Scale, Scope, and Speed in Private Capital Funds

An Institute for Private Capital White Paper *

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Executive Summary

- The substantial growth in both size and scope of the private fund industry has resulted in much discussion about the effects of this growth on performance. In this white paper we examine how a range of size and growth characteristics are related to market-adjusted fund performance.
- More specifically, we use detailed MSCI-Burgiss data to investigate how private fund performance is related to i.) total capital committed to an investment strategy, ii.) fund size, iii.) fund size growth from the previous fund, iv.) general partner (GP) investment scope, and v.) GP fundraising speed (i.e., time-to-market for the next fund). Our analysis is the most comprehensive to date and utilizes a global sample of 10,276 buyout, venture capital (VC), credit, infrastructure & natural resource (infra-NR), and real estate funds representing 8.7 trillion USD in committed capital. Performance data are through 2022:Q4.
- **We find no evidence of negative trends in performance for any investment strategy.** However, there is a notable dip in performance for most strategies in vintages leading up to the global financial crisis (GFC) of 2008. We find some evidence of emphpositive trends in performance for VC and credit strategies.
- **Average returns for large funds are lower than average returns for small funds across all strategies and geographies that we examine.** The negative relation between fund size and performance is most significant for credit and real estate funds. However, these results are driven primarily by greater dispersion (positive skewness) in the performance of small funds. Specifically, **we find no reliable difference in *median* performance of large funds versus small funds.**
- **Growth in fund size from one fund to the next is not related to market-adjusted performance for any strategy or geography.**
- **We find no reliable evidence that overall growth of GP AUM is related to lower performance of private funds.** In contrast, the total number of funds previously managed by a GP is positively related to performance for funds in general, as well as for buyout and venture funds in particular.
- The relation between performance and a GP's time-to-market for its next fund is nonlinear and follows an inverted U-shape: As would be expected, GPs with poor relative performance in the current fund are slow to raise a next fund. However, **GP's that raise a next fund very quickly also have below-average performance in their most recent fund.**
- In sum, our analysis provides a range of new facts relating performance to size, scope, and speed-to-market that we hope will stimulate further research.

I. Introduction

Understanding how increases in investment scale and manager scope affect performance are important questions in private markets. The private fund industry has grown substantially over the last few decades as investors continue to seek avenues for higher returns and benefits from diversification.[1] Additionally, the range of asset classes and fund offerings has grown as more fund types have been created to address new opportunities and take advantage of eager investors' willingness to commit capital to emerging strategies.[2] Private funds are now a common part of institutional investor portfolios and there is a growing movement that seeeks to include private funds in retail investment offerings such as U.S. defined contribution plans (as discussed in Brown et al. (2022)). Along with this historical and expected growth come concerns about the effects of growth on performance given the potential for capacity constraints at the manager (i.e., general partner or GP) level as well as at the asset-class level.

Despite the substantial growth of private funds, the trend in private markets takes on a different feel when considered in the context of overall capital market size. Figure 1 shows the time trend of total net asset value (NAV) for private capital funds as measured by the MSCI-Burgiss Manager Universe scaled by the relevant total market capitalization of publicly-traded assets and private funds combined.[3] The total scaled NAV does increase substantially over the last 30 years, but private fund NAV makes up less than 3% of the North America total market cap and just a little more than 1% of the "Rest of World" (ROW) market cap as of the end of 2022. Similar patterns and low relative values hold for buyout, venture capital (VC), and credit funds, in both North America and the ROW. Private real assets funds (infrastructure, natural resource, and real estate) hold a higher proportion of total assets in North America (in part because the asset classes are not dominated by large public companies), but the percentages peaked before the Global Financial Crisis (GFC). Real asset funds outside of North America have grown more steadily.[4]

Given these contrasting facts, this paper seeks to examine the historical empirical relation between private fund scale and investment performance at the manager and asset-class levels.

[1] See https://www.weforum.org/agenda/2023/12/private-markets-investors/

[2] See https://www.economist.com/special-report/2022/02/23/private-markets-have-grown-exponentially

[3] We describe the data and process in more detail in Section III

[4] Notably, ex-North American Infrastructure & Natural Resources is the one real asset strategy that demonstrates nearly uninterrupted strong growth on a scaled basis over the last 10 years.

We also examine the role of expanding scope of the largest private fund GPs to better understand the relation between performance and broadening investment strategies. Finally, we examine the relation between fundraising speed (time to next fund) and performance given large differences in fundraising activity both across managers and over time.

A. Existing Literature

Declining returns to scale are well-documented in public asset investment strategies such as mutual funds and hedge funds. The seminal paper of Berk and Green (2004) demonstrates in theory how new money rationally flowing into a successful fund can spread thin managerial talent—a scarce resource—within the fund, thereby driving the fund's returns down to average levels. Pástor and Stambaugh (2012) take an industry-level perspective and highlight an externality in which more money chasing more opportunities in the industry reduces mispricing, and therefore opportunities for any manager to find opportunities for excess returns become more elusive. Empirical analysis of fund-level returns to scale give mixed conclusions, but Pástor et al. (2015) provide convincing empirical validation of decreasing returns at the industry level by analyzing the interaction between skill and scale, strongly rejecting constant returns to scale in active management in favor of decreasing returns.[5]

The literature on private equity is not as clear. For buyouts, some research finds insignificant scale effects (Kaplan and Schoar, 2005; Robinson and Sensoy, 2013; Harris et al., 2014; Rossi, 2019; Harris et al., 2023), some finds positive effects (Metrick and Yasuda, 2010; Chung et al., 2012; Robinson and Sensoy, 2016), and some finds negative effects (Humphery-Jenner, 2012; Lopez-de Silanes et al., 2015; Braun et al., 2023a). Research examining venture capital funds, by contrast, tends to show positive returns to scale (Ewens and Rhodes-Kropf, 2015; Rossi, 2019; Lim, 2023).

Harris et al. (2014) find that buyout fund size increases from an average of $390 million in the 1980s to $1.4 billion in the 2000s, but in regressions examining fund performance using public market equivalents (PMEs) they fail to find a significant relationship between fund size and buyout fund returns. VC funds grew by an even larger proportion over the same period, from an average size of $77 million to $358 million. For these funds, Harris et al. (2014) find a strong positive correlation between size and performance: small VC funds significantly underperformed

[5]For additional citations of research examining the roles of scale and scope on public fund performance and the relation to private funds, see Harris et al. (2014).

by about 0.33 PME points relative to funds in the top top two size quartiles.[6] Braun et al. (2023b) examine buyout funds and find that average (gross) PME returns decline with both fund and deal size. For example, fund PMEs fall from 2.14 in the smallest fund size quartile to 1.76 for the largest fund size quartile; but so does dispersion of performance, with the standard deviation of PMEs falling from 1.23 in the smallest fund size quartile to 0.66 in the largest fund size quartile. However, differences in *median* performance are much smaller highlighting the role of substantial positive skewness in small fund returns. Some research has previously examined the role of GP scale on performance. Lopez-de Silanes et al. (2015) find that median IRR and PME of the largest firms are lower than the smallest firms by about 15 percentage points and 0.3, respectively.

B. Summary of Key Findings

Our analysis digs into the relation between performance and both size and scale of the private fund industry using the MSCI-Burgiss global sample of 10,276 buyout, venture capital (VC), credit, infrastructure & natural resource (infra-NR), and real estate funds representing 8.7 trillion USD in committed capital. We focus on vintage years from 1994-2018 and use performance data through 2022:Q4 to ensure that we have at least 5 years of data for all funds.

More specifically, we investigate how private fund market-adjusted performance is related to i.) total capital committed to an investment strategy, ii.) fund size, iii.) fund size growth from the previous fund, iv.) general partner (GP) investment scope, and v.) GP fundraising speed (i.e., time-to-market for the next fund). We document five key findings:

First, we find no evidence of negative trends in performance for any investment strategy. However, there is a notable dip in performance for most strategies in vintages leading up to the global financial crisis (GFC) of 2008. We find (weakly significant) positive trends in performance for VC and credit strategies.

Second, we show that average returns for large funds are lower than average returns for small funds across all strategies and geographies that we examine. The negative relation between fund size and performance is most significant for credit and real estate funds. However, these results are driven primarily by greater dispersion (positive skewness) in the performance of small funds. Specifically, we find no reliable difference in *median* performance of large funds versus small funds.

[6] The Harris et al. (2014) analysis controls for vintage year fixed effects.

Third, we show that, despite commonly held beliefs, growth in fund size from one fund to the next is not related to market-adjusted performance for any strategy or geography.

Fourth, we find no reliable evidence that overall growth of GP AUM is related to lower performance of private funds. In contrast, the total number of funds previously managed by a GP is positively related to performance for funds in general as well as for buyout and venture funds in particular.

Fifth, the relation between performance and a GP's time-to-market for its next fund is nonlinear and follows an inverted U-shape: As would be expected, GPs with poor relative performance in the current fund are slow to raise a next fund, but we also find that GP's who quickly raise a next fund have below-average performance in their most recent fund.

Taken together, our analysis provides a range of new facts relating performance to size, scope, and speed-to-market that we hope will stimulate further research.

The remainder of the paper continues as follows: Section II describes the data we use for our analysis, Section III documents findings on strategy-level growth, Section IV discusses our analysis of scaling and scoping activities on fund-level performance and Section V concludes.

II. Data

For our analysis we utilize the MSCI Private Capital Solutions private capital fund database also known as the MSCI-Burgiss Manager Universe. In order to study the effects of scale and scope for the entirety of private capital markets, we classify funds by investment strategy and geography. For investment strategy, we create five groupings to evaluate the major categories of private funds including buyout, venture capital (VC), credit (debt), infrastructure and natural resources (infra-NR), and real estate. For geographies, we separate North America funds from the full set of funds and designate others as "Rest of World" (ROW). Our sample consists of funds that were active between 1994-2022 and we restrict this sample in our performance analysis to funds with vintage years between 1994-2018 given that funds with more recent vintages are more likely in the investment stage of the fund and returns may not have materialized. However, we utilize performance data for all funds through 2022:Q4.

We measure fund and GP performance using the Kaplan-Schoar public market equivalent (PME), as developed in Kaplan and Schoar (2005). Throughout our study we simply refer to this measure as the PME. The purpose of the PME is to develop a comparison between the

performance a private equity fund's cash flows with a public market benchmark. Essentially, the PME is a market-adjusted return multiple of a fund's distributions to LPs over the LP's contributions, taking into account the timing and size of the cash flows, as demonstrated in the formula below:

$$PME = \frac{\sum_{t=0}^{T} Distribution_t(1 + R_t^M)}{\sum_{t=0}^{T} Contribution_t(1 + R_t^M)} \tag{1}$$

In this formula R_t^M is the public market benchmark returns between the quarter the cash flow occurred (t) and the final close of the fund (T). The PME allows us to compare the how an investor would have fared, had they used the same investment timing and invested in the public market benchmark. A PME greater than one implies the fund outperformed the public-market benchmark, while a PME less than one suggests underperformance. In this way, we are able to appropriately compare the cash flow returns of private funds in an enhancement to traditional multiples, such as Total Value to Paid In Capital (TVPI).

One important caveat to the PME is its sensitivity to the public benchmark selected. As discussed in Harris et al. (2014), the choice of relevant benchmark can greatly impact the measures of performance. For example, in our analysis we study a wide array of both private market strategies and as such, using a single public market index as the benchmark across all funds (such as a broad public equity index) would lead to results that are misleading for some asset classes. In order to more closely match the performance of private markets, we select benchmarks that are closely related to both the strategy and geography of the fund when possible. Specifically, for North America equity we use the Russell 3000 Total Return Index, for equity outside North America we use the MSCI World Ex-USA Total Return Index, for credit funds we use the S&P Leveraged Loan Total Return Index, and for real assets we use the MSCI World Real Estate Net Total Return Index.

To fully appreciate the impact in the changes of scale, we compare the size of private markets to the total market capitalization for each strategy.[7] Similar to our selection of public benchmarks, we choose relevant public market capitalizations for scaling private fund NAVs both by strategy and by geography (when possible): For North American equity and rest-of-world equity we use data from the World Bank and SIFMA; for North American and rest-of-world credit we use data from SIFMA; for North American real assets we use FTSE NAREIT US

[7]We outline the formula scaling process in Section III

Real Estate data and for ROW real assets we use FTSE NAREIT Global REIT data. When data for specific years are not available, we extrapolate changes in total market capitalization from related index returns. For assets classes such as equity and credit, the total market capitalization is straightforward in both data and interpretation. In contrast, infrastructure, natural resources, and real estate present a challenge given the variety of ownership structures, i.e., held by governments, private (non-fund) investors or as part of other corporate entities (e.g., companies owning their own buildings, etc.). In these cases we believe trends in scaled NAVs are largely accurate, but the scaled levels of private fund investment are likely exaggerated.

III. Relation Between Strategy Size and Performance

In this section we analyze the size of private investments in buyout, venture capital, credit, infrastructure and natural resources, and real estate strategies. Size is measured in USD using total committed capital (CC) or NAV, as well as by examining the number of funds. Geographically we consider the entire world as well as a partition into North America and the rest of the world (ROW). We begin with descriptive statistics followed by regression analyses that allow us to control for other important factors such as vintage year effects.

A. Descriptive Statistics

We start by examining the monetary size of funds, measuring CC and NAV both in absolute terms—the sum as of the end of the year—as well as in scaled terms, where

$$\text{scaled CC} \equiv \frac{\text{total CC}}{\text{market cap} + \text{total CC}}, \tag{2}$$

$$\text{scaled NAV} \equiv \frac{\text{total NAV}}{\text{market cap} + \text{total NAV}}, \tag{3}$$

The scaled measures are meant to adjust for the relative growth of relevant public markets over the sample period. Table I shows corresponding growth multiples from 1994 to 2022 using these measures. Two primary patterns emerge. First, CC and NAV have grown in almost every slice of the data from 1994 to 2022, the only small exception being the scaled NAV of North American real estate with a multiple of 0.9x. The second pattern is that private capital growth is substantially smaller when scaled by the relative growth of relevant public market caps. For example, the absolute growth multiple of committed capital for all North America funds is

49.6x, but just 6.2x for scaled CC, For total NAV the corresponding values are 49.9x and 6.3x for NAV, respectively. The largest North America multiples are in infrastructure and natural resources, exceeding 530x absolute and 14x scaled for both CC and NAV; the lowest are in real estate, with an absolute NAV multiple of 26.1x and scaled NAV multiple again of only 0.9x.

For ROW, multiples for the entire set of funds are 221.8x and 29.9.2x for absolute and scaled committed capital, respectively, and 249.5x and 34.0x for NAV, respectively. Interestingly, large ROW multiples are observed across the board, including in real estate, which has the highest multiples of 605.3x in absolute CC and 140.3x in relative CC. The lowest ROW multiples are for buyout and credit.

While many of the growth multiples are extreme, these findings mitigate some prevailing notions of the extreme increase in the amount of capital in private markets. As portrayed in Figure 1, increase of the size of private markets has been gradual and nearly consistent for most strategies. For example, while North America buyout funds have increased from $47B in capital in 1994 to over $2T in 2022, when considering the proportion of the total market capitalization, this represents an increase from just under 1% to above 5%. Considering the linear trend, this increase corresponds to an annual rate of change of only 0.09% over this time period. In fact, North America infrastructure, natural resources, and real estate funds have seen a decline in scaled market cap since the GFC, but have experienced a growth in scale market cap in the "rest of world". Notably, the plot of North America buyout shows larger increases in recent years, from 2% in 2017 to 3.5% in 2022, with a higher annual change of 0.25%.

We also consider the relation between the number of funds and the size of funds (via committed capital) to elucidate the distribution of monetary size among participants. Figure 2 shows the distribution of fund count based on fund size at 1 billion USD intervals. The vast majority of funds—over 80%—are less than 1 billion USD, and the share of total fund count by size bucket sharply decreases for larger size buckets. Megafunds in excess of 9 billion USD only make up a small portion (about 1%) of the total universe of funds. Yet, it is also instructive to look at fund sizes, as shown in Figure 3, which allows us to see how the monetary weight of private capital is distributed. Funds are similarly bucketed by size at 1 billion USD intervals, bucket total sizes still generally decrease with fund size, but not as dramatically as for fund count: so while over 80% of funds are under $1 billion USD in size, these funds constitute only about 30% of committed capital. In contrast, the largest 1% of funds represent about 15% of committed capital. A disproportionately small share of capital is therefore found in the typi-

cal fund (the median fund size is much less than the average fund size, i.e., fund size is quite right-skewed), suggesting that the factors affecting a typical fund might not be affecting private capital at large in the same way or to the same extent.

B. Performance Analysis

We now examine performance trends over time by strategy. Figure 4 plots the time-series of fund PMEs, grouped by vintage year (solid lines). Looking across strategies it is clear that PMEs vary differently through time. For example, buyout funds have stayed comparatively stable with most PMEs between 1.0 and 1.5, while VC funds have experienced a much wider range of outcomes with many vintages around and after the dotcom bubble having PMEs below 1.0. A common feature across strategies appears to be a dip in PMEs somewhere in the middle of the sample (i.e., somewhere in the 2000-2010 range) followed by a general trend upwards of PMEs for more recent fund vintages. For example, the median PME for all strategies is above 1 since 2014. We also fit a simple linear trend in each of the plots. We do a more formal statistical analysis of trends next, but these plots indicate that there are no obvious negative trends in performance and, if anything, trends appear to be weekly positive over our sample period. It is important to note here that we believe the MSCI-Burgiss data to be largely free of survivorship bias over this sample period, so these results are unlikely to be driven by selection of relatively better performing funds more recently.

To understand more precisely the effects of strategy size and growth on performance, we also examine the relation between strategy size and pooled performance using a regression analysis. Specifically we use a prior years' absolute or scaled NAV as a regressor to explain changes in NAV-weighted PME-to-date (for example, the change between the PME-to-date at the end of 2005 and at the end of 2004). Along with the entire set of funds, each strategy is considered individually, and regressions control for geography and for annual linear time trend with GP-clustered standard errors. The results are shown in Table II. In specifications with just a time trend, we find no evidence of a significant positive or negative trends in performance for any specific strategy or for all assets. For the regressions with size variables, we find very little meaningful evidence that an increase in the strategy level absolute NAV in a year impacts a change in fund returns in the following year. For buyout, increases in prior year absolute NAV seem to marginally predict positive changes in PME. However we also find a negative impact for some strategies: an increase in scaled NAV is associated with a decrease in PME the following

year for buyout and credit. VC, infrastructure and natural resource, as well as real estate, do not appear to covary with prior year's NAV.

The results in this section provide very little evidence supporting the hypothesis that strategy-level asset growth results in lower returns.

IV. Relation Between Fund Characteristics and Performance

Having now analyzed the scale of private markets in the aggregate, we now turn to fund-level analysis with a focus on GPs. Our variables of interest include fund size, how many funds a GP has managed, growth of GP assets under management (AUM), GP strategy scope (i.e., number of different fund strategies they manmage), and GP fundraising speed. We begin with a descriptive overview and then move on to a more detailed regression analysis.

A. Descriptive Statistics

We start our fund-level analysis by examining the relation between fund size and performance. Table III reports PMEs for strategies individually and geographies individually by fund size quartiles. Panel A shows results based on size irrespective of vintage year. Across all strategies and geographies, PMEs are consistently greater than 1.0, yet there is an tendency for average PMEs to decline with fund size. Comparing small funds (4th size quartile) to large funds (1st size quartile) we see that larger funds always have lower average PMEs across all strategies and geographies. Declines across size quartiles are not strictly monotonic, but there is a generally tendency for average PME to decline with size quartile. Differences are largest for VC funds (1.87 versus 1.50) and smallest for buyout funds (1.38 versus 1.28). The differences are larger for North American Funds than for ROW funds.

Panel B of Table III reports similar statistics but with fund size measured relative to other funds of the same vintage. The results are generally similar to those in Panel A, but somewhat weaker. Again the strategy exhibiting the smallest difference is buyout, declining from 1.36 for the smallest quartile of funds to 1.29 for the largest quartile. In contrast to absolute fund size, the largest difference for relative fund size is for real estate, dropping from 1.44 for the smallest funds to 1.09 for the largest funds. In North America, small funds have an average PME of 1.57 compared to 1.20 for large funds. Likewise for ROW, mean small fund PME is 1.62 compared to 1.31 for large funds. We further breakdown strategy and geography in Table IV, but the

takeaway is largely the same: PME mostly seems to decline with fund size. The only exception to the pattern of falling PME is ROW venture capital when not accounting for vintage, which increases from 1.65 to 1.92.

As noted in the literature review section, trends in average PMEs can be driven by positive skewness in fund returns. This means that median fund returns may not show trends related to size even when average returns are declining in fund size (see Braun et al. (2023b)).

In Figure 5 we present the PME distribution breakdown across the fund size quartiles for all years, by strategy. Here we find a consistent pattern of decreasing means and relatively consistent medians, both when considering all funds and for each strategy. In terms of all funds, the average PME values for size quartiles are 1.53 (smallest), 1.41, 1.34, and 1.29 (largest), representing a 15.8% decline in PME. However the median for the largest quartile of funds is actually slightly higher than the median for the smallest quartile of funds, with values of 1.17 (smallest), 1.13, 1.14, and 1.18 (largest). As can be seen in the most left (shaded blue) box and whisker plot of each chart, the smallest funds are notably more skewed towards higher PME values. As we move toward the largest funds (shaded yellow), we find a compression towards the median, both in the 25th/75th range and the 5th/95th range, resulting in a 57.6% decrease in the standard deviation between the quartile of smallest funds and the quartile of largest funds.

Notably, the VC returns demonstrate the highest level of dispersion overall, but also the highest amount of distributional compression between the smallest quartile funds and the largest size quartile funds. This effect is driven by a 165% increase in the 25th percentile and a 13.8% decrease in the 75th percentile. A key implication of these findings is that those LPs who are so inclined, and feel they have particular skill in fund selection, could stand to benefit from focusing their attention on the smallest funds, where that due diligence can yield the highest rewards. Otherwise, the evidence suggests that for a typical LP considering which funds to invest in for the sake of diversification and mandated allocation, large funds provide more consistent returns. For example, buyout and credit funds in the largest size quartile have a 25th percentile PME very close to 1 (0.98 and 0.97, respectively), suggesting that the diligence and effort required in the fund screen process becomes less differential as fund size increases. In our subsequent regression analysis we investigate other factors that may determine the distribution of PMEs.

We also examine the relation between fund size growth at the GP level. In Figure 6 we plot median PME returns and fund growth percent (i.e. the change in fund size from a previous

fund in the same series) by fund series.[8] Unsurprisingly, fund growth rates (orange line) tend to decline with subsequent series. More interesting is the trend in PMEs (gray line) which is fairly stable across series number, and, if anything, may tick slightly higher with series number. We note that the while effect is certainly not consistent, it provides some suggestive evidence of a slight negative correlation between fund growth and PME. Figure 7 directly examines the relation between fund size and shows median fund size for series 10+ is substantially larger than for series 1-9 and (as also as shown in Figure 6) that the median PME is also greatest for series 10+ funds.

In Table V we look at the subsequent fund size growth within a GP series, again using quartiles. Smaller fund-to-fund growth typically yields higher mean PME, except for credit which increases slightly from about 1.16 to 1.23. Some of the other preceding conclusions carry over: buyout shows little-to-no difference, and the decline in real estate is the largest, now along with infrastructure and natural resources. There is some reason to believe that mean venture capital PME initially increases, although not with large growth: apparently "growth is good, but not too much growth." Sorting size relative to other funds of the same vintage does not yield any noteworthy differences in conclusions.

We also examine growth of the GP itself, that is, the change in cumulative assets under management (AUM) of a GP with a new fund. Table VI shows mean PME for GP growth quartiles. Once again buyout shows little-to-no relationship with GP growth quartiles, credit appears to increase mildly, and real estate falls sharply. The most notable observation is the sharp decline in venture capital PME, falling from from 1.88 to 1.46 when accounting for vintage. One might speculate that large-growth VC GPs are new and therefore are moving from a small size fund to a larger fund with little experience, whereas the low growth GPs are more seasoned (i.e. they are already big and have gone through their growing pains). Overall mean PME declines when considering all strategies and geographies, controlling for vintage effects or not, and North America mean PME falls more sharply than ROW.

To analyze GP scope, we consider three aspects of GP business lines: the number of funds, the number of distinct strategies, and the number of distinct geographies a GP is invested in prior to starting a new fund, utilizing the MSCI-Burgiss classification for asset class and geography to determine the latter two. We define distinct strategies as the combination of

[8] We do this for all fund strategies and geographies. The group 10+ includes all funds with a series number of 10 or more.

asset class strategy levels, e.g. "Equity Venture Capital" or "Equity Buyout". We likewise define distinct geographies as the combination of geography classifications, e.g. "Americas Latin America" or "Europe Western Europe". Our measures of scoping are the set of the unique distinct strategies (or geographies) for funds a GP has started prior to the start of the current fund, e.g. if a GP has launched three prior funds all in "Western Europe" the number of unique distinct geographies is equal to 1, and only increases if prior funds are classified in different categories. Figure 8 shows median PME versus quartiles of these measures of GP prior scope. The most punctuated pattern is that PME typically appears to be larger when a GP has already managed a larger number of funds; the pattern for more strategies is muted and barely upward sloping. The relation between performance and the number of geographies mixed – increasing slightly across the first three scope quartiles before declining for the largest scope quartile. Overall, the unconditional performance trends for related to strategy and geography scope are weak or nonexistent.

We also examine the relationship between median PME and time-to-market, that is, the time between funds for a GP, where *fast* means a shorter time between funds. Two timings are considered. First, *from prior fund* is the amount of time a GP takes from the prior fund to start the current fund. And second, *to next fund* is the amount of time a GP takes from the current fund to their next fund. In Figure 9 we plot performance results (PMEs) by "speed deciles" for each measure. The results indicate that the performance relation to the time from the prior fund (blue line) is noisy and basically without any apparent trends, suggesting that the current fund performance is largely unrelated to the time since the last fund was raised. In contrast, the relation between performance and the time to the next fund has an inverted-U shape: As would be expected, very slow fundraising is associated with weak performance. However, GPs that are very quick to raise a next fund (9th and 10th fastest deciles) have lower returns with the most recent fund than GPs with intermediate fundraising speed (deciles 2-8). One potential explanation for the results in Figure 9 is that funds with higher PMEs are able to raise funds more quickly, but moving too quickly might compromise a GP's ability to give the current fund adequate attention. For example, GPs may face capacity constraints when raising funds close together that affects their ability to conduct the thorough vetting of potential deals and provide sufficient engagement with selected portfolio investments.

B. *Regression Analysis*

In this subsection, we test several regression models to try to explain variation in PME relative to strategy- and geography-specific benchmarks. In addition to the entire set of funds, each investment strategy is considered individually. Each regression includes geography, and industry fixed effects (again, the strategy and geography classifications are from the MSCI-Burgiss manager universe), but the inclusion of vintage fixed effects vary (as described subsequently). Standard errors are corrected for clustering at the GP level.

First, we perform a set of regressions of PMEs on *Fund Size* measured in billions of USD and on *Size Rank Percent* which is calculated as the rank of the fund size proportional to the maximum rank.[9] The results are reported in Table VII.

When considering the entire set of funds, the coefficients are negative and statistically significant for both fund size and size rank percent (columns 1 & 2). While we do find statistical significance, the economic impact may be lacking in that a $100MM change in fund size implies reduction of PME by 0.004. Within specific strategies (columns 3-12), all coefficients are negative, but statistical significance varies. Buyout and credit funds have significant negative relations for both fund size and size rank percent, whereas real assets and infra-NR funds have a significance negative relation only with size rank percent. Venture capital funds do not have a significant relation between performance and either fund size variable. Overall, the regression results suggest that PMEs tend to decline, but only slightly, with larger fund size after controlling for vintage, geography, and industry fixed effects.

As we found in our analysis of the fund size buckets (Figures 2, 3), the distribution of the number of funds is not consistent with the distribution of fund size. In essence, the *Size Rank Percent* is a normalization of the funds size distribution. This re-shaping provides potential insight and more clarity into parts of the distribution overshadowed by the tail weights, giving higher weight in the analysis to intermediate-sized funds. Table VII shows that when considering all funds, an increase in *Size Rank Percent* of 10%, roughly a $150MM increase in fund size for the median fund, corresponds to a decrease in PME of 0.046, a much larger impact that we found when considering fund size alone. We find similar results across other strategies as well, except in VC where there is no statistical significance, but negative estimates point to a similar

[9] Larger funds have larger fund size ranks. For example, if we rank 20 funds by size, then the 16th largest of the funds would have a size rank percent of 0.8 or 80%.

qualitative negative relationship. This finding highlights the importance of an individual fund's size as a function of the size of other funds in the market. Future research can dig deeper into this result to understand the full nuances and while interesting, we will use *Fund Size* as our measure of size for the remaining analysis for the sake of interpretation.

We now conduct a more careful investigation of how the fund-level and GP-level factors described above affect performance (PMEs) using a regression analysis. Regressors include measures of fund size growth, GP size growth, three measures of GP scope, and GP speed-to-market, which are described in prior subsections. However, we note that the measure of the number of funds used here (*GP Scope Rate - Active Funds*) is different than that used in the previous descriptive statistics section: when considering a particular fund, we measure the number of a GP's currently active funds as a proportion of all of that GP's funds prior to that fund. We also note that we do not include both fund size and size rank in the exhaustive regression analysis because the two measures are strongly positively correlated and fund size, measured in dollars, is the more common metric.[10] To aid in interpretation, *GP speed-to-market* is a measure of how quickly, on average, a GP returns to market after starting a fund by raising the next fund, reported in years.

The results are reported in Table VIII (without vintage fixed effects) and Table IX (with vintage fixed effects). When looking at the entire set of funds, column (1), fund size is statistically significant and negative for both specifications, showing our prior result that a large fund size is associated with a reduction in PME, (Table VII) is robust to controlling for a variety of fund and GP characteristics. Across all funds without (with) controls for vintage, a \$100MM increase in fund size is correlated with a 0.003 (0.002) lower PME. This appears to be driven mainly by VC, which has a large and statistically significant negative coefficient without vintage fixed effects, and a relatively large (but not individually statistically significant) coefficient when including vintage fixed effects. The other regressors are not individually significant for fund size, although buyout fund are just north of the cut-off for statistical significance. For VC funds a \$100MM increase in fund size corresponds to a 0.03 (0.01) lower PME without (with) vintage fixed effects. While the economic significance seems muted for most funds, fund size perhaps has more impact for VC due to the high levels of skewness in the return distributions (shown earlier).

GP Size Growth Rate is negatively related to PME for real estate when not including vintage

[10] In subsequent drafts we plan to explore in detail a broader set of size metrics.

fixed effects. However, the significance disappears when vintage fixed effects are included. This may suggest a difference between the capacity of the real estate strategy overall and GPs' capacity for growth (and is supported by the generally flat trend of the median PME for real estate funds that we found previously in Figure 4). Assuming a change in AUM at the median GP growth rate, 63% in our sample, our specification across all years suggests a reduction in PME of 0.05.

The scope rate for active funds is also statistically significant and positive when looking at the entire set of funds, driven primarily by buyout and VC which are individually significant and positive as well. This effect holds even when looking at the impact within vintage. Recall that in Figure 8 we found that more experienced GPs have better performance. In this regression analysis we find the effect is fairly strong for those who have been more active in recent markets relative to prior total funds. The results suggests that a 10% increase in the ratio of active prior funds to total prior funds relates to an increase in PME of 0.05 (for all funds when controlling for vintage fixed effects). The effect is stronger for buyout and VC funds resulting in higher PMEs of 0.09 and 0.15 for a 10% change.

GP Speed-to-Market shows a statistically significant positive relation when pooling all funds. Buyout and VC funds are individually significant and positive for GP speed-to-market, and most of the effect for all funds is due to the strong relation for VC funds. We find that PMEs are positively associated with GPs that have shorter times between funds. Looking at buyout funds specifically (column 2), we find that if the average time between funds for a GP is reduced by 1 year, the resulting PME is on average 0.02 higher. This change is equivalent to moving from the median amount of time between funds, 2.82 years, to the 75% percentile of 1.82 years.

Interestingly, we find no evidence for an effect, positive or negative, of fund-to-fund growth from the prior fund on the PME of the current fund, despite the potential correlation between PME and fund growth previously shown in Figure 6. Fund-to-fund growth rate does not appear to be a relevant factor in any specification for any strategy, nor do strategy or geography scope rates, but rather serve as a controlling factor for robustness in evaluating other characteristics. Credit and infra-NR do not seem to individually correlate to any of the factors in this regression model.

V. Conclusion

In some ways the results of our analysis are surprising: in contrast to public-market investment funds, we find little evidence of diseconomies of scale for private funds. In fact, we document some weak evidence of (positive) economies of scale. Our results contradict the findings of Lopez-de Silanes et al. (2015) in that we find no negative effects from widening GP strategy scope (and even some evidence of positive returns related to scope).

In other ways, our results are consistent with the extant literature (cited in the introduction) that finds no relation between *private* fund size and performance. The most general conclusion of our analysis is that size, scope and speed have not been major factors determining returns, and so LPs should likely focus more of their efforts on other attributes when making investment decisions.

One possible interpretation of our results is that performance of private funds is determined more by cyclical factors than secular trends at the strategy level. For example, all private fund strategies experienced a bout of weak returns in the 2000s (but admittedly not all at the same time), which some prior research suggests was caused by excessive optimism driving up entry multiples for investments. However, prior research also suggests that is difficult to time private fund commitments successfully, so it is unclear what actionable advice comes from this finding. In this vein, it is interesting to speculate what a similar study will show in 10 years about the current private fund environment given what appears to be a hangover from exuberance that peaked in 2021!

Our hope is that this largely descriptive analysis stimulates deeper dives into issues of size, scope and speed. We see opportunities for future work that examines questions such as: What other market- and GP-related factors explain cross-sectional variation in fund performance? Why have some GPs scaled and broadened their scope more than others? What is the optimal scaling and scoping strategy for a GP (e.g., given its expertise and current market niche), and how does it vary through time? Are there "cyclical constraints" that drive performance patterns? And finally, how much would the private fund industry have to grow to reach meaningful diseconomies of scale?

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Tables and Figures

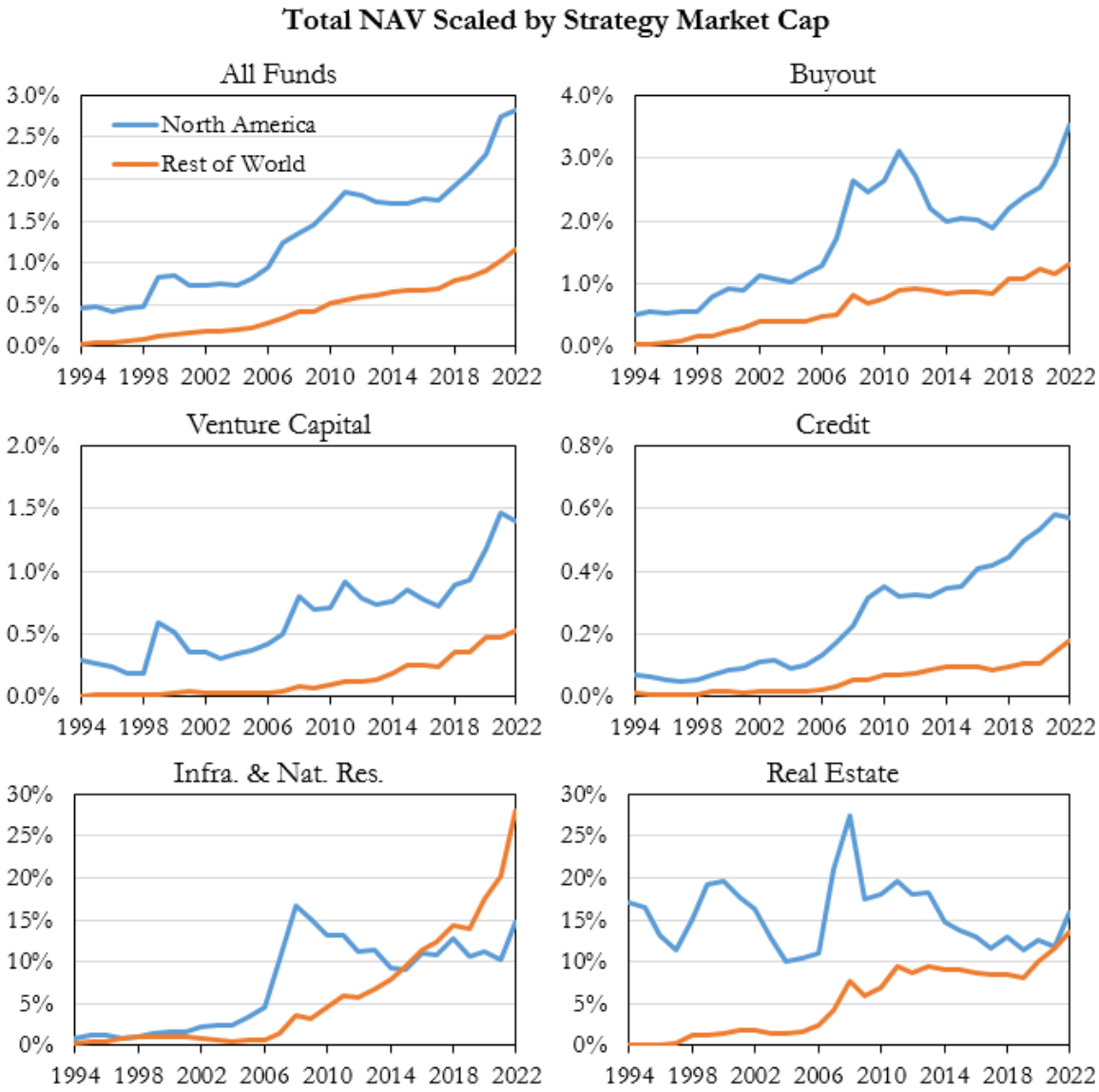

Figure 1. This figure presents the time series of scaled NAV, described in more detail in Section III. The sample includes private capital funds that were active between 1994 and 2022. The total NAVs scaled by strategy market capitalization are shown for all funds (top left chart) and for each strategy classification, as described in Section II. The two lines in each chart represent funds belonging to each geography classification, as described in Section II. The blue line portrays "North America" funds and the orange line portrays "Rest of World" funds. Data from MSCI-Burgiss Manager Universe.

Total Committed Capital and NAV Growth between 1994-2022

	Total Commited Capital			*Total NAV*		
	North America	*Rest of World*	*World*	*North America*	*Rest of World*	*World*
All Funds						
Absolute	49.6x	221.8x	71.9x	49.9x	249.5x	70.4x
Scaled	6.2x	29.9x	9.4x	6.3x	34.0x	9.3x
Buyout						
Absolute	47.2x	191.1x	68.3x	55.6x	231.7x	76.2x
Scaled	5.8x	29.0x	9.6x	6.9x	35.6x	10.8x
Venture Capital						
Absolute	29.1x	228.8x	43.7x	37.8x	320.2x	55.4x
Scaled	3.7x	35.4x	6.3x	4.8x	49.6x	8.0x
Credit						
Absolute	84.8x	350.3x	110.2x	60.2x	119.3x	70.6x
Scaled	11.1x	42.4x	13.8x	7.9x	14.5x	8.9x
Infra. & Nat. Res.						
Absolute	535.9x	198.9x	276.8x	532.6x	425.9x	470.3x
Scaled	14.9x	39.7x	26.5x	16.0x	102.4x	50.8x
Real Estate						
Absolute	45.3x	605.3x	66.9x	26.1x	394.6x	35.9x
Scaled	1.4x	140.3x	6.6x	0.9x	113.8x	4.2x

Note: Scaled represents (total CC / (MktCap + total CC)) and (total NAV / (MktCap + total NAV))

Table I. This table presents a comparison between the absolute growth and scaled growth of total committed capital and NAV in private markets. The sample includes private capital funds that were active from 1994 to 2022. Multiples of absolute and scaled growth, described in more detail in Section III, represent the change in end-of-year values from the year 1994 to the end-of-year values in the year 2022. Growth multiples are demonstrated for each strategy, geography, and strategy x geography combination, as described in Section II. Data from MSCI-Burgiss Manager Universe.

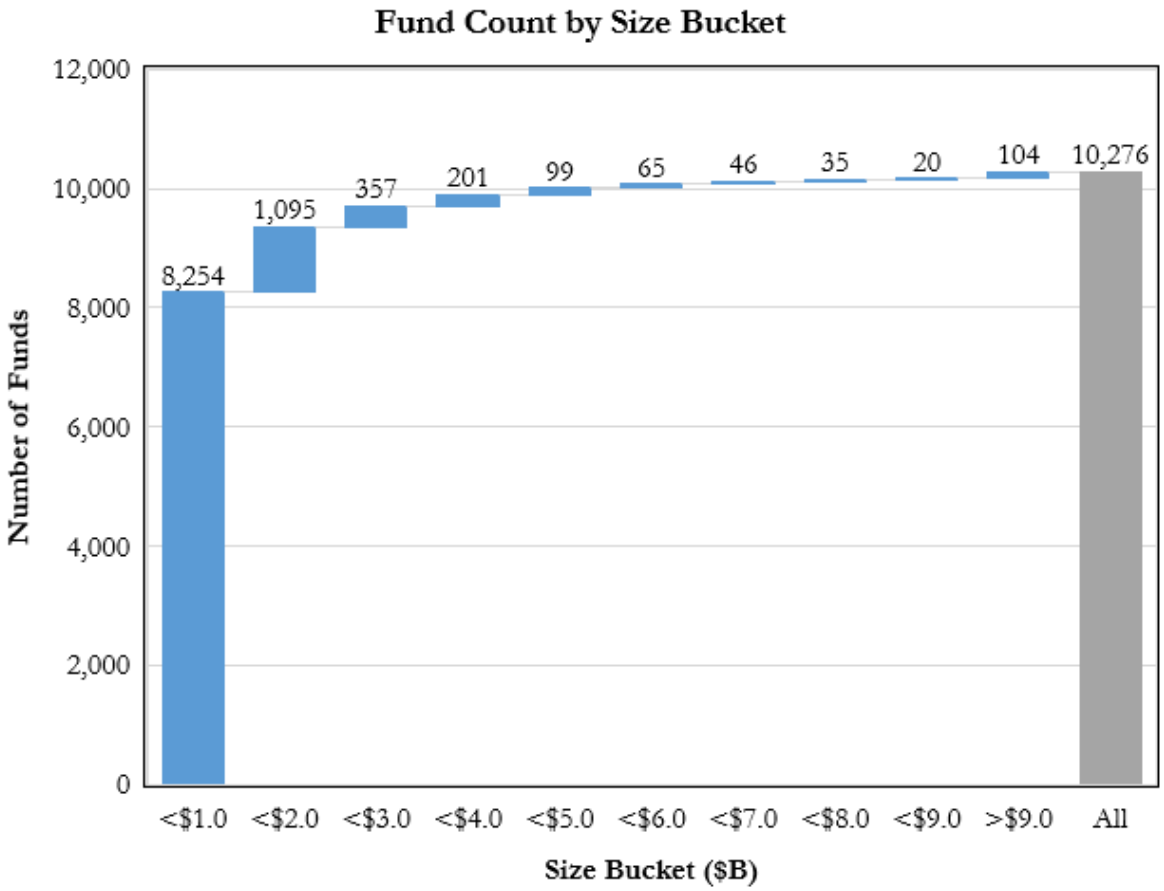

Figure 2. This figure presents a waterfall chart of the total count of funds that belong to a certain range of fund size. The sample includes all private capital funds that were active between 1994 and 2022. Funds are exclusively grouped by their respective amount of committed capital, or fund size. Fund size is measured is billions of U.S. dollars. Each blue bar represents the total count of funds within the specified range of fund size. The grey bar is the total count of funds. Data from MSCI-Burgiss Manager Universe.

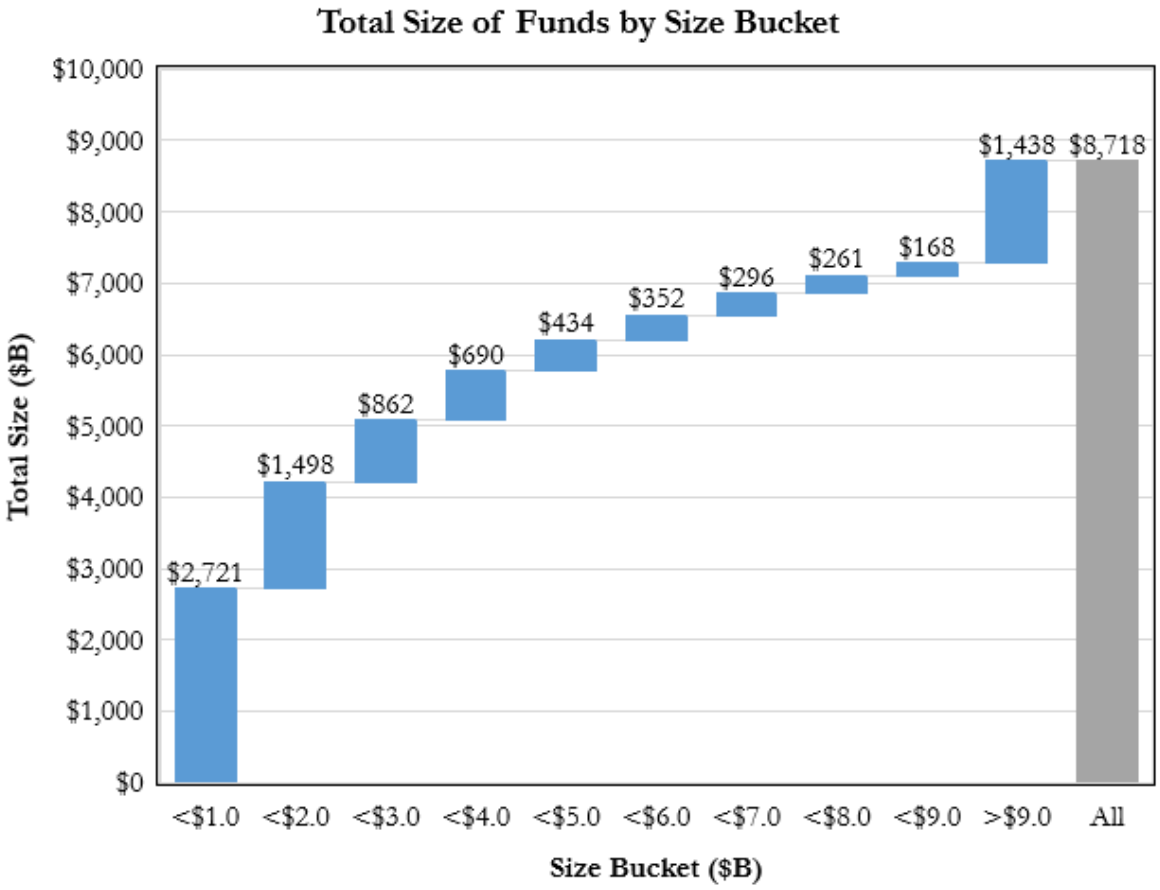

Figure 3. This figure presents a waterfall chart of the total combined size of funds that belong to a certain range of fund size. The sample includes all private capital funds that were active between 1994 and 2022. Funds are exclusively grouped by their respective amount of committed capital, or fund size. Fund size is measured is billions of U.S. dollars. Each blue bar represents the summation of committed capital for funds within the specified range of fund size. The grey bar is the summation of committed capital across all funds. Data from MSCI-Burgiss Manager Universe.

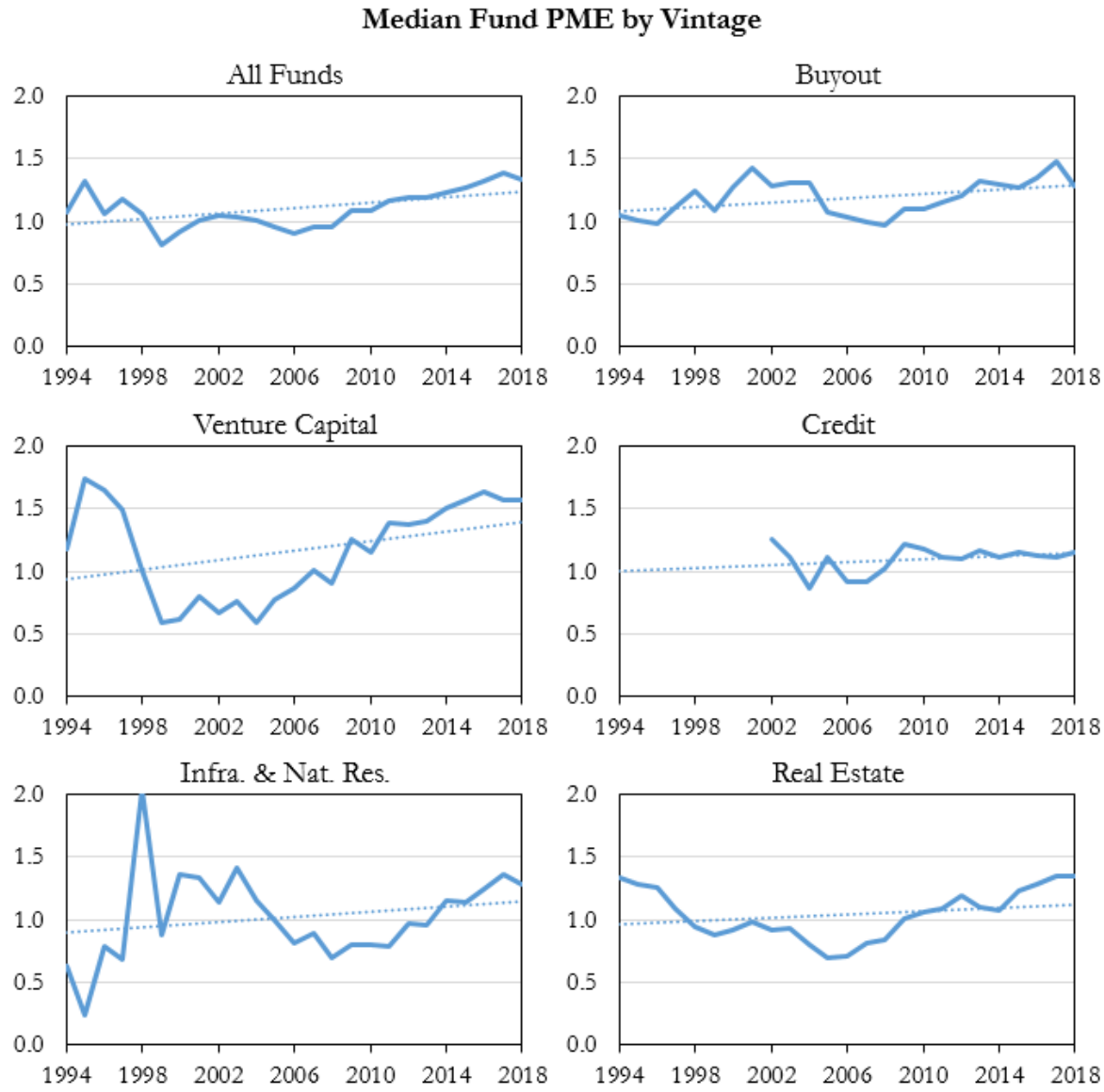

Figure 4. This figure presents a time series of fund performance by vintage. The measure of performance is the median PME, calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. The median PMEs for each vintage is portrayed as the blue solid line in each chart and is show for all funds (top left chart) and for each strategy classification, as described in Section II. The linear time trend is demonstrated by the dotted blue line. Data from MSCI-Burgiss Manager Universe.

PME and Pooled Strategy Size

Dependent variable =	Change in PME-to-date (Pooled)							
	All Assets				*Buyout*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Time Trend (Annual)	0.00			0.00	0.00			0.00
t-statistic	(0.21)			(0.48)	(0.49)			(0.13)
Prior year Pooled NAV ($B)		-0.00		-0.00		0.00		<0.01*
t-statistic		(0.68)		(1.42)		(1.05)		(1.80)
Prior year NAV / (MktCap + NAV)			-0.48	-0.58			-0.44	-8.03*
t-statistic			(0.88)	(1.01)			(0.13)	(1.68)
Geography fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered std. errors (GP)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	280	280	280	280	56	56	56	56
	Venture Capital				*Credit*			
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Time Trend (Annual)	0.00			0.04*	0.00			<0.01*
t-statistic	(0.01)			(1.97)	(0.47)			(1.87)
Prior year Pooled NAV ($B)		-0.00		0.00		-0.00		0.00
t-statistic		(0.76)		(1.08)		(1.52)		(0.90)
Prior year NAV / (MktCap + NAV)			-61.69	-302.94			-18.23*	-77.62*
t-statistic			(1.05)	(1.60)			(1.85)	(1.86)
Geography fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered std. errors (GP)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	56	56	56	56	56	56	56	56
	Infra. & Nat. Res.				*Real Estate*			
	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Time Trend (Annual)	0.00			0.00	0.00			0.00
t-statistic	(0.05)			(0.13)	(0.49)			(0.20)
Prior year Pooled NAV ($B)		0.00		0.00		-0.00		-0.00
t-statistic		(0.33)		(1.02)		(0.18)		(0.12)
Prior year NAV / (MktCap + NAV)			-0.40	-1.80			-2.46	-2.64
t-statistic			(0.54)	(1.35)			(1.38)	(1.19)
Geography fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered std. errors (GP)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	56	56	56	56	56	56	56	56

Table II. This table presents point estimates from regressions of strategy-level performance for private capital funds on strategy size characteristics across all assets, in columns (1)-(4), and within strategy classifications, in columns (5)-(24). The sample includes the private capital funds with vintages from 1994 to 2018, utilizing performance data through 2022:Q4. *Change in PME-to-date (Pooled)* is the dependent variable and is calculated as the change of between the end-of-year NAV-weighted average of fund Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II and Section III. The independent variables *Time Trend*, *Prior year Pooled NAV*, and *Prior year NAV /(MktCap + NAV)* are described in detail in Section III. All regressions include geography fixed effects. 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.

Average Fund Performance (PME) by Fund Size Quartile

Panel A: Fund Size Measured Across All Funds				
	Small Funds	3rd Size Quartile	2nd Size Quartile	Large Funds
Strategy				
Buyout	1.38	1.33	1.34	1.28
Venture Capital	1.87	1.69	1.58	1.50
Credit	1.32	1.31	1.13	1.14
Infra. & Nat. Res.	1.41	1.33	1.06	1.13
Real Estate	1.44	1.14	1.15	1.08
Total	1.53	1.41	1.34	1.29
Geography				
North America	1.65	1.35	1.28	1.21
Rest of World	1.64	1.49	1.34	1.30
Total	1.65	1.39	1.30	1.24
Panel B: Fund Size Relative to Funds in Same Vintage Year				
	Small Funds	3rd Size Quartile	2nd Size Quartile	Large Funds
Strategy				
Buyout	1.36	1.36	1.33	1.29
Venture Capital	1.78	1.64	1.61	1.61
Credit	1.32	1.30	1.12	1.15
Infra. & Nat. Res.	1.38	1.19	1.19	1.14
Real Estate	1.44	1.09	1.18	1.09
Total	1.50	1.38	1.36	1.33
Geography				
North America	1.57	1.41	1.30	1.20
Rest of World	1.62	1.51	1.32	1.31
Total	1.58	1.44	1.31	1.24

Table III. This table presents a comparison of fund performance between quartiles of fund size, defined as the total capital committed to a fund. The measure of performance is the median PME, calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. PMEs are presented for each quartile, arranged in order of fund size for funds in the lowest quartile of fund size ("Small Funds") to highest quartile of fund size ("Large Funds"). Panel A presents quartiles based across the full sample of funds. Panel B presents quartiles based with vintages. Average PME for each strategy and geography, as described in Section II, are shown in both panels. Data from MSCI-Burgiss Manager Universe.

Average Fund Performance (PME) by Fund Size Quartile, Expanded

Panel A: Fund Size Measured Across All Funds				
	Small Funds	3rd Size Quartile	2nd Size Quartile	Large Funds
Strategy x Geography				
Buyout				
North America	1.29	1.29	1.31	1.25
Rest of World	1.49	1.39	1.39	1.35
Venture Capital				
North America	1.91	1.66	1.41	1.37
Rest of World	1.65	1.92	2.06	1.92
Credit				
North America	1.37	1.33	1.12	1.14
Rest of World	1.37	1.21	1.01	1.16
Infra. & Nat. Res.				
North America	1.31	1.30	1.27	1.10
Rest of World	1.48	1.12	1.00	1.21
Real Estate				
North America	1.46	1.24	1.17	1.10
Rest of World	1.32	1.18	0.89	1.04
Panel B: Fund Size Relative to Funds in Same Vintage Year				
	Small Funds	3rd Size Quartile	2nd Size Quartile	Large Funds
Strategy x Geography				
Buyout				
North America	1.29	1.31	1.28	1.26
Rest of World	1.46	1.40	1.36	1.39
Venture Capital				
North America	1.77	1.48	1.54	1.55
Rest of World	1.95	1.77	2.02	1.79
Credit				
North America	1.36	1.30	1.14	1.14
Rest of World	1.35	1.09	1.08	1.18
Infra. & Nat. Res.				
North America	1.31	1.20	1.34	1.11
Rest of World	1.44	0.97	1.07	1.27
Real Estate				
North America	1.46	1.16	1.23	1.11
Rest of World	1.33	1.10	0.89	1.08

Table IV. This table presents a comparison of fund performance between quartiles of fund size, defined as the total capital committed to a fund. The measure of performance is the median PME, calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. PMEs are presented for each quartile, arranged in order of fund size for funds in the lowest quartile of fund size ("Small Funds") to highest quartile of fund size ("Large Funds"). Panel A presents quartiles based across the full sample of funds. Panel B presents quartiles based with vintages. Average PME for each combination of strategy and geography, as described in Section II, are shown in both panels. Data from MSCI-Burgiss Manager Universe.

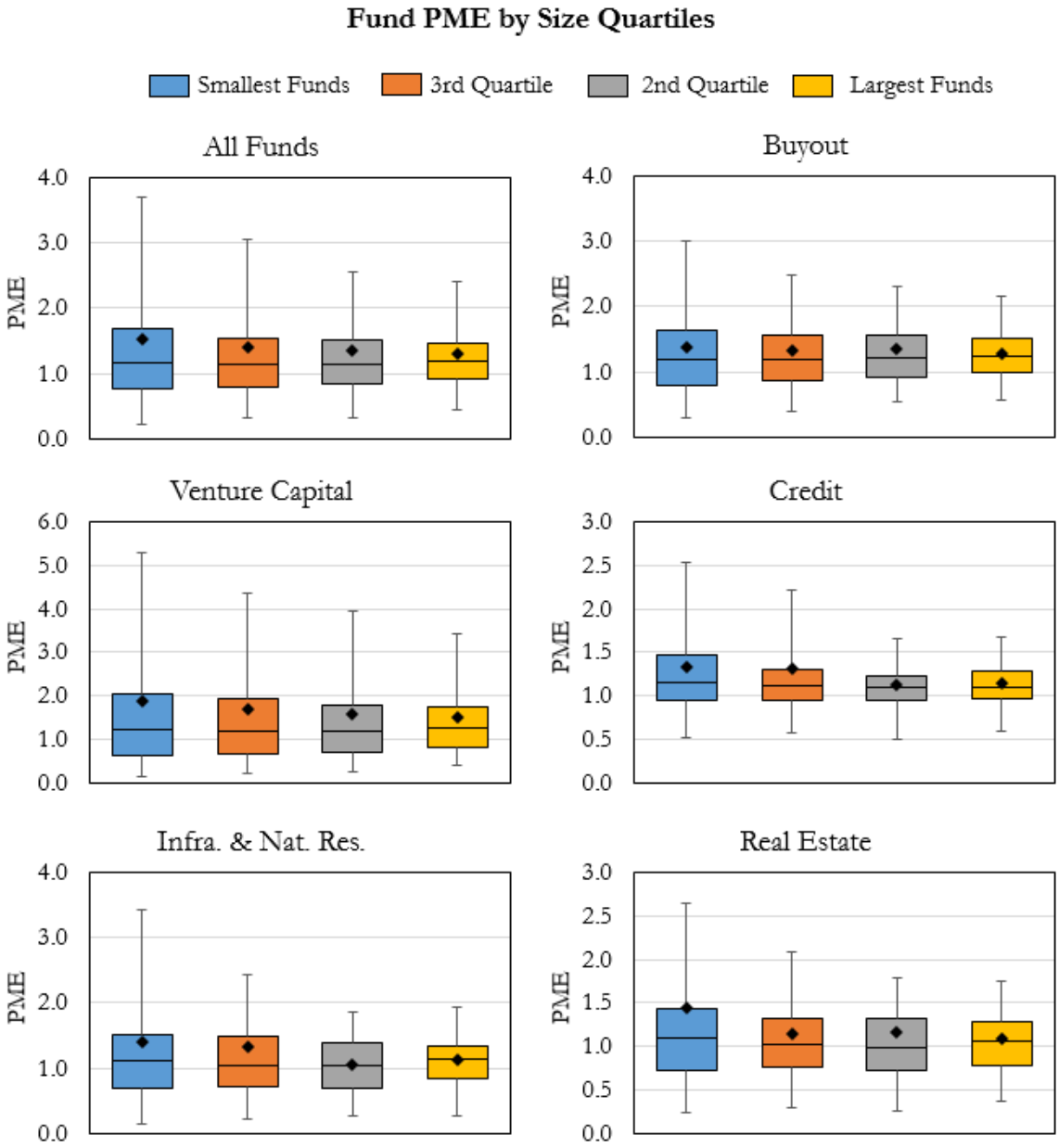

Figure 5. This figure presents box and whisker distribution plots of fund performance within quartiles of fund size, defined as the total capital committed to a fund. The measure of performance is the PME, calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. PMEs are presented for each quartile, arranged in order of fund size for funds in the lowest quartile of fund size, "Smallest Funds" in blue, to highest quartile of fund size, "Largest Funds" in yellow. Quartiles are based across the full sample of funds. The distribution of PMEs are shown for all funds (top left chart) and for each strategy classification, as described in Section II. The box and whiskers plots show 6 distributional values, ranging between the 5 percentile and the 95 percentile. The bottom of box is the 25 percentile, the middle line is the median (50 percentile), and the top of box is the 75 percentile. The diamond represents the mean value. Data from MSCI-Burgiss Manager Universe.

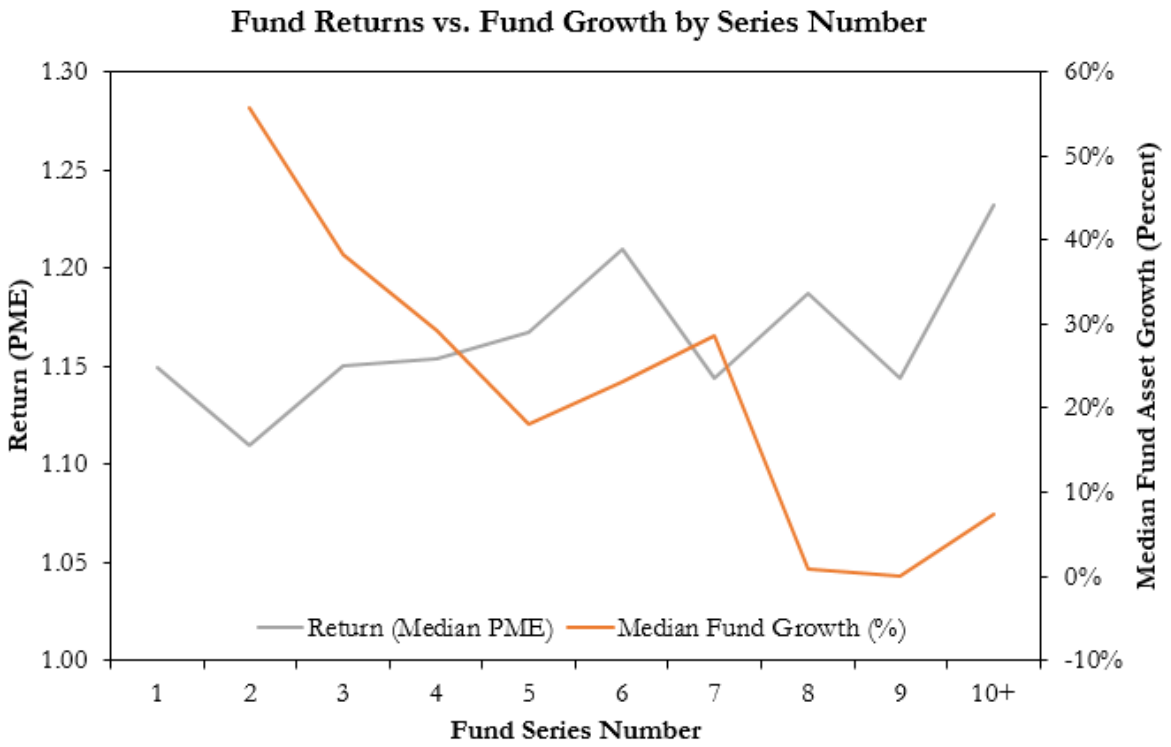

Figure 6. This figure presents a comparison between fund performance and fund size growth, across groupings by fund series number. Each fund is assigned a fund series number as the chronological order of inception dates of a GP's funds. Funds with a fund series equal to one are the first fund the GP has started. Funds with a series number 10 or higher are grouped into the "10+" category. The measure of performance is the median PME, calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. Fund growth is determined as the rate of increase between the size of the current fund over the size of the prior fund in the GP fund series. The PME for each grouping of fund series number is depicted with a grey line and corresponding values are found on the primary (left) y-axis. Median fund size growth for each grouping of fund series number is depicted with an orange line and corresponding values are found on the secondary (right) y-axis. Data from MSCI-Burgiss Manager Universe.

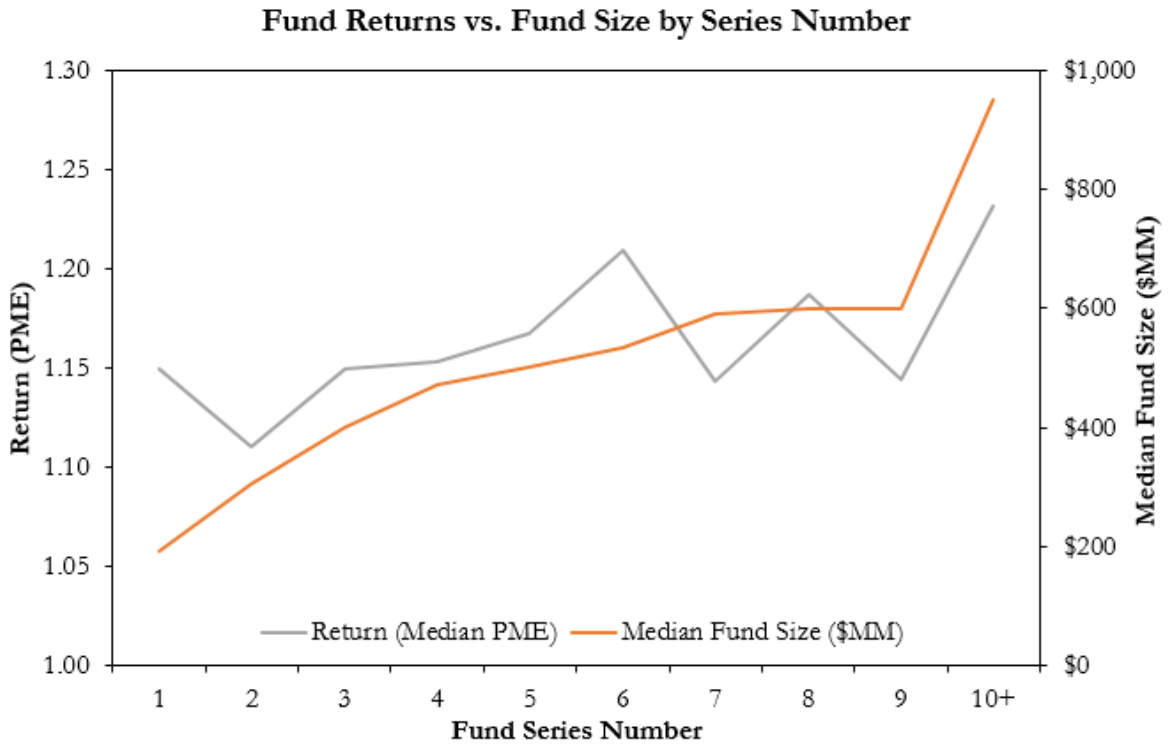

Figure 7. This figure presents a comparison between fund performance and fund size, across groupings by fund series number. Each fund is assigned a fund series number as the chronological order of inception dates of a GP's funds. Funds with a fund series equal to one are the first fund the GP has started. Funds with a series number 10 or higher are grouped into the "10+" category. The measure of performance is the median PME, calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. Median fund size is measured in millions of U.S. dollars. The PME for each grouping of fund series number is depicted with a grey line and corresponding values are found on the primary (left) y-axis. Median fund size for each grouping of fund series number is depicted with an orange line and corresponding values are found on the secondary (right) y-axis. Data from MSCI-Burgiss Manager Universe.

Average Fund Performance (PME) by Fund Series Growth Quartiles

Panel A: Fund Size Growth Measured Across All Funds

	Small Growth	3rd Growth Quartile	2nd Growth Quartile	Large Growth
Strategy				
Buyout	1.34	1.28	1.29	1.29
Venture Capital	1.58	1.67	1.93	1.31
Credit	1.17	1.17	1.12	1.23
Infra. & Nat. Res.	1.34	1.23	1.07	1.11
Real Estate	1.42	1.12	1.11	1.09
Total	1.40	1.35	1.41	1.24
Geography				
North America	1.34	1.36	1.37	1.23
Rest of World	1.47	1.42	1.48	1.34
Total	1.38	1.37	1.40	1.26

Panel B: Fund Size Growth Relative to Funds in Same Vintage Year

	Small Growth	3rd Growth Quartile	2nd Growth Quartile	Large Growth
Strategy				
Buyout	1.33	1.24	1.31	1.32
Venture Capital	1.67	1.73	1.50	1.59
Credit	1.16	1.15	1.15	1.23
Infra. & Nat. Res.	1.37	1.11	1.14	1.11
Real Estate	1.36	1.07	1.13	1.16
Total	1.41	1.34	1.31	1.35
Geography				
North America	1.39	1.32	1.33	1.25
Rest of World	1.43	1.47	1.42	1.39
Total	1.40	1.36	1.36	1.29

Table V. This table presents a comparison of fund performance between quartiles of fund growth, defined as the increased in fund size between the current fund and the prior fund in a GP's fund series. fund growth is described in more detail in Section IV. The measure of performance is the median PME, calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. PMEs are presented for each quartile, arranged in order of fund growth for funds in the lowest quartile of fund growth ("Small Growth") to the highest quartile of fund growth ("Large Growth"). Panel A presents quartiles based across the full sample of funds. Panel B presents quartiles based with vintages. Average PME for each strategy and geography, as described in Section II, are shown in both panels. Data from MSCI-Burgiss Manager Universe.

Average Fund Performance (PME) by GP Growth Quartiles

Panel A: GP Growth Measured Across All Funds

	Small Growth	3rd Growth Quartile	2nd Growth Quartile	Large Growth
Strategy				
Buyout	1.33	1.33	1.27	1.27
Venture Capital	1.80	1.79	1.47	1.43
Credit	1.15	1.19	1.18	1.17
Infra. & Nat. Res.	1.27	1.23	1.18	1.07
Real Estate	1.47	1.05	1.12	1.09
Total	1.46	1.40	1.29	1.26
Geography				
North America	1.39	1.42	1.28	1.20
Rest of World	1.51	1.42	1.34	1.44
Total	1.43	1.42	1.30	1.27

Panel B: GP Growth Relative to Funds in Same Vintage Year

	Small Growth	3rd Growth Quartile	2nd Growth Quartile	Large Growth
Strategy				
Buyout	1.33	1.31	1.22	1.33
Venture Capital	1.88	1.58	1.56	1.46
Credit	1.15	1.16	1.15	1.22
Infra. & Nat. Res.	1.26	1.25	1.15	1.09
Real Estate	1.40	1.05	1.19	1.07
Total	1.47	1.33	1.30	1.30
Geography				
North America	1.43	1.35	1.29	1.22
Rest of World	1.51	1.42	1.36	1.43
Total	1.45	1.37	1.31	1.28

Table VI. This table presents a comparison of fund performance between quartiles of GP growth, defined as the increased proportional change in a GP's cumulative AUM with the raising of the current fund. GP growth is described in more detail in Section IV. The measure of performance is the median PME, calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. PMEs are presented for each quartile, arranged in order of GP growth for funds in the lowest quartile of GP growth ("Small Growth") to the highest quartile of GP growth ("Large Growth"). Panel A presents quartiles based across the full sample of funds. Panel B presents quartiles based with vintages. Average PME for each strategy and geography, as described in Section II, are shown in both panels. Data from MSCI-Burgiss Manager Universe.

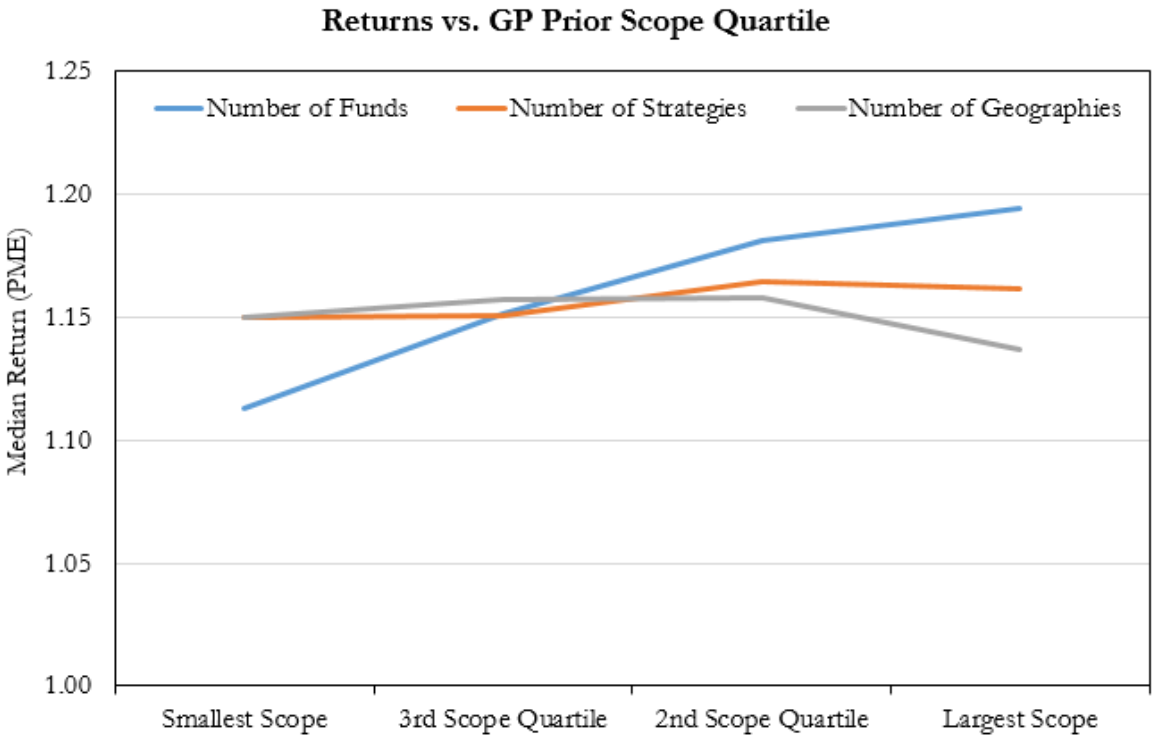

Figure 8. This figure presents a comparison between fund performance and three measures of prior GP scoping activities. Funds are grouped into quartiles for based on the number of funds a GP has started prior to the current fund inception date (blue line), the number of unique distinct strategies of those prior funds (orange line), and the number of unique distinct geographies of those prior funds (grey line). The measure of performance is the median PME, calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. The analysis variables are described in more detail in Section IV. The "Smallest Scope" bucket represents GPs that have engaged in the lowest amount of the respective prior scoping activity. The "Largest Scope" bucket represents GPs that have engaged in the highest amount of the respective prior scoping activity. Data from MSCI-Burgiss Manager Universe.

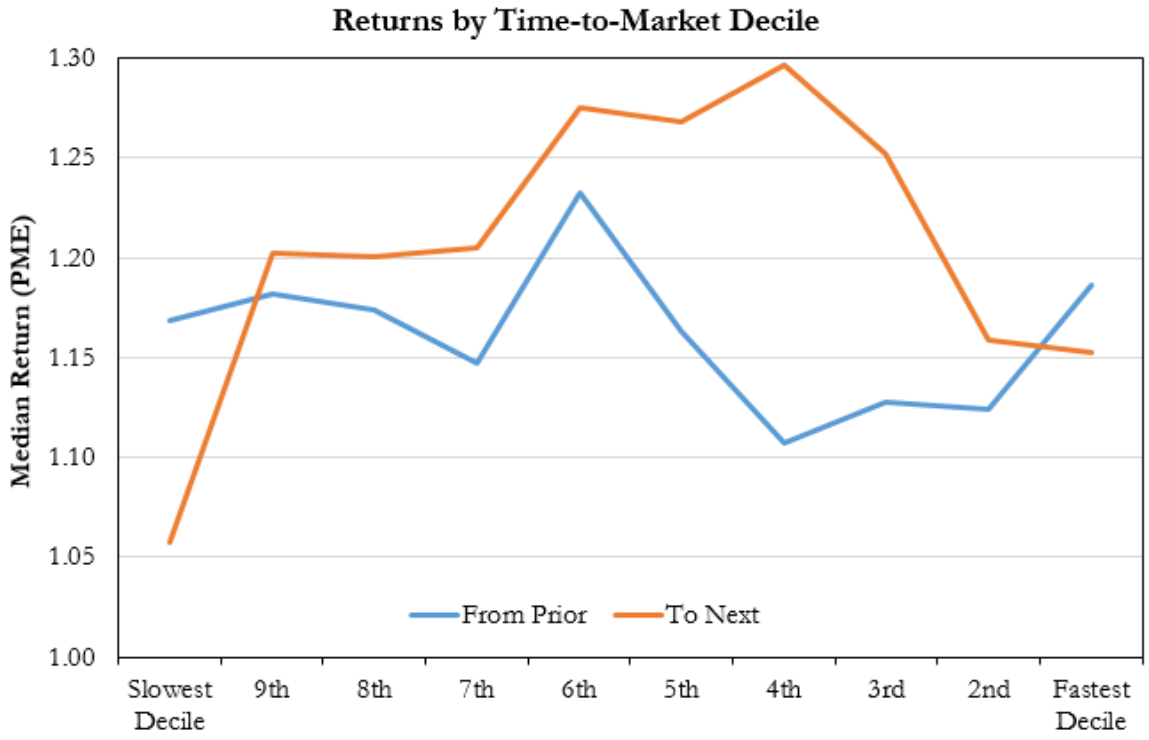

Figure 9. This figure presents a comparison between fund performance and the amount of time between funds. Funds are grouped into deciles of time-to-market, or the amount of days between the inception date of two funds in the sequence of a GP's fund series. The measure of performance is the median PME, calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. The analysis variables are described in more detail in Section IV. The "Slowest Decile" bucket represents the largest amount of days between funds and the "Fastest Decile" bucket represents the shortest amount of days between funds. The blue line depicts the median PME for deciles based on the amount of days between the current fund inception date and the prior fund inception date. The orange line depicts the median PME for deciles based on the amount of days between the current fund inception date and the next fund inception date. Data from MSCI-Burgiss Manager Universe.

Fund Size and Fund Size Rank within Vintage Year

Dependent variable =	PME (Relative to Strategy x Geography Benchmark)					
	All Assets		*Buyout*		*Venture Capital*	
	(1)	(2)	(3)	(4)	(5)	(6)
Fund Size ($B)	-0.04***		-0.01**		-0.14	
t-statistic	(5.08)		(2.23)		(1.28)	
Size Rank Percent		-0.46***		-0.14*		-0.32
t-statistic		(6.65)		(1.95)		(1.63)
Observations	7,408	7,408	2,718	2,718	2,235	2,235
	Credit		*Infra. & Nat. Res.*		*Real Estate*	
	(7)	(8)	(9)	(10)	(11)	(12)
Fund Size ($B)	-0.04*		-0.01		-0.03	
t-statistic	(1.74)		(0.39)		(1.12)	
Size Rank Percent		-0.40***		-0.36**		-0.51**
t-statistic		(3.31)		(2.21)		(2.16)
Observations	837	837	530	530	1,082	1,082
Vintage fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Geography fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered std. errors (GP)	Yes	Yes	Yes	Yes	Yes	Yes

Table VII. This table presents point estimates from regressions of fund performance on fund and GP characteristics across all funds, in columns (1)-(2), and within strategy classifications, in columns (3)-(12). The sample includes private capital funds with vintages from 1994 to 2018, utilizing performance data through 2022:Q4. *PME* is the dependent variable and is calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. *Fund Size* is measured in billions of U.S. dollars. *Size Rank Percent* is the ratio of a fund's size rank to the max rank, over the full sample period, described in more detail in Section IV. All regressions include fixed effects for vintage, geography, and industry. 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.

Fund Size and Growth, GP Scale and Scope (Across all Years)

Dependent variable =	PME (Relative to Strategy x Geography Benchmark)					
	All Assets	*Buyout*	*Venture Capital*	*Credit*	*Infra. & Nat. Res.*	*Real Estate*
	(1)	(2)	(3)	(4)	(5)	(6)
Fund Size ($B)	-0.03***	-0.01	-0.33**	-0.01	0.00	-0.03
t-statistic	(3.48)	(1.53)	(2.48)	(0.39)	(0.10)	(1.13)
Fund-to-Fund Growth Rate	-0.00	0.00	-0.00	0.00	-0.02	-0.01
t-statistic	(0.33)	(1.03)	(0.23)	(0.42)	(1.04)	(0.88)
GP Size Growth Rate	-0.01	-0.01	-0.04	0.00	0.02	-0.08**
t-statistic	(1.33)	(1.04)	(1.06)	(0.03)	(0.60)	(2.17)
GP Scope Rate - Active Funds	0.60**	0.95**	1.61***	0.01	-0.38	0.13
t-statistic	(2.52)	(2.01)	(3.95)	(0.03)	(0.93)	(0.55)
GP Scope Rate - Strategies	-0.02	0.01	-0.11	0.01	0.17	-0.01
t-statistic	(1.10)	(0.71)	(1.28)	(0.68)	(0.86)	(0.24)
GP Scope Rate - Geographies	-0.02	-0.02	-0.04	-0.01	-0.05	0.02
t-statistic	(1.09)	(1.21)	(0.50)	(0.56)	(0.67)	(0.38)
GP Speed-to-Market	0.09***	0.02**	0.24**	-0.02	0.04	-0.00
t-statistic	(6.49)	(2.70)	(6.94)	(0.80)	(0.92)	(0.14)
Vintage fixed effects	No	No	No	No	No	No
Strategy fixed effects	Yes	No	No	No	No	No
Geography fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered std. errors (GP)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,918	1,744	1,457	614	335	762

Table VIII. This table presents point estimates from regressions of fund performance on fund and GP characteristics across all funds, in column (1), and within strategy classifications, in columns (2)-(6). The sample includes private capital funds with vintages from 1994 to 2018, utilizing performance data through 2022:Q4. *PME* is the dependent variable and is calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. *Fund Size* is measured in billions of U.S. dollars. The independent variables *Fund-to-Fund Growth Rate*, *GP Size Growth Rate*, *GP Scope Rate - Active Funds*, *GP Scope Rate - Strategies*, *GP Scope Rate - Geographies*, and *GP Speed-to-Market* are described in Section IV. All regressions include fixed effects for geography and industry. Strategy 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.

Fund Size and Growth, GP Scale and Scope (within Vintage Year)

Dependent variable =	PME (Relative to Strategy x Geography Benchmark)					
	All Assets	*Buyout*	*Venture Capital*	*Credit*	*Infra. & Nat. Res.*	*Real Estate*
	(1)	(2)	(3)	(4)	(5)	(6)
Fund Size ($B)	-0.02***	-0.01	-0.12	-0.00	-0.01	-0.03
t-statistic	(2.55)	(1.21)	(1.22)	(0.18)	(0.41)	(1.09)
Fund-to-Fund Growth Rate	-0.00	0.00	-0.01	0.00	-0.01	-0.01
t-statistic	(0.25)	(1.04)	(0.82)	(0.41)	(0.62)	(1.13)
GP Size Growth Rate	-0.00	0.00	0.00	0.00	0.03	-0.02
t-statistic	(0.37)	(0.63)	(0.06)	(0.52)	(1.07)	(0.42)
GP Scope Rate - Active Funds	0.54**	0.85**	1.50***	0.00	-0.04	0.39
t-statistic	(2.26)	(2.01)	(3.55)	(0.01)	(0.10)	(1.37)
GP Scope Rate - Strategies	-0.03	0.01	-0.11	0.01	0.17	-0.05
t-statistic	(1.56)	(0.64)	(1.46)	(0.50)	(0.80)	(0.98)
GP Scope Rate - Geographies	-0.02	-0.03	-0.05	-0.01	-0.04	0.04
t-statistic	(1.21)	(1.25)	(0.70)	(0.65)	(0.44)	(0.95)
GP Speed-to-Market	0.09***	0.03**	0.23***	-0.02	0.03	0.03
t-statistic	(6.85)	(2.70)	(6.40)	(1.07)	(0.57)	(0.84)
Vintage fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Strategy fixed effects	Yes	No	No	No	No	No
Geography fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered std. errors (GP)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,918	1,744	1,457	614	333	762

Table IX. This table presents point estimates from regressions of fund performance on fund and GP characteristics across all funds, in column (1), and within strategy classifications, in columns (2)-(6). The sample includes private capital funds with vintages from 1994 to 2018, utilizing performance data through 2022:Q4. *PME* is the dependent variable and is calculated as the Kaplan-Schoar PME, determined using strategy x geography public market benchmarks where available, as described in Section II. *Fund Size* is measured in billions of U.S. dollars. The independent variables *Fund-to-Fund Growth Rate*, *GP Size Growth Rate*, *GP Scope Rate - Active Funds*, *GP Scope Rate - Strategies*, *GP Scope Rate - Geographies*, and *GP Speed-to-Market* are described in Section IV. All regressions include fixed effects for vintage, geography, and industry. Strategy 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.