	0.28	0.22	226	0.39	0.33	0.25
Time Next Fund (Yrs)	379	3.74	3.74	2.07	212	4.33	4.30	1.99
Next Fund Size (\$B)	379	2.94	1.13	4.30	212	1.13	0.71	1.12
All N. America (0/1)	432	0.58	1.00	0.49	251	0.66	1.00	0.48

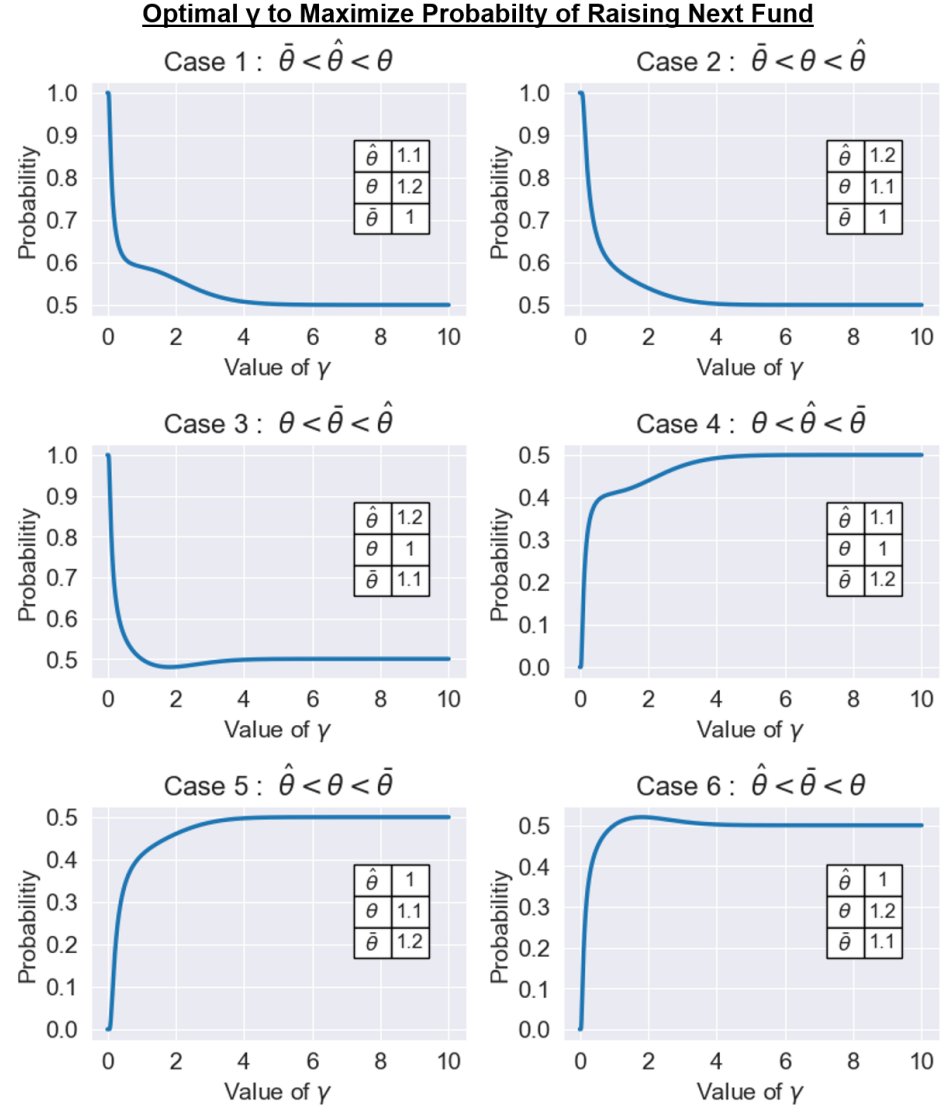


Figure 1. This figure provides numerical solutions for the GP's problem of the optimal level of γ in order to maximize the probability of raising the next fund. Values for $\tau = 1, \tau_\epsilon = 1, \rho = 0.5, Z = 1.5$ are set. The 6 cases for the relationship between $\bar{\theta}, \hat{\theta}, \theta$ are shown with representative values for each. The probability of raising the next fund is then estimated for varying levels of γ . The model is discussed in Section II and Appendix B

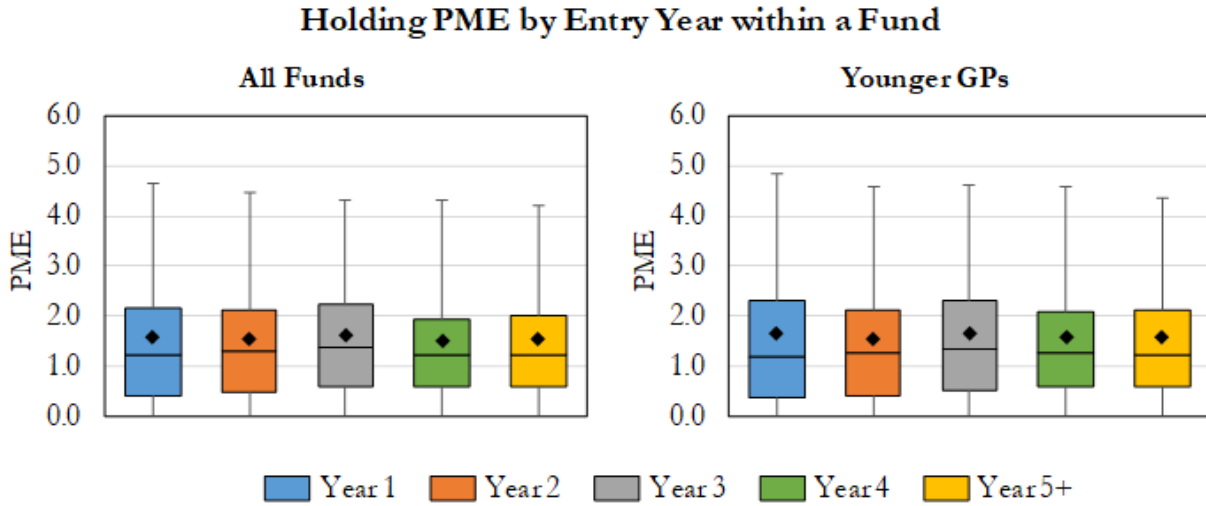


Figure 2. This figure presents the distribution of the performance of deals made within the same holding year. The distributions for two sample are depicted, the sample of young GP funds and the full sample of North American private equity buyout funds with vintages from 1999 to 2018. Performance data through 2023:Q4. The measure of performance is the PME, calculated as the Kaplan-Schoar PME, determined using equity x geography public market benchmarks, as described in Section III. Variables are likewise described in Section III. Data from MSCI-Burgiss Manager Universe.

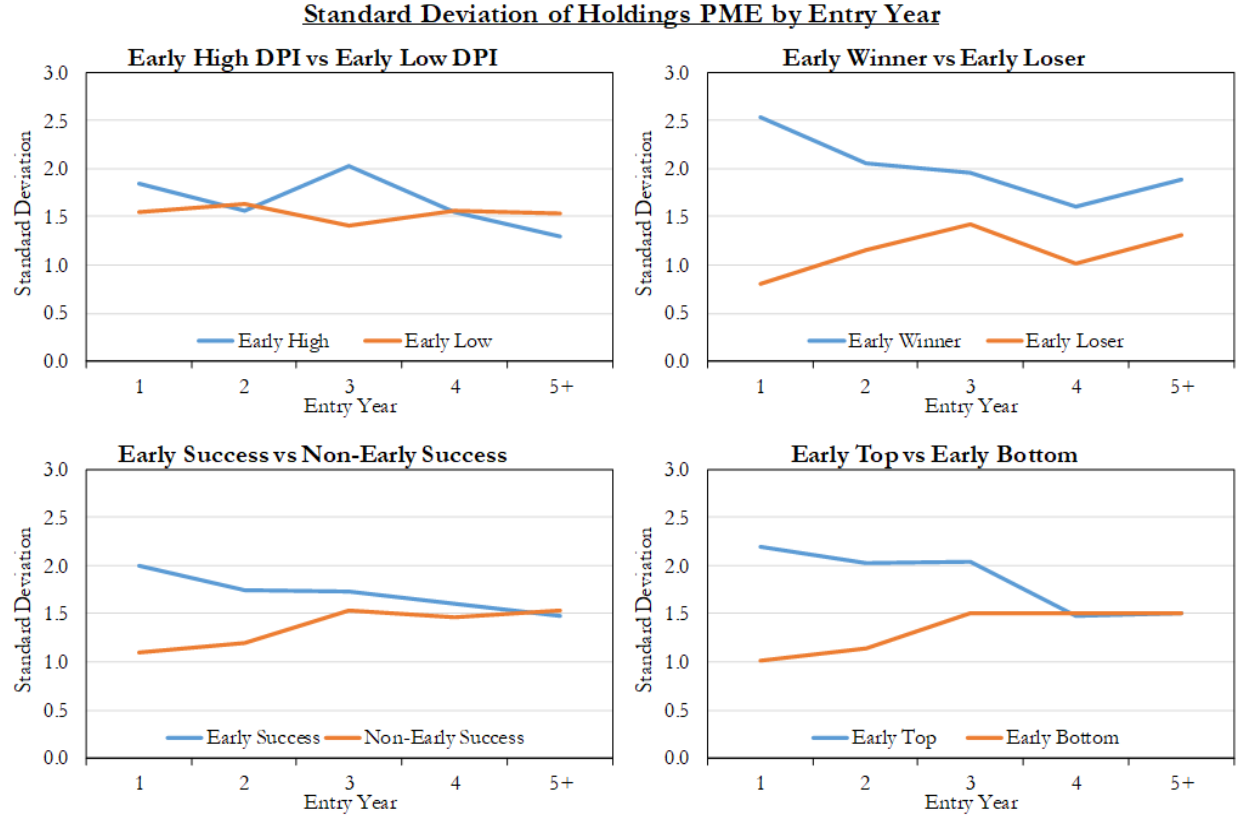


Figure 3. This figures presents the standard deviation of PME for deals made within the same holding year, directly comparing Early High DPI funds vs Early Low DPI funds, Early Winner funds vs Early Loser funds, Early Success funds vs Non-Early Success funds, and Early Top funds vs Early Bottom funds. The sample includes North American private equity buyout funds with vintages from 1999 to 2018. Performance data through 2023:Q4. *PME* is calculated as the Kaplan-Schoar PME, determined using equity x geography public market benchmarks, as described in Section III. Other variables are likewise described in Section III. Data from MSCI-Burgiss Manager Universe.

Table II. Performance and Risk of Deals in Funds by Interim Returns

This table presents point estimates from regressions of the average PME and PME Semi-standard deviation of both early deals and late deals on categories of interim returns, where each row designates separate regressions. The sample includes North American private equity buyout funds with vintages from 1999 to 2018, utilizing performance data through 2023:Q4. *High Risk Sector* is the dependent variable and is equal to 1 belongs to a sector with a top combination rankings of holding returns and standard deviation of holding TVPI as described in Section III. The independent variables dummy variable for designation of *Early High DPI*, *Early Low DPI*, *Interim Success*, *Interim Top*, or *Interim Bottom*. Controls include *Exit Dummy*, *Deal Size*, *Fund Size*, and *Deal Duration*. Variables are described in Section III. All regressions include fixed effects for fund vintage. GP fixed effects are denoted when used in each column. Standard errors are clustered at the GP level. *t*-statistics are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data from MSCI-Burgiss Manager Universe. Note: Each row provides estimates from separate regressions.

	All Funds				Young GP Funds			
	Final PME Mean		Final PME Semi-S.D.		Final PME Mean		Final PME Semi-S.D.	
	Early Deals	Late Deals	Early Deals	Late Deals	Early Deals	Late Deals	Early Deals	Late Deals
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Early High DPI (0/1)	0.177** (2.05)	-0.037 (0.51)	0.099 (1.57)	0.013 (0.27)	0.219** (1.87)	-0.067 (0.66)	0.138 (1.49)	0.057 (0.84)
Early Low DPI (0/1)	-0.227*** (2.71)	-0.007 (0.11)	-0.062 (1.06)	0.047 (0.98)	-0.217* (1.80)	0.020 (0.21)	-0.004 (0.05)	0.009 (0.14)
Interim Success (0/1)	0.442*** (5.82)	-0.042 (0.71)	0.211*** (4.03)	-0.026 (0.67)	0.556*** (5.49)	-0.116 (1.19)	0.245*** (3.36)	-0.048 (0.80)
Interim Top (0/1)	0.547*** (6.42)	0.036 (0.55)	0.298*** (4.31)	0.031 (0.63)	0.613*** (4.37)	-0.071 (0.65)	0.370*** (3.43)	0.085 (1.11)
Interim Bottom (0/1)	-0.280*** (3.37)	-0.015 (0.23)	-0.125** (2.32)	0.027 (0.63)	-0.434*** (4.10)	-0.041 (0.40)	-0.152** (2.06)	-0.007 (0.11)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vintage FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,010	6,010	6,010	6,010	3,166	3,166	3,166	3,166

Table III. Investment in Higher Risk Sectors

This table presents point estimates from regressions of holding high risk sector dummy on the interaction between a fund's early holdings returns and deals occurring after year 2 in a fund life for all funds, columns (1-4), and young GP funds, columns (5-8). The sample includes North American private equity buyout funds with vintages from 1999 to 2018, utilizing performance data through 2023:Q4. *High Risk Sector* is the dependent variable and is equal to 1 belongs to a sector with a top combination rankings of holding returns and standard deviation of holding TVPI as described in Section III. *Early Returns* is a dummy variable for designation of *Early High DPI*, *Early Low DPI*, *Early Winner*, *Early Loser*, *Early Success*, *Early Top*, or *Early Bottom*. Controls include *Exit Dummy*, *Deal Size*, *Fund Size*, and *Deal Duration*. Variables are described in Section III. All regressions include fixed effects for geography and fund vintage. GP fixed effects are denoted when used in each column. Standard errors are clustered at the fund level. *t*-statistics are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data from MSCI-Burgiss Manager Universe.

	<i>Dependent Variable: High Risk Sector (0/1)</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Early Returns (0/1)	0.043 (1.53)	0.023 (0.96)	0.007 (0.27)	0.057** (2.10)	-0.008 (0.63)	-0.012 (0.44)	-0.039 (1.33)
After Year 2 (0/1)	0.051*** (3.11)	0.028* (1.71)	0.031* (1.95)	0.048*** (2.96)	0.037* (1.85)	0.034** (2.08)	0.024 (1.46)
Early Returns $\times$ After Year 2	-0.089*** (3.00)	0.008 (0.26)	-0.002 (0.05)	-0.069** (2.29)	-0.014 (0.52)	-0.016 (0.54)	0.026 (0.83)
<i>Early Returns Variable</i>	Early High DPI	Early Low DPI	Early Winner	Early Loser	Early Success	Early Top	Early Bottom
<i>Controls</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vintage FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GP FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,010	6,010	6,010	6,010	6,010	6,010	6,010
Adj. R-squared	0.183	0.182	0.182	0.183	0.182	0.182	0.182

Table IV. Investment Sector Concentration

This table presents point estimates from regressions of Sector HHI of after year 2 holdings on the interaction between a fund's early holdings returns and deals occurring after year 2 in a fund life for all funds, columns (1-4), and young GP funds, columns (5-8). The sample includes North American private equity buyout funds with vintages from 1999 to 2018, utilizing performance data through 2023:Q4. *Sector HHI After Year 2* is the dependent variable and is a measure of sector concentration of deals done after year 2 in a fund's life cycle. *Early Returns* is a dummy variable for designation of *Early High DPI*, *Early Low DPI*, *Early Winner*, *Early Loser*, *Early Success*, *Early Top*, or *Early Bottom*.. Controls include *Exit Dummy*, *Deal Size*, *Fund Size*, and *Deal Duration*. Variables are described in Section III. All regressions include fixed effects for geography, sector, and fund vintage. GP fixed effects are denoted when used in each column. Standard errors are clustered at the GP level. *t*-statistics are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data from MSCI-Burgiss Manager Universe.

	All Funds				Young GP Funds			
	<i>Dependent Variable: Sector HHI</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Early Returns (0/1)	-0.059** (2.52)	-0.087*** (3.56)	0.021 (1.18)	0.010 (0.38)	-0.023 (0.70)	-0.170*** (4.51)	-0.040 (1.32)	-0.083** (2.08)
After Year 2 (0/1)	-0.068*** (3.52)	-0.079*** (3.56)	-0.035** (2.46)	-0.045** (2.17)	-0.089*** (0.30)	-0.132*** (3.93)	-0.039* (1.70)	-0.073** (1.98)
Early Returns $\times$ After Year 2	0.069*** (2.57)	0.089*** (3.07)	-0.013 (0.63)	-0.015 (0.51)	0.078** (1.97)	0.135*** (3.10)	-0.026 (0.80)	0.001 (0.01)
Early Returns Variable	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vintage FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GP FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,010	6,010	6,010	6,010	3,166	3,166	3,166	3,166
Adj. R-squared	0.664	0.664	0.659	0.660	0.691	0.697	0.685	0.688

Table V. Geography Concentration

This table presents point estimates from regressions of Geography (U.S. State) HHI of after year 2 holdings on the interaction between a fund's early holdings returns and deals occurring after year 2 in a fund life for all funds, columns (1-4), and young GP funds, columns (5-8). The sample includes North American private equity buyout funds with vintages from 1999 to 2018, utilizing performance data through 2023:Q4. *State HHI After Year 2* is the dependent variable and is a measure of U.S. State concentration of deals done after year 2 in a fund's life cycle. *Early Returns* is a dummy variable for designation of *Early High DPI*, *Early Low DPI*, *Early Winner*, *Early Loser*, *Early Success*, *Early Top*, or *Early Bottom*.. Controls include *Exit Dummy*, *Deal Size*, *Fund Size*, and *Deal Duration*. Variables are described in Section III. All regressions include fixed effects for geography, sector, and fund vintage. GP fixed effects are denoted when used in each column. Standard errors are clustered at the GP level. *t*-statistics are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data from MSCI-Burgiss Manager Universe.

	All Funds				Young GP Funds			
	<i>Dependent Variable:</i>				U.S. State HHI			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Early Returns (0/1)	-0.059 (1.44)	-0.086*** (4.35)	-0.001 (0.03)	-0.021 (1.00)	-0.043 (1.37)	-0.129*** (4.49)	-0.007 (0.31)	-0.049 (1.49)
After Year 2 (0/1)	-0.074*** (4.46)	-0.125*** (6.54)	-0.057*** (4.74)	-0.088*** (4.89)	-0.101*** (4.52)	-0.161*** (6.10)	-0.079*** (4.37)	-0.123*** (4.52)
Early Returns $\times$ After Year 2	0.051** (2.03)	0.106*** (4.07)	0.001 (0.03)	0.023 (0.85)	0.067* (1.87)	0.126*** (3.30)	0.001 (0.01)	0.035 (0.86)
Early Returns Variable	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vintage FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GP FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,163	5,163	5,163	5,163	2,785	2,785	2,785	2,785
Adj. R-squared	0.431	0.447	0.425	0.431	0.517	0.531	0.509	0.516

Table VI. Deal Size

This table presents point estimates from regressions of deal size as a fraction of the fund on the interaction between a fund’s early holdings returns and deals occurring after year 2 in a fund life for all funds, columns (1-4) and young GP funds, columns (5-8). The sample includes North American private equity buyout funds with vintages from 1999 to 2018, utilizing performance data through 2023:Q4. *Deal Size Fraction of Fund* is the dependent variable and defined as the holding deal size divided by the total observed holding investments. *Early Returns* is a dummy variable for designation of *Early High DPI*, *Early Low DPI*, *Early Winner*, *Early Loser*, *Early Success*, *Early Top*, or *Early Bottom*. Variables are described in Section III. Standard errors are clustered at the GP level. *t*-statistics are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data from MSCI-Burgiss Manager Universe.

	All Funds				Young GP Funds			
	<i>Dependent Variable: Deal Size as Fraction of Fund Size</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Early Returns (0/1)	0.004 (0.87)	-0.009** (2.51)	-0.004 (1.22)	-0.004 (1.02)	-0.003 (0.54)	-0.008 (1.30)	-0.005 (1.10)	-0.004 (0.62)
After Year 2 (0/1)	0.003 (1.05)	0.001 (0.13)	0.001 (0.45)	-0.001 (0.30)	-0.001 (0.04)	-0.001 (0.09)	0.001 (0.12)	-0.004 (0.95)
Early Returns × After Year 2	0.002 (0.49)	0.007* (1.88)	0.007** (2.57)	0.009** (2.42)	0.011** (2.27)	0.008 (1.39)	0.010** (2.58)	0.013** (2.27)
Early Returns Variable	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vintage FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GP FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,010	6,010	6,010	6,010	3,166	3,166	3,166	3,166
Adj. R-squared	0.309	0.310	0.310	0.310	0.323	0.323	0.324	0.324

Table VII. Deal Duration

This table presents point estimates from regressions of holding duration on the interaction between a fund's early holdings returns and deals occurring after year 2 in a fund life for all funds, columns (1-4) and young GP funds, columns (5-8). The sample includes North American private equity buyout funds with vintages from 1999 to 2018, utilizing performance data through 2023:Q4. *Deal Duration* is the dependent variable and defined as the number of years between the investment date and exit date of a holding. *Early Returns* is a dummy variable for designation of *Early High DPI*, *Early Low DPI*, *Early Winner*, *Early Loser*, *Early Success*, *Early Top*, or *Early Bottom*. Variables are described in Section III. Standard errors are clustered at the GP level. *t*-statistics are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data from MSCI-Burgiss Manager Universe.

	All Funds				Young GP Funds			
	<i>Dependent Variable: Deal Duration (Years)</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Early Returns (0/1)	-0.341* (1.65)	-0.518** (2.27)	-0.618*** (4.09)	-1.052*** (4.93)	-0.152 (0.50)	-0.569* (1.86)	-0.336 (1.31)	-0.862** (2.48)
After Year 2 (0/1)	-1.703*** (11.03)	-1.630*** (8.15)	-1.565*** (11.31)	-1.679*** (10.35)	-1.634*** (7.33)	-1.799*** (7.71)	-1.512*** (8.08)	-1.648*** (6.25)
Early Returns $\times$ After Year 2	0.716*** (2.77)	0.641** (2.17)	0.539*** (2.77)	0.699*** (2.64)	0.874** (2.11)	1.061*** (2.59)	0.558* (1.92)	0.867** (2.09)
Early Returns Variable	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vintage FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GP FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,010	6,010	6,010	6,010	3,166	3,166	3,166	3,166
Adj. R-squared	0.320	0.319	0.321	0.322	0.309	0.309	0.308	0.307

Table VIII. Deal Performance

This table presents point estimates from regressions of holding PME on the interaction between a fund's early holdings returns and deals occurring after year 2 in a fund life for all funds, columns (1-4), and young GP funds, columns (5-8). The sample includes North American private equity buyout funds with vintages from 1999 to 2018, utilizing performance data through 2023:Q4. *PME* is the dependent variable and is calculated as the Kaplan-Schoar PME, determined using equity x geography public market benchmarks, as described in Section III. *Early Returns* is a dummy variable for designation of *Early High DPI*, *Early Low DPI*, *Early Winner*, *Early Loser*, *Early Success*, *Early Top*, or *Early Bottom*. Controls include *Exit Dummy*, *Deal Size*, *Fund Size*, and *Deal Duration*. Variables are described in Section III. All regressions include fixed effects for geography, sector, and fund vintage. GP fixed effects are denoted when used in each column. Standard errors are clustered at the GP level. *t*-statistics are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data from MSCI-Burgiss Manager Universe.

	All Funds				Young GP Funds			
	<i>Dependent Variable:</i>				Holding PME			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Early Returns (0/1)	0.072 (0.69)	0.922*** (10.48)	0.771*** (12.96)	1.217*** (14.57)	-0.196 (1.28)	0.744*** (5.34)	0.769*** (7.26)	1.283*** (8.02)
After Year 2 (0/1)	-0.056 (0.67)	0.291*** (4.31)	0.248*** (4.66)	0.485*** (7.08)	-0.043 (0.36)	0.416*** (4.34)	0.379*** (4.76)	0.667*** (6.26)
Early Returns × After Year 2	-0.105 (0.94)	-0.845*** (7.04)	-0.754*** (9.75)	-1.322*** (12.57)	-0.101 (0.60)	-1.081*** (6.35)	-1.018*** (9.02)	-1.557*** (10.00)
Early Returns Variable	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vintage FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GP FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,010	6,010	6,010	6,010	3,166	3,166	3,166	3,166
Adj. R-squared	0.122	0.137	0.140	0.147	0.116	0.130	0.137	0.141

Table IX. Fund Level Outcomes following Early Returns

This table presents point estimates from regressions of fund level outcome variables on fund’s early holdings returns for all funds, columns (1-4), and young GP funds, columns (5-8). The sample includes North American private equity buyout funds with vintages from 1999 to 2018, utilizing performance data through 2023:Q4. In Panel A *Fund PME* is the dependent variable and is calculated as value-weighted average of a fund’s holdings’ Kaplan-Schoar PME, determined using equity x geography public market benchmarks. In Panel B *Time to Next Fund* is the dependent variable and is the number of days between the start of a GP’s current fund and a GP’s next fund. In Panel C *Size of Next Fund* is the dependent variable and is the total committed capital, in \$ millions, of a GP’s next fund. *Early Returns* is a dummy variable for designation of *Early High DPI*, *Early Low DPI*, *Early Winner*, *Early Loser*, *Early Success*, *Early Top*, or *Early Bottom*. Controls include *Fund Size*, *Fund Duration*, *Fund Fraction Invested*, and *Fund Total Deals*. Variables are described in Section III. All regressions include fixed effects for fund vintage. Standard errors are clustered at the GP level. *t*-statistics are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data from MSCI-Burgiss Manager Universe.

	All Funds				Young GP Funds			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A - <i>Dependent Variable</i> : Value-Weighted Fund Final PME								
Early Returns (0/1)	0.026 (0.46)	0.406*** (7.07)	0.365*** (8.82)	0.529*** (9.43)	0.007 (0.09)	0.377*** (4.61)	0.393*** (6.77)	0.551*** (7.07)
Observations	432	432	432	432	251	251	251	251
Adj. R-squared	0.148	0.260	0.311	0.342	0.114	0.201	0.286	0.305
Panel B - <i>Dependent Variable</i> : Time to Next Fund (Days)								
Early Returns (0/1)	-106.1 (1.08)	-285.2*** (3.45)	-225.4*** (3.18)	-235.3** (2.54)	-113.9 (0.92)	-369.9*** (3.21)	-279.1*** (2.89)	-382.6*** (3.16)
Observations	379	379	379	379	212	212	212	212
Adj. R-squared	0.213	0.237	0.237	0.225	0.168	0.203	0.197	0.192
Panel C - <i>Dependent Variable</i> : Size of Next Fund (\$MM)								
Early Returns (0/1)	686.0* (1.68)	198.9 (0.68)	318.9 (1.31)	364.6 (0.95)	429.5* (1.94)	36.2 (0.22)	260.2** (2.38)	189.4 (1.31)
Observations	379	379	379	379	212	212	212	212
Adj. R-squared	0.430	0.426	0.429	0.425	0.325	0.296	0.312	0.300
Early Returns Variable	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom	H. DPI vs L. DPI	Winner vs Loser	Early Success	Top vs Bottom
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vintage FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table X. Instrumented Interim IRR: Performance of Later Deals

This table presents point estimates from instrumental variables 2SLS regressions of fund-level later deal performance on the instrumented interim fund IRR, the fund-level IRR at the end of fund-year 2. The sample includes North American private equity buyout funds with vintages from 1999 to 2018, utilizing performance data through 2023:Q4. The main independent variable $\widehat{InterimIRR}$ is the instrumented interim fund IRR. The dependent variables are as follows: $IRR\ mean$ in columns (1-2) is the fund-level mean IRR of later deals, $IRR\ Std.\ Dev.$ in columns (3-4) is the fund-level standard deviation of later deals IRR, $IRR\ Semi-Std.\ Dev.$ in columns (5-6) is the fund-level semi-standard deviation of later deals IRR. Controls for $Fund\ Size$ are included when indicated. Variables are described in Section III. Standard errors are clustered at the GP level. t -statistics are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data from MSCI-Burgiss Manager Universe.

	IRR Mean		IRR Std. Dev.		IRR Semi-Std. Dev.	
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{InterimIRR}$	0.001 (0.37)	0.001 (0.39)	-0.010*** (2.88)	-0.011*** (2.98)	-0.010*** (2.68)	-0.010*** (2.69)
Controls	No	Yes	No	Yes	No	Yes
Clustered S.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	343	343	337	337	339	339
First-stage F-stat	14.26	14.25	13.72	13.77	13.61	13.62

Table XI. Instrumented Interim IRR: Risk Characteristics of Later Deals

This table presents point estimates from instrumental variables 2SLS regressions of fund-level later deal deal characteristics on the instrumented interim fund IRR, the fund-level IRR at the end of fund-year 2. The sample includes North American private equity buyout funds with vintages from 1999 to 2018, utilizing performance data through 2023:Q4. The dependent variables are as follows: *Frac. of Fund* in columns (1-2) is the average deal size of later deals as a fraction of the fund size, *Deal Dur.* in columns (3-4) is the fund-level average deal duration, measured in years, of later deals, *Sector HHI* in columns (5-6) is the fund-level industry sector concentration of later deals, *U.S. State HHI* in columns (7-8) is the fund-level geographic concentration, by U.S. state, of later deals. Controls for *Fund Size* are included when indicated. Variables are described in Section III. Standard errors are clustered at the GP level. *t*-statistics are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data from MSCI-Burgiss Manager Universe.

	Frac. of Fund		Deal Dur. (Years)		Sector HHI		U.S. State HHI	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\widehat{InterimIRR}$	0.001*** (3.08)	0.002*** (2.95)	-0.095*** (3.02)	-0.093*** (3.03)	0.011*** (2.84)	0.008** (2.51)	0.002 (1.58)	0.001 (1.20)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Clustered S.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	344	344	344	344	344	344	339	339
First-stage F-stat	14.29	14.28	14.29	14.28	14.29	14.28	14.91	14.81

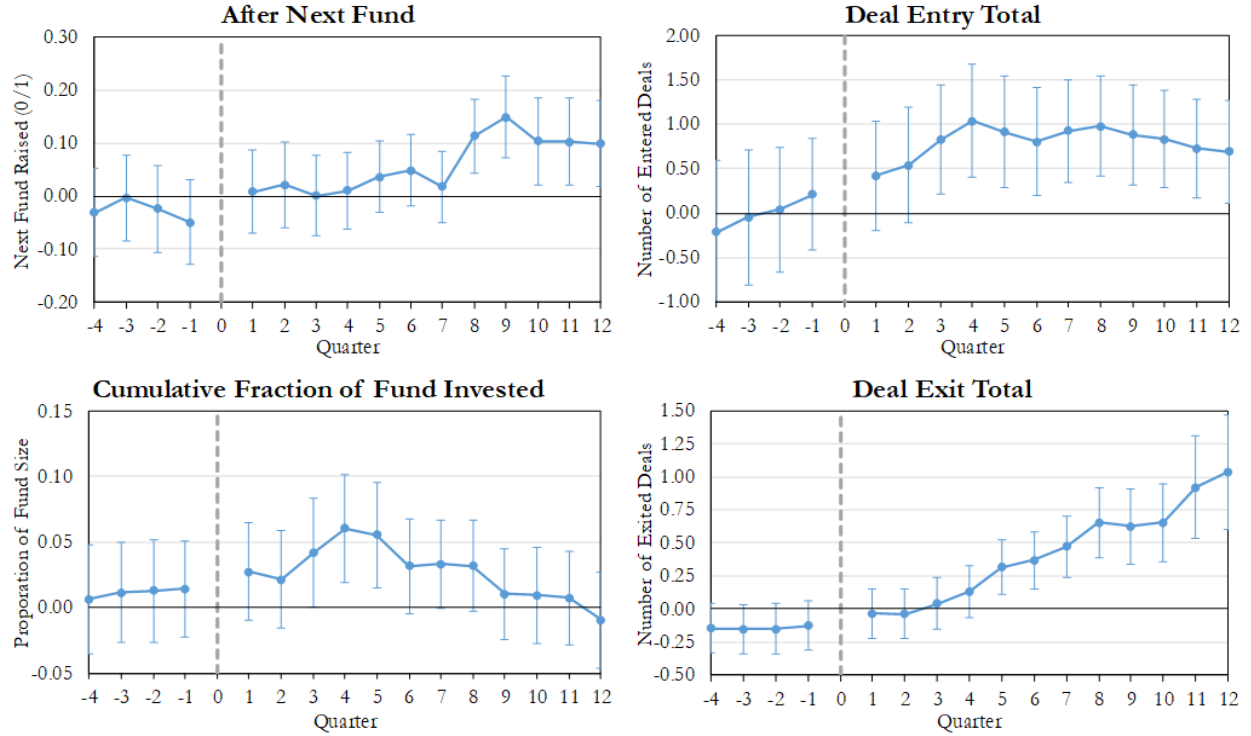


Figure 4. Quarterly Fund Characteristics around Early Returns

This figure presents regression estimates from quarterly difference-in-difference regressions for funds with high early returns, Early Winner funds, against other firms. The sample includes North American private equity buyout funds with vintages from 1999 to 2018. Performance data through 2023:Q4. The dependent variables are as follows: *After Next Fund* is a dummy variable (0/1) if the quarter comes after the fund manager's next fund, *Deal Entry Total* is the cumulative number of deals entered in the fund through the specified quarter, *Cumulative Fraction of Fund Invested* is the sum of deal size of entered deals through the quarter divided by the fund size, *Deal Exit Total* is the cumulative number of deals exited by the fund through the specified quarter. Regression controls include *Fund Size*, *Fund Duration*, *Fund Fraction Invested*, and *Fund Total Deals*. Variables are described in Section III. All regressions include fund vintage and GP fixed effects. Standard errors are clustered at the GP level. 90% confidence intervals are also presented. Data from MSCI-Burgiss Manager Universe.

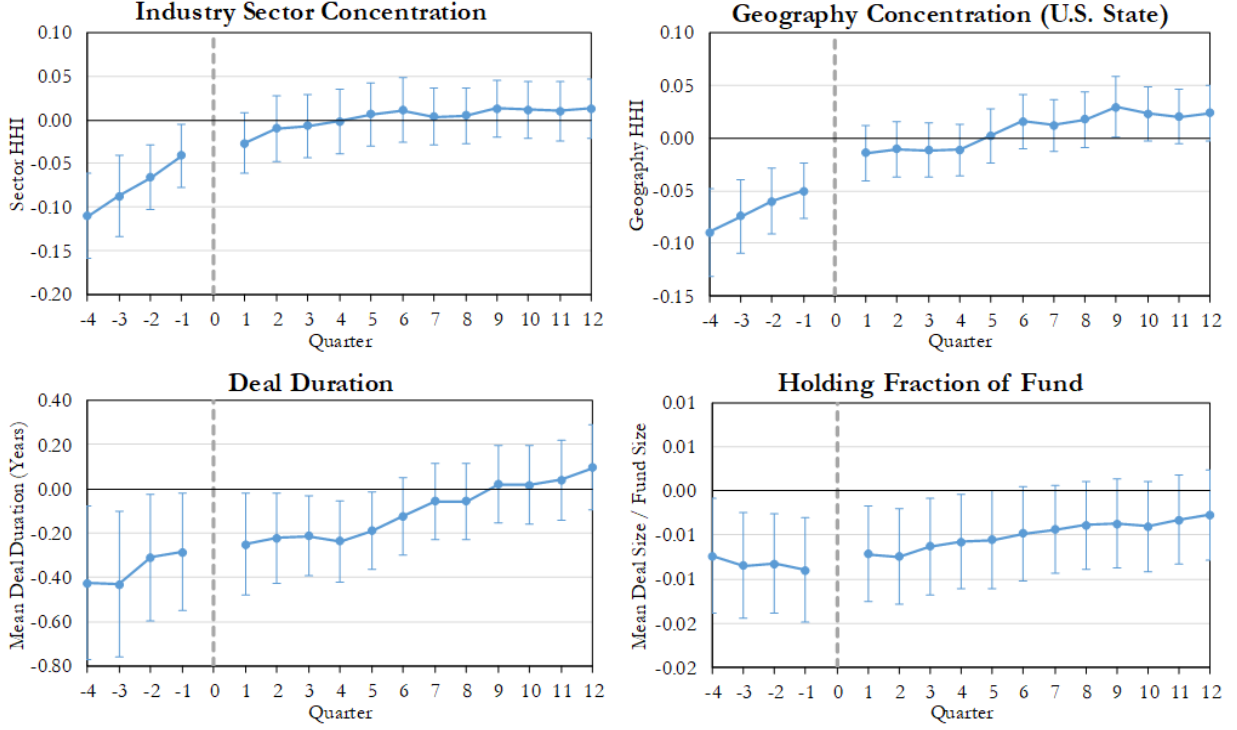


Figure 5. Quarterly Deal Characteristics around Early Returns

This figure presents regression estimates from quarterly difference-in-difference regressions for funds with high early returns, Early Winner funds, against other firms. The sample includes North American private equity buyout funds with vintages from 1999 to 2018. Performance data through 2023:Q4. Regression controls include *Fund Size*, *Fund Duration*, *Fund Fraction Invested*, and *Fund Total Deals*. Variables are described in Section III. All regressions include fund vintage and GP fixed effects. Standard errors are clustered at the GP level. 90% confidence intervals are also presented. Data from MSCI-Burgiss Manager Universe.

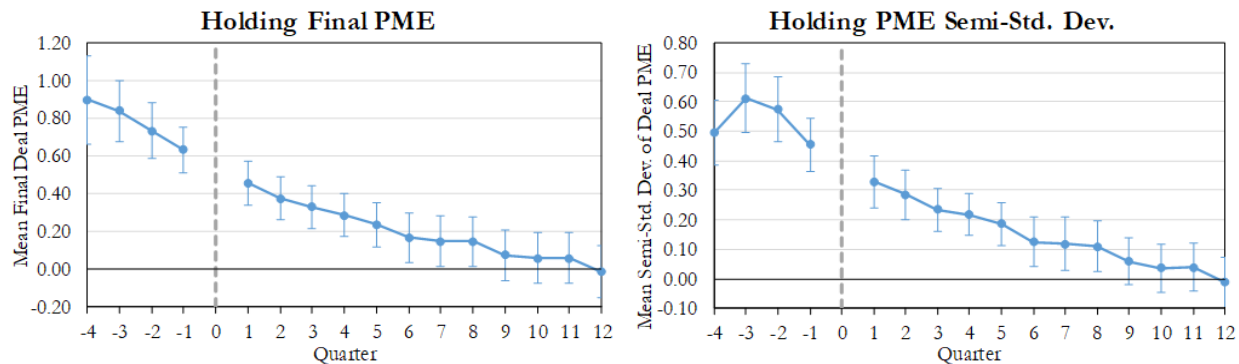


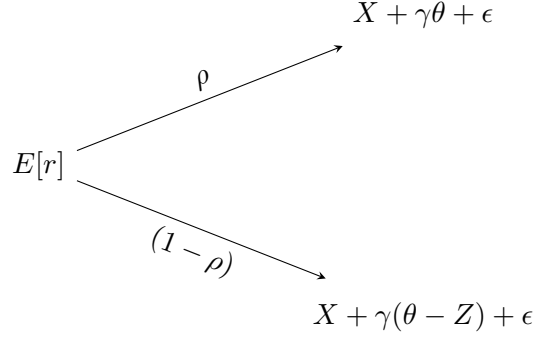
Figure 6. Quarterly Deal Performance around Early Returns

This figure presents regression estimates from quarterly difference-in-difference regressions for funds with high early returns, Early Winner funds, against other firms. The sample includes North American private equity buyout funds with vintages from 1999 to 2018. Performance data through 2023:Q4. The dependent variables *Final Holding PME* is the mean of deals currently active in a respective quarter and is calculated as the Kaplan-Schoar PME, determined using equity x geography public market benchmarks, and *Holding PME Semi-Std Dev* the semi-standard deviation of a fund's active holdings, as described in Section III. Regression controls include *Fund Size*, *Fund Duration*, *Fund Fraction Invested*, and *Fund Total Deals*. Variables are described in Section III. All regressions include fund vintage and GP fixed effects. Standard errors are clustered at the GP level. 90% confidence intervals are also presented. Data from MSCI-Burgiss Manager Universe.

Appendix B. Model Supplement

Here I include a basic overview of the derivations of the model as set forth in Section II.

Expected Return of Holding, Two States



This gives the follow for the expected return:

$$E[r] = \rho(X + \gamma\theta + \epsilon) + (1 - \rho)(X + \gamma(\theta - Z) + \epsilon)$$

where

- θ : the GPs skill
- γ : the choice of how GP capitalize on skill
- Z : down-state payoff penalty
- ρ : probability of up-state payoff
- X : the average return
- $\Rightarrow$ increasing γ increases expected return and riskiness of investment
- $\theta \sim N(0, \tau^{-1})$, $\epsilon \sim N(0, \tau_{\epsilon}^{-1})$

In addition, I assume further more that:

$$1 - \rho < \frac{\theta}{Z} < 1$$

which provides

- $1 - \rho < \frac{\theta}{Z}$: + returns to skill
- $\frac{\theta}{Z} < 1$: loss

Also I assume:

- $\theta \sim N(0, \tau^{-1})$
- $\epsilon \sim N(0, \tau_\epsilon^{-1})$

Let $\rho = 1$, we see that

$$E[\theta|r] = \frac{\gamma^2 \tau_\epsilon \left(\frac{r-X}{\gamma} \right)}{\tau + \gamma^2 \tau_\epsilon}$$

Thus more γ is always more informative, increasing risk and increasing return.

Solve for Optimal γ

$$\begin{aligned} E[E[\theta|r]] &= \rho \left[\frac{\gamma^2 \tau_\epsilon(\theta)}{\tau + \gamma^2 \tau_\epsilon} \right] + (1 - \rho) \left[\frac{\gamma^2 \tau_\epsilon(\theta)}{\tau + \gamma^2 \tau_\epsilon} \right] \\ \frac{d}{d\gamma} &\Rightarrow [\tau + \gamma^2 \tau_\epsilon][2\gamma \tau_\epsilon \theta] - [\gamma^2 \tau_\epsilon \theta + \tau \hat{\theta}] 2\gamma \tau_\epsilon \\ &= 2\gamma \tau_\epsilon \tau [\theta - \hat{\theta}] \end{aligned}$$

Increasing in γ depends on relation between θ and $\hat{\theta}$. Writing out r more precisely:

$$\begin{aligned} E[E[\theta|r]] &= E \left[\frac{\rho \gamma^2 \tau_\epsilon \left[\frac{X + \gamma \theta + \epsilon - X + (1-\rho)\gamma Z}{\gamma} \right]}{\tau + \gamma^2 \tau_\epsilon} + \frac{(1 - \rho) \gamma^2 \tau_\epsilon \left[\frac{X + \gamma \theta + \epsilon - \gamma Z - X + (1-\rho)\gamma Z}{\gamma} \right]}{\tau + \gamma^2 \tau_\epsilon} \right] \\ &= E \left[\frac{\rho \gamma^2 \tau_\epsilon \left[\theta + (1 - \rho)Z + \frac{\epsilon}{\gamma} \right]}{\tau + \gamma^2 \tau_\epsilon} + \frac{(1 - \rho) \gamma^2 \tau_\epsilon \left[\theta - \rho Z + \frac{\epsilon}{\gamma} \right]}{\tau + \gamma^2 \tau_\epsilon} \right] \end{aligned}$$

Assuming some $\underline{\theta}$ as a threshold for raising next fund:

$$\mathbb{P}[E[\theta|r] > \underline{\theta}] = \rho \cdot \mathbb{P} \left[\frac{\gamma^2 \tau_\epsilon \left[\theta + (1 - \rho)Z + \frac{\epsilon}{\gamma} \right] + \tau \hat{\theta}}{\tau + \gamma^2 \tau_\epsilon} > \underline{\theta} \right] + (1 - \rho) \cdot \mathbb{P} \left[\frac{\gamma^2 \tau_\epsilon \left[\theta - \rho Z + \frac{\epsilon}{\gamma} \right] + \tau \hat{\theta}}{\tau + \gamma^2 \tau_\epsilon} > \underline{\theta} \right]$$

focusing on $\rho \cdot \mathbb{P}[\cdot]$:

$$\begin{aligned}
& \frac{\gamma^2 \tau_\epsilon \left[\theta + (1 - \rho)Z + \frac{\epsilon}{\gamma} \right] + \tau \hat{\theta}}{\tau + \gamma^2 \tau_\epsilon} > \underline{\theta} \\
& \gamma^2 \tau_\epsilon \left[\theta + (1 - \rho)Z + \frac{\epsilon}{\gamma} \right] + \tau \hat{\theta} > [\tau + \gamma^2 \tau_\epsilon] \underline{\theta} \\
& \gamma^2 \tau_\epsilon \left[\theta + (1 - \rho)Z + \frac{\epsilon}{\gamma} \right] > [\tau + \gamma^2 \tau_\epsilon] \underline{\theta} - \tau \hat{\theta} \\
& \theta + (1 - \rho)Z + \frac{\epsilon}{\gamma} > \frac{[\tau + \gamma^2 \tau_\epsilon] \underline{\theta} - \tau \hat{\theta}}{\gamma^2 \tau_\epsilon} \\
& \frac{\epsilon}{\gamma} > \frac{[\tau + \gamma^2 \tau_\epsilon] \underline{\theta} - \tau \hat{\theta}}{\gamma^2 \tau_\epsilon} - \theta - (1 - \rho)Z \\
& \epsilon > \frac{[\tau + \gamma^2 \tau_\epsilon] \underline{\theta} - \tau \hat{\theta}}{\gamma \tau_\epsilon} - \gamma \theta - \gamma(1 - \rho)Z \\
& \epsilon > \frac{\tau[\underline{\theta} - \hat{\theta}]}{\gamma \tau_\epsilon} + \gamma[\underline{\theta} - \theta] - \gamma(1 - \rho)Z \\
& \frac{d}{d\gamma} \Rightarrow \frac{-\tau[\underline{\theta} - \hat{\theta}]}{\gamma^2 \tau_\epsilon} + [\underline{\theta} - \theta] - (1 - \rho)Z
\end{aligned}$$

focusing on $(1 - \rho) \cdot \mathbb{P}[\cdot]$:

$$\begin{aligned}
& \frac{\gamma^2 \tau_\epsilon \left[\theta - \rho Z + \frac{\epsilon}{\gamma} \right] + \tau \hat{\theta}}{\tau + \gamma^2 \tau_\epsilon} > \underline{\theta} \\
& \gamma^2 \tau_\epsilon \left[\theta - \rho Z + \frac{\epsilon}{\gamma} \right] + \tau \hat{\theta} > [\tau + \gamma^2 \tau_\epsilon] \underline{\theta} \\
& \gamma^2 \tau_\epsilon \left[\theta - \rho Z + \frac{\epsilon}{\gamma} \right] > [\tau + \gamma^2 \tau_\epsilon] \underline{\theta} - \tau \hat{\theta} \\
& \theta - \rho Z + \frac{\epsilon}{\gamma} > \frac{[\tau + \gamma^2 \tau_\epsilon] \underline{\theta} - \tau \hat{\theta}}{\gamma^2 \tau_\epsilon} \\
& \frac{\epsilon}{\gamma} > \frac{[\tau + \gamma^2 \tau_\epsilon] \underline{\theta} - \tau \hat{\theta}}{\gamma^2 \tau_\epsilon} - \theta + \rho Z \\
& \epsilon > \frac{[\tau + \gamma^2 \tau_\epsilon] \underline{\theta} - \tau \hat{\theta}}{\gamma \tau_\epsilon} - \gamma \theta + \gamma \rho Z \\
& \epsilon > \frac{\tau[\underline{\theta} - \hat{\theta}]}{\gamma \tau_\epsilon} + \gamma[\underline{\theta} - \theta] + \gamma \rho Z \\
& \frac{d}{d\gamma} \Rightarrow \frac{-\tau[\underline{\theta} - \hat{\theta}]}{\gamma^2 \tau_\epsilon} + [\underline{\theta} - \theta] + \rho Z
\end{aligned}$$

and thus

$$\mathbb{P}[E[\theta|r] > \underline{\theta}] = \rho \cdot \mathbb{P}\left[\epsilon > \frac{\tau[\underline{\theta} - \hat{\theta}]}{\gamma\tau_\epsilon} + \gamma[\underline{\theta} - \theta] - \gamma(1 - \rho)Z\right] + (1 - \rho) \cdot \mathbb{P}\left[\epsilon > \frac{\tau[\underline{\theta} - \hat{\theta}]}{\gamma\tau_\epsilon} + \gamma[\underline{\theta} - \theta] + \gamma\rho Z\right]$$

with

$$\frac{d}{d\gamma} \Rightarrow \frac{-\tau[\underline{\theta} - \hat{\theta}]}{\gamma^2\tau_\epsilon} + [\underline{\theta} - \theta] - (1 - \rho)Z \quad \frac{d}{d\gamma} \Rightarrow \frac{-\tau[\underline{\theta} - \hat{\theta}]}{\gamma^2\tau_\epsilon} + [\underline{\theta} - \theta] + \rho Z$$

setting aside ρ and Z :

$$\frac{d}{d\gamma} \Rightarrow \frac{-\tau[\underline{\theta} - \hat{\theta}]}{\gamma^2\tau_\epsilon} + [\underline{\theta} - \theta]$$

Considering optimality w.r.t γ jointly

We rewrite $\mathbb{P}[E[\theta|r] > \underline{\theta}]$ given that $\mathbb{P}(\epsilon > x) = 1 - \Phi(x)$:

$$\begin{aligned} \mathbb{P}[E[\theta|r] > \underline{\theta}] = \rho \cdot & \left[1 - \Phi\left(\frac{\tau[\underline{\theta} - \hat{\theta}]}{\gamma\tau_\epsilon} + \gamma[\underline{\theta} - \theta] - \gamma(1 - \rho)Z\right) \right] \\ & + (1 - \rho) \cdot \left[1 - \Phi\left(\frac{\tau[\underline{\theta} - \hat{\theta}]}{\gamma\tau_\epsilon} + \gamma[\underline{\theta} - \theta] + \gamma\rho Z\right) \right] \end{aligned}$$

Setting values for $\tau, \tau_\epsilon, \rho$, and Z creates 6 cases for the potential relationship between $\bar{\theta}, \hat{\theta}, \theta$. Using Python, I simulate the above equation for varying levels of γ using set values for $\bar{\theta}, \hat{\theta}, \theta$ under the 6 cases:

- $\bar{\theta} < \hat{\theta} < \theta$: LPs correctly believe GP skill is high enough to raise next fund
- $\bar{\theta} < \theta < \hat{\theta}$: LPs correctly believe GP skill is high enough to raise next fund
- $\theta < \bar{\theta} < \hat{\theta}$: LPs mistakenly believe GP skill is high enough to raise next fund
- $\theta < \hat{\theta} < \bar{\theta}$: LPs correctly believe GP skill is too low to raise next fund
- $\hat{\theta} < \theta < \bar{\theta}$: LPs correctly believe GP skill is too low to raise next fund
- $\hat{\theta} < \bar{\theta} < \theta$: LPs mistakenly believe GP skill is too low to raise next fund

Numerical estimates are presented in Figure 1.