What the London Stock Exchange Can Teach Us About Private Equity: A Closer Look *

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Abstract

Ennis and Rasmussen (2025a) analyze performance of private equity funds listed on the London Stock Exchange and find that listed private equity (LPE) "has underperformed the stock market in risk-adjusted terms" over the 17 year period since the global financial crisis (GFC). A newer version of their analysis (Ennis and Rasmussen, 2025b) finds similar results for a broader sample of European LPE over a 20-year horizon. We replicate the analysis in Ennis and Rasmussen (2025a) using best practices in academic empirical finance and document some meaningfully different results. Specifically, we find no statistically reliable evidence of risk-adjusted underperformance of LPE. We find that over the last 5, 10, 15, and 25 years, LPE has outperformed public markets on an unadjusted basis, sometimes by a substantial amount. We only observe substantial underperformance for starting years around the global financial crisis (when just two funds accounted for about 50% of the LPE value-weight index) and for the last three years of the sample period. We estimate CAPM βs that are rarely statistically different from 1.0 (and are close to those documented by another recent large-sample academic study). CAPM αs at various horizons are usually small (sometimes positive and sometimes negative) and none are statistically different from zero at conventional confidence levels. Factor regressions suggest that LPE has significant exposure to both the small stock factor (SMB) and value factor (HML). Correcting for these factor exposures sharpens estimates of α though most estimates remain statistically indistinguishable from zero. Finally, we document that adding a 10% allocation of LPE to a diversified portfolio of public stocks and bonds would have often increased (and never meaningfully decreased) the Sharpe Ratio of the portfolios over the last 10, 17 and 25 years. We offer our statistical code and dataset for others to examine.

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1 Introduction & Executive Summary

Despite many academic studies examining the historical performance of private equity funds, there is still debate about their risk-adjusted returns.[1] In a recent working paper, Ennis and Rasmussen (2025a) (henceforth, E&R.1) examine the historical performance of private equity funds listed on the London Stock Exchange (LSE) because these funds provide a potentially clearer lens for analyzing the historical returns of private equity. Specifically, the traditional toolbox developed for analyzing publicly-traded stocks can be applied to listed private equity (LPE) which eliminates the need for relying on low-frequency estimates of fund net asset values (NAVs) which are well-known to be stale, smoothed, and biased (see Brown et al. (2023) for a detailed analysis). We agree that this is an interesting laboratory for analyzing a long history of (potentially representative) buyout fund performance. We were surprised by the working paper's conclusion that LPE "has underperformed the stock market in risk-adjusted terms" which is at odds with findings with an up-to-date comprehensive analysis of risk-adjusted performance of private equity funds using a variety of models and methods that we recently conducted (Brown et al., 2025). Ennis and Rasmussen (2025b) have subsequently updated their analysis (henceforth, E&R.2) to use the Finominal Private Equity Index which includes additional (mostly smaller and de-listed) funds that trade(d) on other European exchanges. We plan to include the Finominal PE index in a future draft of this paper.

To better understand what listed private equity can tell us about historical risk-adjusted performance, we have replicated the analysis in E&R.1. We use the same funds and general methodology (e.g., market-cap weighted index of returns) to recreate their value-weighted index (LPE-VW), but we apply methods that are generally considered best practices in the academic literature (e.g., using monthly returns instead of annual returns). We also examine two related LPE indices. One is an equally-weighted index. We believe this is an important alternative to consider because for most of the time prior to 2010 more than 50% of the value of the LPE-VW index was comprised of just two funds, one of which was a primary fund (i.e., not a fund-of-funds). Consequently, the LPE-VW index was not very representative of the broader universe of private equity funds prior

[1] For example, see Gupta and Van Nieuwerburgh (2021), Boyer et al. (2023), Korteweg and Nagel (2024), and Brown et al. (2023) which are all peer-reviewed studies published in top academic journals. Also, Korteweg (2019) provides a comprehensive review of the academic literature on risk-adjusted performance of private funds.

to 2010. E&R.1 also exclude the 3i Fund in their analysis despite it being the largest LSE-traded investment trust with the majority of its assets in private equity buyout deals. Consequently, we create an equally-weighted index that includes 3i which we call LPE-EW+. Considering the equal-weight version of the index that includes the 3i fund is a conservative approach because it is such a large and well-performing fund that it dominates a value-weighted index.

Importantly, we document some substantially different results from E&R.1 regarding the historical performance of listed private equity:

- First, E&R.1 focus on the 17-year time period from July 2008 through June 2025. (E&R.2 extend their sample to 20 years). Nothing prevents examining other periods, so we report results for the trailing 25-year years (and other sub-periods and rolling windows). This is important because some of their results for long-run returns appear to be sensitive to the time frame which begins immediately prior to the global financial crisis. E&R.2 also examine more standard 5-, 10-, 15-, and 20-year historical periods.
- E&R.1 report that the LPE series has an annualized return that is 2.8% per year less than the MSCI-ACWI return over the last 17 years. We find that LPE-VW underperformed the MSCI-ACWI by a similar 2.9% over this period. However, we find that LPE-VW has outperformed the MSCI-ACWI by 0.7% and 2.2% per year for the trailing 25-year and 15-year periods, respectively. The LPE-EW and LPE-EW+ indices underperform the MSCI-ACWI index by only -1.3% and -0.5% over the last 17 years, respectively. Both EW indices outperfrom the MSCI-ACWI for the last 25- and 15-year horizons.
- E&R.1 use annual data to estimate a CAPM β for LPE of 1.7 for the trailing 17 years (but do not report confidence intervals). We use monthly data to estimate βs over multiple horizons including the trailing 17 years, and consistently find values not statistically different from 1.0 for our three LPE indices. Our estimates are more consistent with values near 1.0 generated from up-to-date data using multiple methods as reported in Brown et al. (2025). The authors claim that annual data leads to better estimates of β. We show that this is incorrect. However, we also document that the monthly LPE indices are significantly autocorrelated. We account for the autocorrelation and find higher "Dimson" βs which lead to point esti-

mates close to CAPM βs using annual returns averaged across different assumed year-end months.[2] Because of reasons we explain in detail below, we believe the estimates of CAPM βs using only contemporaneous returns are an approximate lower bound for the true β of the underlying PE portfolio assets and the Dimson βs are an approximate upper bound.

- We estimate α in a myriad of ways, including replicating the method in E&R.1, and never find values that are statistically different from zero at conventional levels of significance. That said, the authors report a CAPM α of -4.5% per year for LPE for the trailing 17 years, and we estimate similar αs (-6.1% to -4.0%) using the upper-bound Dimson betas. Using lower-bound βs, we estimate αs ranging from -1.2% to $+1.0\%$. The lower-bound βs generate estimates of α for 25-, 15-, 10-, and 5-year trailing periods that are always positive and in the range of 3.0% to 6.1%. Upper-bound βs imply αs ranging from -1.5% to 2.6% for 25-, 15-, 10-, and 5-year trailing periods.

- An analysis of LPE on Sharpe Ratios shows that the inclusion of 10% LPE into an otherwise fully diversified portfolio usually increases, and occasionally leaves essentially unchanged, the portfolio's Sharpe Ratio for horizons of the last 25-, 17-, and 15 years.[3]

- We collect data on the geographical composition of the investments in LPE and show that the assets in these funds more closely match the geographical composition of the MSCI-ACWI. E&R.1 note that "the correlation of the LPE series with US [Russell 3000] and non-US [MSCI-ACWI] stocks was essentially identical." In contrast, we find the R-squareds we estimate from CAPM-style market models with monthly data are always higher when using the MSCI-ACWI index as the market benchmark as compared to the Russell 3000.

- We agree with the E&R.1 assessment that the returns of LPE over the last three years have been below the returns of public benchmarks. However, we document that the CAPM βs of the LPE indices have declined over this period and that the CAPM α of the LPE indices straddle zero (ranging from -2.7% to $+2.2\%$ depending on the index and model).

[2] Or similarly, using monthly time series of overlapping trailing 12-month returns and correcting standard errors for serial correlation of the regression residuals.

[3] E&R.1 analyzes Sharpe Ratios of LPE, but E&R.2 drops this analysis.

2 Data

We use the same LPE funds as E&R.1, shown in Table A1. Currently listed funds have total return indices (i.e., including dividends) obtained from Bloomberg for July 2000 through June 2025. We obtain market capitalization data from LSEG Data & Analytics. Analysis is conducted in GBP to avoid currency conversion effects. For three delisted funds, price data are are taken from LSEG Data & Analytics. We confirmed with LSEG that the total return values they report are incorrect for delisted funds because they do not include dividends. We hand-collect data on dividends for delisted funds to generate correct total return series. This may be a source of differences between our finding and those reported in E&R.1. In two cases (NBPE and CTPE), market capitalization data did not go as far back as the indices, so we backfill market cap observations with the last known value.[4] We are in the process of analyzing the Finominal Private Equity index to verify returns of the constituent funds (given the concerns about data quality for delisted funds noted above) and we plan to include it in a subsequent draft.

Total annualized returns from July 2000 through June 2025 for each of the constituent funds are reported in Table A1, ranging from 15.5% for NBPE down to −9.0% for CDI (which has been delisted as of April 2018). Besides 3i with its dominant average market cap of 7.8 billion GBP, the largest average market cap of about 1 billion GBP is from HVPE, and the smallest is 172 million GBP from BCAP (which has been delisted as of June 2020).

We create a listed private equity value-weighted index (LPE-VW) in the same way as E&R.1 by weighting the total returns of each LPE by their respective market caps from the previous month (as is standard practice in empirical finance research). To get a better idea of which funds have the largest and longest influence over the LPE-VW series, we plot the market cap weight of each constituent over the July 2000 - June 2025 window as shown in Figure 1, excluding 3i. The figure reveals that from 2000 until 2008 just two funds, SVI and CDI, contribute 40-60% of the index weight (as noted above, both funds have since been delisted). Since 2009, weights have been steadier and more balanced.

[4] Alternatively, eliminating these funds from the analysis during the period that market capitalization data are unavailable has no effect on our conclusions.

Value-Weighted LPE Constituent Weights

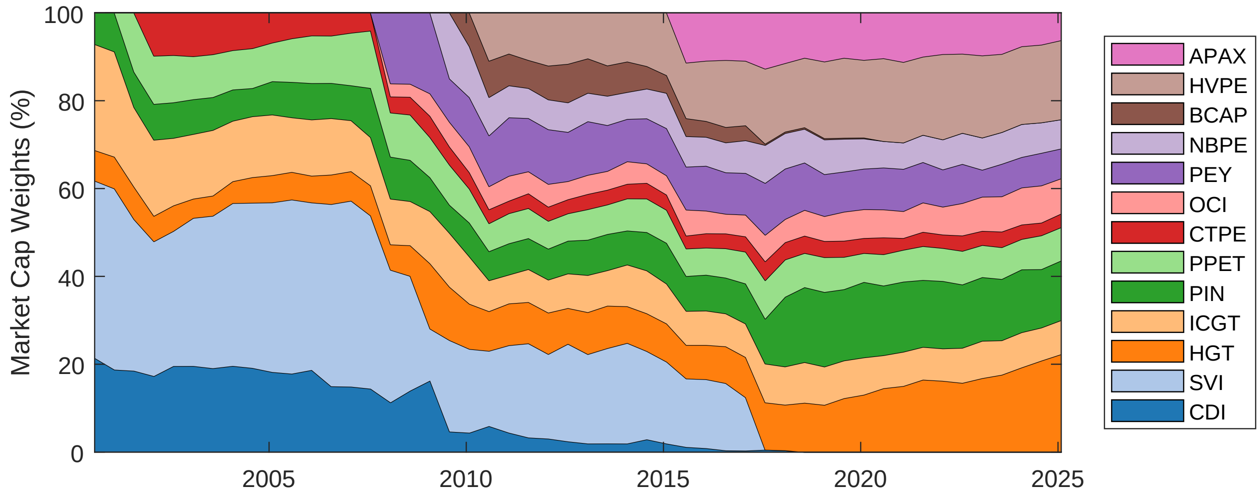

Figure 1: This figure shows market cap weights of constituent LPE funds from July 2000 through June 2025. To smooth the lines, only weights in January and July of each year are shown. 3i is excluded since it would otherwise dominate the figure, and we do not include 3i in our value-weighted index for the same reason.

Given the disproportionate weights of SVI and CDI until 2009, it is hard to argue that the LPE-VW index is representative of the broader universe of private equity funds until about 2010 – even more so since CDI was a primary fund, not a fund-of-funds. Given that most of the other funds in the index are fund-of-funds, an equal-weighted index provides a more representative characterization of the broader market of (unlisted) private equity funds, especially prior to 2010. Consequently, we also examine an equally-weighted index of listed private equity funds (LPE-EW). Finally, we note that the largest listed private equity fund, the 3i Fund, is excluded from the E&R.1 index, so we create another equally-weighted index that includes the 3i Fund (LPE-EW+). Considering the equal-weight version of the index with 3i fund is a conservative approach because it is such a large (and well-performing) fund that the fund dominates a value-weighted index.

Each of the LPE return series are benchmarked against the MSCI-ACWI total return GBP index (Bloomberg: MBWD).[5] The LPE indices and the MSCI-ACWI are plotted in Figure 2, normalized to a value of 100 in July 2000 and spanning through June 2025. The LPE index is usually above that ACWI index, the most notable exception being during Great Financial Crisis period.

[5]We have also conducted an analysis with the Russell 3000 index (Bloomberg: RU30INTR) measured in GBP as the benchmark though we show below that a U.S.-only benchmark is not appropriate total return. These results are available from the authors on request. The MSCI-ACWI GBP index only extends back to December 2000; we backfill the missing 5 months with returns from the MSCI ACWI World Index (Bloomberg: M2WD), denominated in GBP.

LPE AND BENCHMARK INDICES

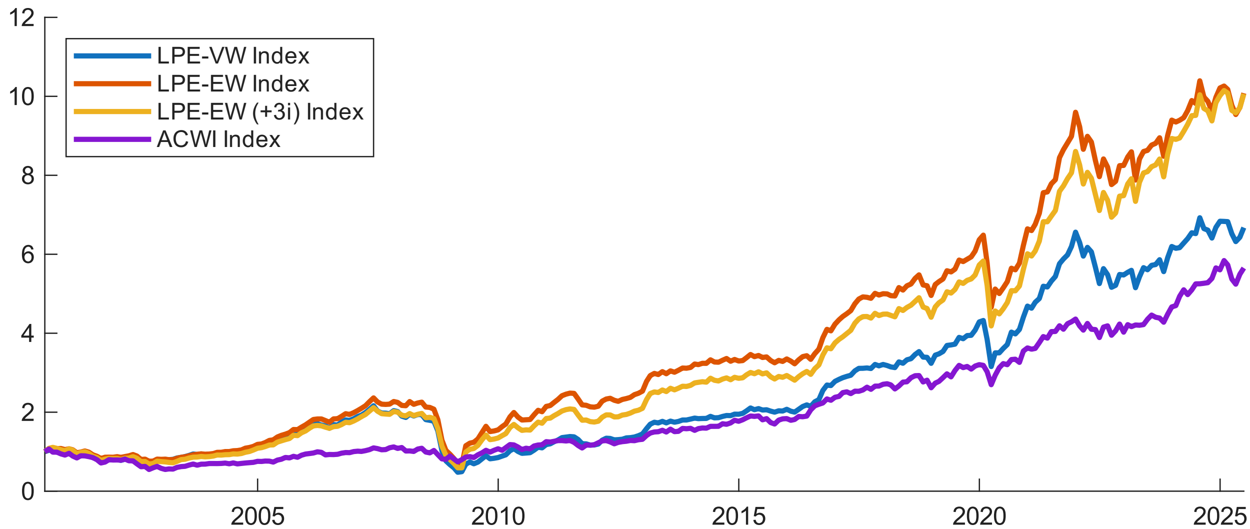

FIGURE 2: This figure shows the value-weighted LPE index, the value-weighted LPE index for currently listed funds, the equal-weighted LPE index, and the ACWI index normalized to a value of 100 in July 2000 and through June 2025.

We collect portfolio holdings data that show the ACWI is a reasonably good fit geographically to private equity in general over the last 25 years. According to MSCI-Burgiss data, active capitalization in U.S. private equity has been, on average, 63% of all private equity when looking at 2000:Q1 through 2025:Q1, compared to 54% for ACWI. More pertinent for this analysis, the most recent weight of the LPE index in North American investments is around mid-30% when either equally weighted or when accounting for both market cap and fund age, as shown in Table A1 (and 42-44% when excluding the delisted funds which have relatively poor documentation); the investment in the U.S. specifically is therefore somewhat lower still. Granted, these weights do vary over time, and we cannot account for those changes; the numbers used here were found in period-specific fact sheets made publicly available by the LPE managers.

In any case, the ACWI index is actually somewhat tilted ”against” LPE by having a higher concentration in U.S. equities which have had relatively good performance over the last 25 years realtive to non-U.S. equities. Using an index which is 100% U.S.-invested such as the Russell 3000 is entirely inappropriate.[6]

[6]E&R.1 included results with the Russell 3000 as a benchmark index. E&R.2 dropped the Russell 3000 results and switched from the MSCI-ACWI index to the MSCI World index. Using the MSCI World Index instead of the MSCI-ACWI has no effects on our general conclusions.

3 Statistical Analysis of Returns and Risk

3.1 LPE Index Returns Relative to the Public Benchmark

In this subsection we calculate the total annualized return and volatility of returns for the LPE indices as compared to the benchmarks. We do so over six different trailing horizons as a way of checking the robustness of the results relative to various starting points. All horizons end in June 2025. As starting points we use July 2000, July 2008, July 2010, July 2015, July 2020, and July 2022 which correspond to 25-, 17-, 15-, 10, 5-, and 3-year trailing returns. Observations are monthly for our main analysis, as is standard in the literature. (We next highlight the inadequacies of using annual observations as in both E&R.1 and E&R.2.)

The results are shown in Table 1. Panel A shows the full sample from July 2000 through June 2025. The LPE-VW return of 7.9% is above the ACWI return of 7.2%. The performance of both of the equal-weighted indices over this 25-year horizon is 9.7% which is 2.5% above the ACWI return. Panel B shows returns for the trailing 17-years examined by E&R.1 and finds similar results with the LPE-VW index underperforming the ACWI by -2.9%. The equally-weighted indices underperform the ACWI over this horizon, but less so than for the LPE-VW index. Panels C-E show performance for the trailing 15-, 10-, and 5 year horizons. All three LPE indices outperform the ACWI at all three horizons. Panel F shows returns for the trailing 3 years ending June 2025 and, consistent with findings of E&R.1, the LPE-VW index has substantially underperformed the ACWI over this period. The same is true of the LPE-EW index, but the LPE-EW index has just slightly underperformed the ACWI.

The results in Table 1 also show that the volatility of LPE is always higher than the volatility of the ACWI index. This is an expected result since LPE is substantially less diversified than the ACWI both in terms of geography and industry composition. The underlying portfolio companies in LPE funds are also typically small-mid capitalization which are known to have higher volatility than large-capitalization stocks. That said the differences in volatility are typically in the range of just 1-2% starting in 2010. Regardless, the differences in risk indicate a need for a more careful analysis of risk and specifically, risk-adjusted returns.

TABLE 1: RETURN PROFILES OF LPE INDICES AND THE ACWI BENCHMARK

PANEL A: DATA FROM JULY 2000 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+31)	
	Return	**Volatility**	**Return**	**Volatility**	**Return**	**Volatility**
LPE	7.9%	18.6%	9.7%	21.2%	9.7%	20.8%
ACWI	7.2%	13.9%	7.2%	13.9%	7.2%	13.9%
Difference	0.7%	4.6%	2.5%	7.2%	2.5%	6.9%

PANEL B: DATA FROM JULY 2008 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+31)	
	Return	**Volatility**	**Return**	**Volatility**	**Return**	**Volatility**
LPE	8.1%	20.8%	9.7%	24.6%	10.5%	23.8%
ACWI	11.0%	13.2%	11.0%	13.2%	11.0%	13.2%
Difference	-2.9%	7.6%	-1.3%	11.4%	-0.5%	10.6%

PANEL C: DATA FROM JULY 2010 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+31)	
	Return	**Volatility**	**Return**	**Volatility**	**Return**	**Volatility**
LPE	13.8%	12.9%	12.2%	12.4%	13.3%	12.6%
ACWI	11.7%	11.3%	11.7%	11.3%	11.7%	11.3%
Difference	2.2%	1.6%	0.5%	1.1%	1.7%	1.3%

PANEL D: DATA FROM JULY 2015 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+31)	
	Return	**Volatility**	**Return**	**Volatility**	**Return**	**Volatility**
LPE	12.6%	13.9%	11.6%	13.7%	13.0%	13.8%
ACWI	12.0%	11.8%	12.0%	11.8%	12.0%	11.8%
Difference	0.6%	2.1%	-0.4%	1.9%	1.0%	2.0%

PANEL E: DATA FROM JULY 2020 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+31)	
	Return	**Volatility**	**Return**	**Volatility**	**Return**	**Volatility**
LPE	12.7%	13.7%	13.9%	13.2%	16.4%	13.3%
ACWI	12.2%	11.2%	12.2%	11.2%	12.2%	11.2%
Difference	0.4%	2.5%	1.7%	1.9%	4.1%	2.1%

PANEL F: DATA FROM JULY 2022 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+31)	
	Return	**Volatility**	**Return**	**Volatility**	**Return**	**Volatility**
LPE	6.0%	12.1%	6.4%	11.9%	10.3%	12.1%
ACWI	11.1%	10.7%	11.1%	10.7%	11.1%	10.7%
Difference	-5.1%	1.4%	-4.7%	1.1%	-0.9%	1.3%

3.2 Risk-adjusted Returns

E&R.1 and E&R.2 conduct an analysis of risk-adjusted returns using annual returns with annual returns calculated as of the end of June each year. We believe their analysis is flawed. We explain here our reasoning and present what we consider to be an analysis more consistent with best-practices in empirical finance.

Fundamental to our concern is that the data in E&R.1 (E&R.2) from July 2008 (2005) through June 2025 only yield 17 (20) samples when observations are annual. Such a small sample size leads to wide confidence intervals for estimates of CAPM βs (which E&R do not report). Likewise, such a limited number of observations results in large sensitivities with respect to minor changes, for example, whether annual observations are defined by June endpoints or May endpoints. Monthly (or even more frequent) observations are the preferred frequency in academic empirical analysis. Of course, monthly observations generate sample sizes 12 times larger than annual observations and *ex ante* one would therefore expect analysis on monthly returns to exhibit less sensitivity to minor changes in timing.

In a rebuttal to our criticism of E&R's use of annual returns, the authors state that "Shortening the differencing interval compresses volatility and makes legitimate correlation vanish. The joint effect is to reduce beta and increase alpha, which occurs in your analysis." and also cite a result from Perplexity that "monthly differencing can also introduce more 'noise,' making it harder to detect long-term trends". There is a large literature on estimation of factor models that establishes best-practices for dealing with long-horizon correlations and estimation challenges related to microstructure noise generating autocorrelated returns. Rather than review this literature, we provide a brief set of tests that definitively show that the E&R use of annual returns ending in June leads them to erroneously over-estimate β relative to a more standard analysis using monthly data.

The simplest and most compelling criticism of E&R's use of annual data is that their results depend crucially on the month they choose for measuring annual returns. We document the sensitivities of annual versus monthly observations by using different endpoint months ranging a full year from July 2024 through June 2025, thereby creating 12 different sub-intervals over which to analyze risk. Specifically, we conduct the annual analysis using 17 year-long observations with different year-end months and compare this to monthly analysis consisting of $17 \times 12 = 204$ observations using the same start date and end dates as those in the respective annual analysis. We calculate CAPM βs using the ACWI index as the benchmark.[7]

The results for estimates of CAPM β, α, and R-squared using annual data (first column) and monthly data (second column) are shown in Figure 3. The first column shows sensitivity of annual observations: βs range from 1.07 (September year-end) to 2.23 (June year-end). Thus, E&R's estimate of a large CAPM β for LPE is highly dependent on their choice of June as the year-end month. If they had chosen September as the year-end month, they would report an LPE β near 1.0 (consistent with the bulk of the recent literature). To reiterate, this extreme variation results from merely shifting the window of analysis by one month intervals. There is, of course, no reason why analysis using a June 2025 endpoint should be preferred to using a September 2024 endpoint. The two results are both statistically weak due to the methodology. Using annual observations does not robustly capture long-run trends: a genuine long-run pattern would remain robust to small shifts in the analysis window. When results vary this dramatically with small changes, they are the result of instability in the estimates due to small sample sizes. This fact is captured by the enormous 95% confidence intervals of Figure 3. Intuitively, the confidence interval for the E&R estimates of LPE β effectively extend from the lower bound for the lowest estimate, which is 0.3 for September year-end to over 3.0 for February year-end, thus making E&R's point estimates for β almost meaningless.

Annual data lead to similarly unreliable estimates of αs which again depend critically on the assumed year-ending month. The estimated αs range from -11.90% to -1.38% with p-values from 0.02 to 0.72. Indeed, the average confidence interval for α is 18.6 percentage points wide. Likewise, the highest confidence interval endpoint in the window for α is 7.5% and the lowest -22.9%, a range of 30.4 percentage points! R-squareds using annual data also vary wildly based on assumed year-end month.

This methodological weakness is easily rectified by using monthly observations. As shown in the second column of Figure 3, monthly analysis is less sensitive: αs range from -1.30% to -0.42%

[7] The results are nearly identical if we use 20 annual observations from 2005-2025 as in E&R.2.

with p-values ranging from 0.80 to 0.94, βs range from 0.96 to 0.99 and R-squareds ranging from 0.39 to 0.40. Confidence intervals with monthly observations are 90% tighter for α (92% when using the full sample) and 56% tighter for β (66% when using the full sample) than those from annual observations. Or to put it differently: annual observations yield β estimates that are almost 33x more sensitive than those given by monthly observations (as a ratio of standard deviations), and 8.5x for α.

Note that the higher R-squareds when using annual observations do not present a valid case for choosing annual observations; one should instead examine standard errors to properly account for uncertainty, and the extremely large confidence intervals shown for annual observations in Figure 3 illustrate the meaninglessness of high R-squared when using annual data.[8]

While use of annual data is clearly unwarranted, there is a legitimate concern about whether a CAPM estimation for β and α using only contemporaneous factors is appropriate. For example, if returns are autocorrelated because of illiquidity (e.g., "microstructure noise") or some other market imperfection, then this needs to be accounted for in the analysis using monthly data. In fact, an analysis of LPE index autocorrelation reveals significant autocorrelation for one-month lags. This surprising result suggests that the market for LPE shares is highly inefficient and does not even satisfy the condition for weak-form efficiency in the sense of Fama (1970).

We account for the autocorrelation in the LPE indices in two separate ways, that, reassuringly result in similar estimates for LPE index βs. First, we estimate so-called "Dimson βs" following the method described in Dimson (1979) which includes lags of the market returns in the estimation and sums the coefficients on the contemporaneous and lagged terms to provide an estimate of market β. When we do this over the full 25-year period from 2000-2025, we obtain estimates of β of 1.20, 1.21, and 1.26 for the LPE-VW, LPE-EW, and LPE-EW+ indices, respectively. The 95% confidence intervals for these estimates are similar – about 0.8 to 1.6.

Our second method for addressing autocorrelated LPE index returns is to estimate CAPM regressions with (overlapping) trailing 12-month returns (for both the LPE index and ACWI bench-

[8]This logic can be illustrated by taking it to its extreme. Imagine dividing the 17-year sample into two 8.5-year long observations. A regression on these two points would generate an R-squared of 1, as one can achieve a perfect line of fit through only two points. With only two points, however, the uncertainty is unbounded: standard errors are literally infinite.

Annual to Monthly Estimate Sensitivity Comparisons

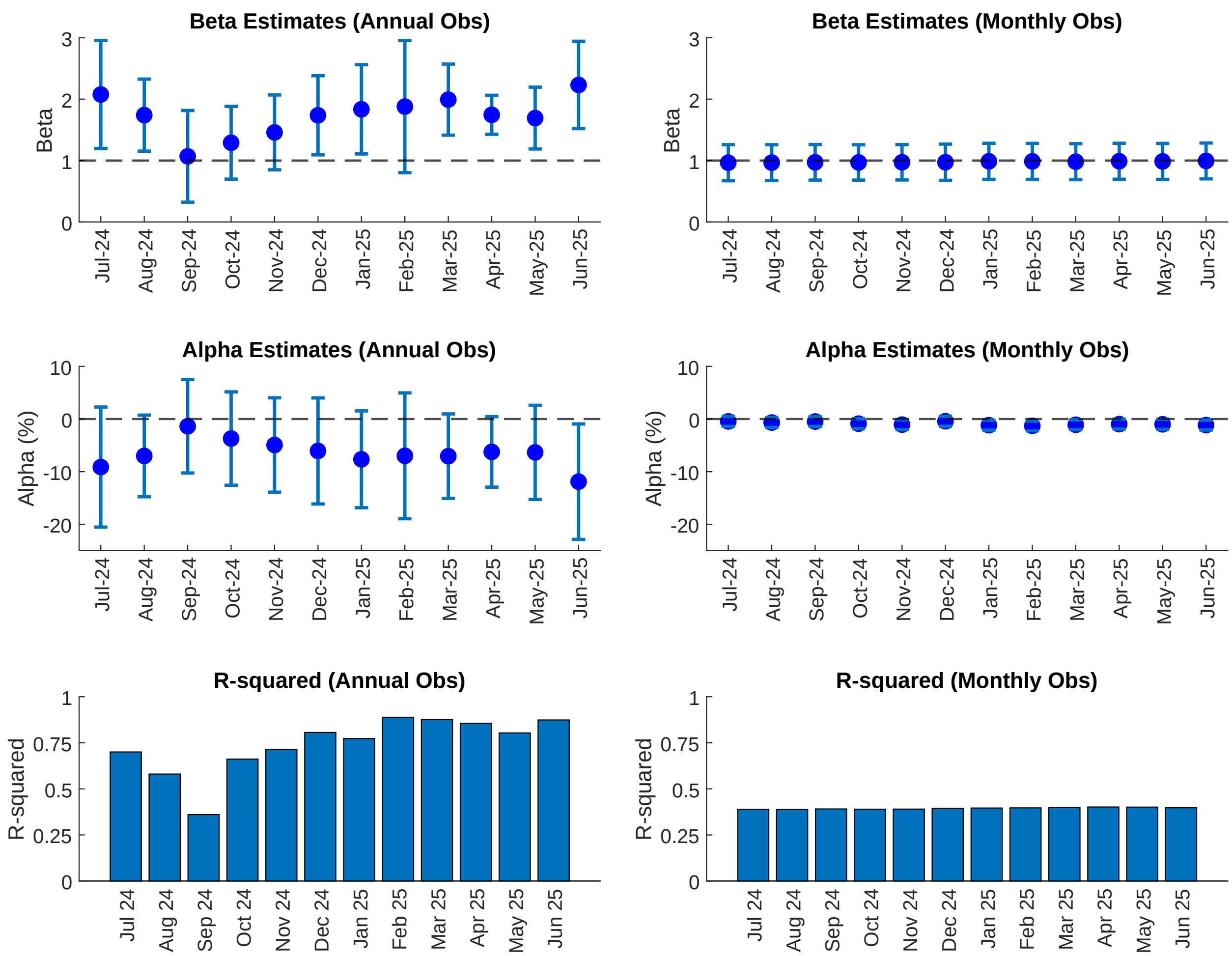

FIGURE 3: This figure shows estimated αs (Alpha), βs (Beta), and R-squareds from a 1-factor CAPM model of LPE-VW on MSCI-ACWI, using monthly and annual data, over 12 different subintervals defined by different monthly endpoints. Each annual subinterval consists of 17 years of data, and each monthly subinterval consists of 204 month-long observations.

mark) and adjust for the serial correlation in residuals using Newey-West HAC-corrected standard errors with 12 lags. In contrast to the method using annual returns in E&R, this results in robust estimates of the CAPM β correcting for any "noise" or correlated returns up to the annual frequency and smaller standard errors. This method results in estimates of βs of 1.29, 1.35, and 1.41 for the LPE-VW, LPE-EW, and LPE-EW+ indices, respectively, over the 2000-2025 sample period. We note the similarity of the point estimates of these values to those obtained from the Dimson method. The 95% confidence intervals for these estimates are also similar, running from about 0.8 to 1.8.

The inefficiency of the LPE market is surprising and generates an immediate concern about how much one can learn about the underlying portfolio of private equity investments from observing market prices. One important consideration, not unique to LPE, is time-variation in the discount or premium to NAV of traded closed-end investment trusts. This is a well-studied phenomenon for closed-end funds (CEFs) that hold liquid assets (e.g., stocks and bonds with observable traded prices). CEF discounts vary pro-cyclically with market returns (i.e., discounts widen when the market declines) and thus have the effect of increasing the market β of the CEF relative to the underlying portfolio.[9] The LPE indices are likely subject to the same pro-cyclical variation in CEF discounts and thus the β estimates from the Dimson (or overlapping annual) regressions represent an approximate upper bound for the βs of the underlying portfolios.[10] Of course the estimates using only contemporaneous returns, will suffer from a similar upward bias that will counter some of the downward bias from ignoring the LPE index autocorrelation.

Given these challenges to inferring the true β of underlying portfolios of private equity investments, we suggest the following. Estimates of βs derived from the contemporaneous (only) returns represent something close to a lower bound on underlying PE βs and thus an upper bound on αs. In contrast, the Dimson estimates from the LPE indices represent something close to an upper bound on underlying PE βs and thus a lower bound on αs. In this way we can "bookend" the analysis of risk and risk-adjusted return for the underlying PE portfolios of LPE funds.

[9]See, for example, the long-run plot of discounts for LSE-traded closed-end investment trusts in https://www.theaic.co.uk/aic/news/press-releases/longest-period-of-double-digit-discounts-for-30-years-presents-investors.

[10]We don't deny that the variation in CEF discounts poses a real risk for investors in LPE. We are instead making the point that CEF discount is not a risk factor for other investors in PE that make primary investments directly to funds or funds-of-funds and therefore LPE has higher systematic risk than unlisted PE.

Using the June 2025 endpoint, we report the estimates from a 1-factor CAPM model. The results are shown in Table 2. Panel A shows the full sample from July 2000 through June 2025, which yield a β of 0.81 against the value-weighted LPE index, 0.79 against the equal-weighted LPE index, and 0.86 against the equal-weighted index that also includes 3i. With Dimson adjustments, these βs become 1.20, 1.21, and 1.26 respectively, none of which are statistically difference from 1.0. These results are generally in line with the estimates of Brown et al. (2025) for global buyout funds. Alphas are all positive with or without Dimson β, ranging from 0.3% to 4.8% annually, although none of them are statistically different from zero.[11]

The other panels show similar results for the most part, although the shorter series yield even less confident estimates of α due to smaller sample sizes. We focus now on Panel B which ranges from July 2008 through June 2025 and matches the analysis period of E&R.1. (Tables 3 and 4 report results for 20-year trailing returns studied in E&R.2.) We estimate lower-bound LPE βs of about 1.0 for each LPE index. Upper-bound LPE βs range from 1.54 to 1.59. Estimated αs range from -6.1% to $+1.0\%$ though none are statistically different from zero. Given the variation in results depending on index and method, there is no evidence of reliable risk-adjusted underperformance, even in this particularly unflattering interval that begins just before the global financial crisis. Panel C-E show results for trailing 15-, 10-, and 5-year periods. Estimated βs range from 0.71 to 1.13 and none are statistically greater than 1.0. Estimated αs range from -1.5% to 6.1% and none are statistically different from 0.0. Overall the results in Table 2 indicate that there is no statistically reliable evidence that LPE has performed better or worse than the broader market of listed equities on a risk-adjusted basis.

We finish this section with two conclusions. First, using annual observations in this CAPM framework generates unreliable estimates of risk and therefore risk-adjusted returns. The instability renders any meaningful conclusion impossible. This is not a flaw that can be overcome by adding more funds, or by appealing to coincidental similarities to other papers: it can only be overcome by using more frequent data (along with needed econometric adjustments). Second, utilizing monthly observations, LPE β has been roughly 1.0 and α close to zero.

[11] In results not tabulated, we estimate similar values for the Russel 3000. We find that the R-squared of the CAPM-style regressions is always lower when using the Russell 3000 as the market proxy, thus ACWI represents a better statistical fit for LPE than does the Russell 3000. This contrasts with the statement by E&R that "the correlation of the LPE series with US [Russell 3000] and non-US [MSCI-ACWI] stocks was essentially identical."

TABLE 2: RISK PROFILES OF LPE

PANEL A: DATA FROM JULY 2000 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+3I)	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
Beta-Contemp	0.807	0.062	0.789	0.098	0.860	0.226
Alpha-Contemp	2.7%	0.510	4.8%	0.235	4.3%	0.273
R-squared	0.369		0.270		0.333	
Beta-Dimson	1.204	0.284	1.209	0.398	1.256	0.251
Alpha-Dimson	0.3%	0.937	2.1%	0.578	1.7%	0.644
R-squared	0.367		0.268		0.331	

PANEL B: DATA FROM JULY 2008 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+3I)	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
Beta-Contemp	0.994	0.968	0.991	0.959	1.019	0.911
Alpha-Contemp	-1.2%	0.816	0.6%	0.898	1.0%	0.844
R-squared	0.398		0.283		0.321	
Beta-Dimson	1.542	0.037	1.585	0.100	1.573	0.082
Alpha-Dimson	-6.1%	0.260	-4.7%	0.283	-4.0%	0.369
R-squared	0.395		0.279		0.317	

PANEL C: DATA FROM JULY 2010 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+3I)	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
Beta-Contemp	0.765	0.028	0.713	0.011	0.772	0.032
Alpha-Contemp	4.7%	0.117	3.7%	0.230	4.1%	0.168
R-squared	0.448		0.420		0.475	
Beta-Dimson	1.001	0.993	0.925	0.584	0.974	0.846
Alpha-Dimson	2.0%	0.457	1.4%	0.640	2.0%	0.499
R-squared	0.445		0.417		0.473	

PANEL D: DATA FROM JULY 2015 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+3I)	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
Beta-Contemp	0.782	0.118	0.752	0.088	0.791	0.132
Alpha-Contemp	3.1%	0.418	2.4%	0.540	3.3%	0.398
R-squared	0.435		0.418		0.457	
Beta-Dimson	0.975	0.881	0.935	0.731	0.968	0.864
Alpha-Dimson	0.8%	0.817	0.4%	0.909	1.4%	0.711
R-squared	0.430		0.413		0.452	

PANEL E: DATA FROM JULY 2020 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+3I)	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
Beta-Contemp	0.765	0.038	0.725	0.006	0.781	0.029
Alpha-Contemp	3.0%	0.524	4.4%	0.318	6.1%	0.161
R-squared	0.387		0.376		0.430	
Beta-Dimson	1.132	0.411	1.077	0.647	1.099	0.570
Alpha-Dimson	-1.5%	0.721	0.5%	0.895	2.6%	0.525
R-squared	0.376		0.365		0.420	

PANEL F: DATA FROM JULY 2022 – JUNE 2025

	VALUE-WEIGHTED LPE		EQUAL-WEIGHTED LPE		EQUAL-WEIGHTED LPE (+3I)	
	Estimate	**p-value**	**Estimate**	**p-value**	**Estimate**	**p-value**
Beta-Contemp	0.531	0.003	0.510	0.001	0.580	0.006
Alpha-Contemp	-1.5%	0.753	-1.0%	0.827	2.2%	0.654
R-squared	0.219		0.212		0.264	
Beta-Dimson	0.922	0.601	0.824	0.274	0.840	0.352
Alpha-Dimson	-2.7%	0.541	-1.9%	0.669	1.8%	0.697
R-squared	0.196		0.188		0.242	

p-values calculated using HAC-robust standard errors.

3.3 Sub-period and Factor Model Analysis

Since the results can vary so much depending on the dates chosen to define the window and the model specification, we also take a close look at various 5-, 10-, 15, and 20-year sub-periods. To that end, we measure a series of αs and βs using 5-year windows over the full interval. The results are reported in Tables 3 and 4 and show that the large negative return differences and α estimates are limited to the 5 years from 2005-2010 that includes the financial crisis. During this sub-period the results are substantially worse for the LPE-VW index that has over 50% of its weight in just CDI and SVI. The more balanced EW indices have return differences and αs that are mostly positive (though still never statistically different from zero).

TABLE 3: LPE VERSUS ACWI, 5-YEAR WINDOW INCREMENTS

LPE Value-Weighted

Start/End	2005	2010	2015	2020	2025
2000					
Δ	10.6%	-1.0%	0.9%	0.6%	0.7%
α	7.8%	0.7%	2.7%	2.5%	2.7%
β	0.54	0.83	0.82	0.81	0.81
R^2	0.47	0.33	0.35	0.37	0.37
2005					
Δ		-11.6%	-3.8%	-2.7%	-1.7%
α		-8.0%	-1.8%	-0.8%	0.1%
β		1.14	1.04	0.97	0.93
R^2		0.37	0.37	0.38	0.38
2010					
Δ			5.7%	2.6%	2.2%
α			8.4%	5.2%	4.7%
β			0.72	0.77	0.77
R^2			0.50	0.49	0.45
2015					
Δ				-0.1%	0.6%
α				2.5%	3.1%
β				0.80	0.78
R^2				0.49	0.44
2020					
Δ					0.4%
α					3.0%
β					0.77
R^2					0.39

LPE Equal-Weighted

Start/End	2005	2010	2015	2020	2025
2000					
Δ	11.5%	5.6%	4.5%	2.5%	2.5%
α	8.2%	8.0%	6.6%	4.7%	4.8%
β	0.49	0.85	0.81	0.80	0.79
R^2	0.49	0.24	0.24	0.26	0.27
2005					
Δ		0.2%	1.1%	-0.4%	0.3%
α		5.1%	3.4%	1.7%	2.4%
β		1.22	1.05	0.97	0.93
R^2		0.26	0.25	0.27	0.28
2010					
Δ			2.7%	-0.5%	0.5%
α			6.8%	2.9%	3.7%
β			0.61	0.71	0.71
R^2			0.45	0.45	0.42
2015					
Δ				-3.4%	-0.4%
α				-0.3%	2.4%
β				0.78	0.75
R^2				0.47	0.42
2020					
Δ					1.7%
α					4.4%
β					0.72
R^2					0.38

LPE Equal-Weighted including 3i

Start/End	2005	2010	2015	2020	2025
2000					
Δ	9.3%	3.9%	3.5%	1.9%	2.5%
α	7.2%	6.2%	5.3%	3.7%	4.3%
β	0.66	0.93	0.89	0.87	0.86
R^2	0.63	0.30	0.31	0.33	0.33
2005					
Δ		-1.0%	0.8%	-0.5%	0.8%
α		3.5%	2.7%	1.3%	2.6%
β		1.20	1.07	1.00	0.96
R^2		0.28	0.29	0.31	0.31
2010					
Δ			3.2%	0.0%	1.7%
α			6.1%	2.7%	4.1%
β			0.72	0.77	0.77
R^2			0.55	0.51	0.48
2015					
Δ				-3.0%	1.0%
α				-0.3%	3.3%
β				0.81	0.79
R^2				0.50	0.46
2020					
Δ					4.1%
α					6.1%
β					0.78
R^2					0.43

Δ denotes LPE annualized return above ACWI annualized return; α, β, and R^2 denote the annualized alpha, beta, and R-squared of a CAPM model of the LPE index against ACWI. Start dates are in July and end dates are in June.

TABLE 4: LPE VERSUS ACWI, 5-YEAR WINDOW INCREMENTS, DIMSON-ADJUSTED

LPE Value-Weighted

Start/End	2005	2010	2015	2020	2025
2000					
Δ	10.6%	-1.0%	0.9%	0.6%	0.7%
α	9.6%	0.8%	0.9%	0.5%	0.3%
β	0.78	1.33	1.30	1.21	1.20
R^2	0.53	0.44	0.46	0.45	0.45
2005					
Δ		-11.6%	-3.8%	-2.7%	-1.7%
α		-12.1%	-7.4%	-5.2%	-4.3%
β		1.91	1.71	1.47	1.42
R^2		0.53	0.53	0.48	0.48
2010					
Δ			5.7%	2.6%	2.2%
α			3.4%	3.1%	2.0%
β			1.09	0.94	1.00
R^2			0.60	0.51	0.48
2015					
Δ				-0.1%	0.6%
α				1.3%	0.8%
β				0.86	0.98
R^2				0.47	0.45
2020					
Δ					0.4%
α					-1.5%
β					1.13
R^2					0.43

LPE Equal-Weighted

Start/End	2005	2010	2015	2020	2025
2000					
Δ	11.5%	5.6%	4.5%	2.5%	2.5%
α	9.2%	7.9%	4.5%	2.4%	2.1%
β	0.71	1.42	1.32	1.22	1.21
R^2	0.57	0.33	0.34	0.33	0.34
2005					
Δ		0.2%	1.1%	-0.4%	0.3%
α		0.2%	-2.9%	-3.1%	-2.4%
β		2.10	1.79	1.52	1.45
R^2		0.39	0.37	0.35	0.36
2010					
Δ			2.7%	-0.5%	0.5%
α			2.8%	1.1%	1.4%
β			0.91	0.86	0.92
R^2			0.53	0.46	0.45
2015					
Δ				-3.4%	-0.4%
α				-1.3%	0.4%
β				0.84	0.94
R^2				0.44	0.42
2020					
Δ					1.7%
α					0.5%
β					1.08
R^2					0.41

LPE Equal-Weighted including 3i

Start/End	2005	2010	2015	2020	2025
2000					
Δ	9.3%	3.9%	3.5%	1.9%	2.5%
α	7.9%	5.9%	3.2%	1.4%	1.7%
β	0.88	1.45	1.37	1.27	1.26
R^2	0.69	0.38	0.39	0.39	0.40
2005					
Δ		-1.0%	0.8%	-0.5%	0.8%
α		-1.0%	-3.0%	-3.2%	-1.9%
β		2.02	1.75	1.51	1.45
R^2		0.40	0.40	0.38	0.39
2010					
Δ			3.2%	0.0%	1.7%
α			2.5%	1.0%	2.0%
β			1.00	0.92	0.97
R^2			0.61	0.52	0.50
2015					
Δ				-3.0%	1.0%
α				-1.3%	1.4%
β				0.88	0.97
R^2				0.47	0.46
2020					
Δ					4.1%
α					2.6%
β					1.10
R^2					0.46

Δ denotes LPE annualized return above ACWI annualized return; α, β, and R^2 denote the annualized alpha, beta, and R-squared of a CAPM model of the LPE index against ACWI. Start dates are in July and end dates are in June.

Rolling regressions reveal similar patterns, as shown in Figure 4. Focusing on the years 2007-2011 illustrates the enormous impact the Great Financial Crisis had on LPEs, with αs dropping as far as -12% and βs jumping up to 1.28. In our view, it is no more sensible to select the worst performing era of LPE and claim underperformance as it would be to pick the best performing era (with the 15.8% α in October 2004, or the 0.36 β of March 2016). The rolling window mean α is 3.2% (2.7% with Dimson adjustment) with a median of 5.4% (2.3% with Dimson adjustment), and the mean β is 0.82 (1.18 with Dimson adjustment) with a median of 0.84 (1.06 with Dimson adjustment).

We also estimate a Fama-French 3-factor regression with developed-market factors from Ken French's website. We estimate models for the full sample period and all 5-year subperiods, both without and with Dimson adjustments.[12] Results are presented in Tables 5 and 6.

[12] We adjust the market factor for Dimson lags. We do not find significant lags for other factors, and so only include contemporaneous factor returns.

CENTERED 5-YEAR ROLLING WINDOW FOR ALPHA AND BETA

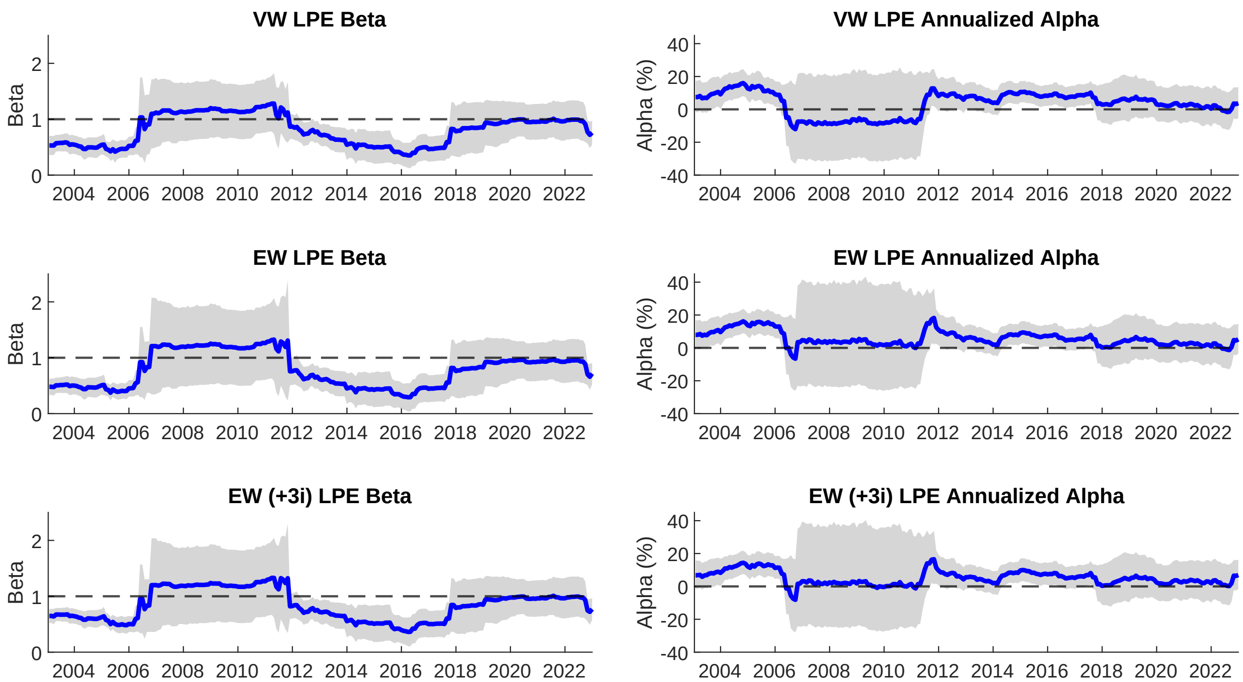

FIGURE 4: This figure shows estimated αs (Alpha), βs (Beta) using centered 5-year rolling windows for the LPE-VW index, the LPE-EW index, and LPE-EW(+3i) index, all benchmarked against ACWI.

CENTERED 5-YEAR ROLLING WINDOW FOR ALPHA AND BETA, DIMSON-ADJUSTED

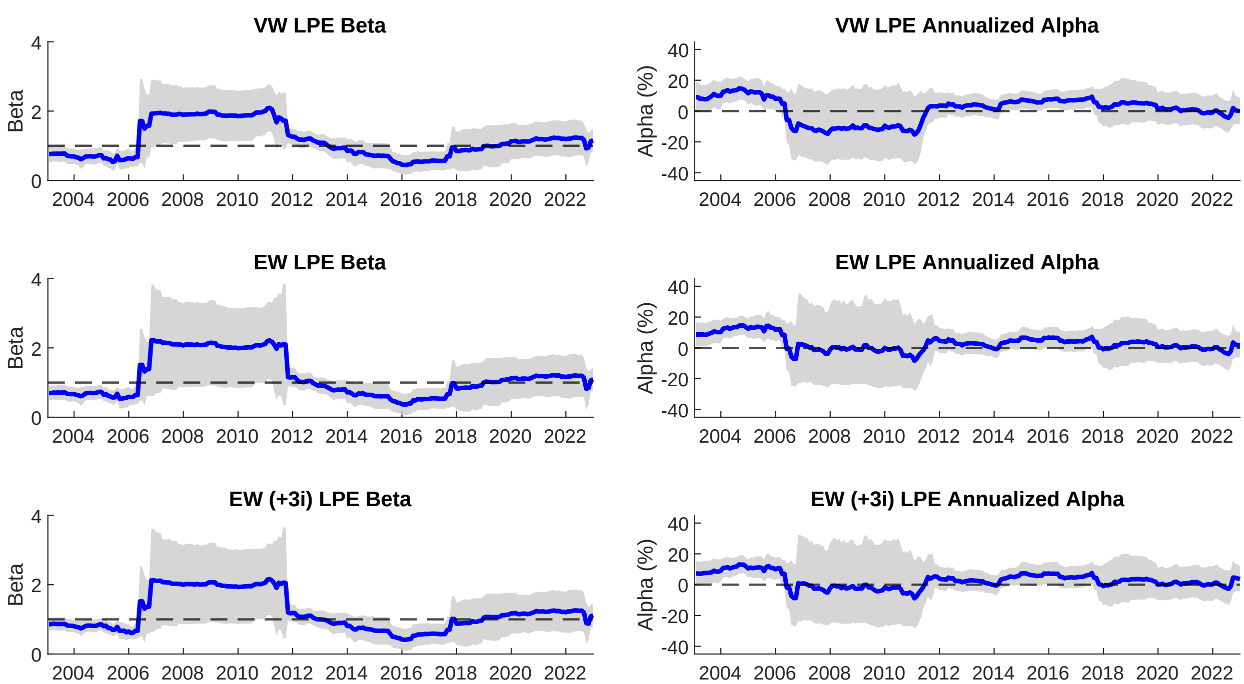

FIGURE 5: This figure shows estimated αs (Alpha), βs (Beta) using centered 5-year rolling windows for the LPE-VW index, the LPE-EW index, and LPE-EW(+3i) index, all benchmarked against ACWI.

TABLE 5: FACTOR REGRESSIONS FOR LPE INDEXES ON ACWI

Value-Weighted LPE Index						Equal-Weighted LPE Index						Equal-Weighted (+3i) LPE Index					
Date	**Alpha**	**Mkt-RF**	**SMB**	**HML**	**Adj. R^2**	**Date**	**Alpha**	**Mkt-RF**	**SMB**	**HML**	**Adj. R^2**	**Date**	**Alpha**	**Mkt-RF**	**SMB**	**HML**	**Adj. R^2**
2000	1.6%	0.845	0.603	0.321	0.422	2000	3.3%	0.837	0.705	0.413	0.331	2000	3.1%	0.900	0.669	0.343	0.383
2025	(0.691)	(0.108)	(0.000)	(0.007)		2025	(0.368)	(0.197)	(0.000)	(0.006)		2025	(0.389)	(0.393)	(0.000)	(0.014)	
2000	5.3%	0.543	0.402	0.020	0.489	2000	4.4%	0.512	0.429	0.078	0.536	2000	4.8%	0.651	0.473	-0.008	0.669
2005	(0.284)	(0.000)	(0.013)	(0.886)		2005	(0.341)	(0.000)	(0.001)	(0.507)		2005	(0.281)	(0.000)	(0.000)	(0.931)	
2005	-10.5%	0.923	1.146	1.745	0.452	2005	1.3%	0.941	1.766	2.169	0.355	2005	0.0%	0.947	1.605	2.016	0.368
2010	(0.426)	(0.774)	(0.056)	(0.003)		2010	(0.930)	(0.841)	(0.054)	(0.022)		2010	(1.000)	(0.860)	(0.057)	(0.019)	
2010	8.4%	0.740	0.412	-0.011	0.506	2010	7.0%	0.626	0.418	0.109	0.462	2010	6.3%	0.734	0.420	0.124	0.565
2015	(0.028)	(0.004)	(0.120)	(0.955)		2015	(0.045)	(0.000)	(0.088)	(0.584)		2015	(0.056)	(0.007)	(0.084)	(0.487)	
2015	8.2%	0.729	0.847	0.422	0.598	2015	5.4%	0.719	0.706	0.483	0.572	2015	5.4%	0.751	0.660	0.490	0.598
2020	(0.024)	(0.069)	(0.003)	(0.003)		2020	(0.132)	(0.088)	(0.010)	(0.007)		2020	(0.134)	(0.111)	(0.012)	(0.006)	
2020	5.4%	0.806	0.623	0.076	0.442	2020	6.3%	0.782	0.604	0.124	0.439	2020	8.3%	0.825	0.588	0.085	0.484
2025	(0.267)	(0.068)	(0.002)	(0.512)		2025	(0.163)	(0.028)	(0.002)	(0.280)		2025	(0.051)	(0.060)	(0.001)	(0.407)	

Beta for Mkt-RF tested against a null of 1, p-values in parentheses. Starting months are July and ending months are June.

TABLE 6: FACTOR REGRESSIONS FOR LPE INDEXES ON ACWI WITH DIMSON ADJUSTMENT

Value-Weighted LPE Index						Equal-Weighted LPE Index						Equal-Weighted (+3i) LPE Index					
Date	**Alpha**	**Mkt-RF**	**SMB**	**HML**	**Adj. R^2**	**Date**	**Alpha**	**Mkt-RF**	**SMB**	**HML**	**Adj. R^2**	**Date**	**Alpha**	**Mkt-RF**	**SMB**	**HML**	**Adj. R^2**
2000	-0.3%	1.179	0.388	0.278	0.480	2000	1.1%	1.180	0.483	0.369	0.376	2000	1.0%	1.226	0.457	0.303	0.425
2025	(0.936)	(0.343)	(0.006)	(0.009)		2025	(0.751)	(0.450)	(0.000)	(0.005)		2025	(0.780)	(0.298)	(0.001)	(0.015)	
2000	9.2%	0.727	0.204	-0.050	0.531	2000	7.1%	0.670	0.251	0.019	0.580	2000	7.1%	0.806	0.296	-0.066	0.703
2005	(0.090)	(0.035)	(0.386)	(0.723)		2005	(0.131)	(0.009)	(0.154)	(0.871)		2005	(0.119)	(0.062)	(0.077)	(0.494)	
2005	-13.0%	1.679	0.186	1.231	0.557	2005	-1.1%	1.714	0.788	1.654	0.418	2005	-2.2%	1.669	0.692	1.536	0.429
2010	(0.282)	(0.109)	(0.768)	(0.012)		2010	(0.934)	(0.146)	(0.286)	(0.027)		2010	(0.871)	(0.155)	(0.329)	(0.026)	
2010	3.5%	1.097	0.360	-0.037	0.612	2010	3.1%	0.912	0.376	0.086	0.543	2010	2.8%	0.999	0.379	0.097	0.625
2015	(0.279)	(0.378)	(0.110)	(0.845)		2015	(0.338)	(0.378)	(0.086)	(0.654)		2015	(0.369)	(0.991)	(0.083)	(0.578)	
2015	9.1%	0.660	0.888	0.432	0.591	2015	6.5%	0.657	0.753	0.496	0.561	2015	6.3%	0.707	0.701	0.502	0.586
2020	(0.031)	(0.079)	(0.003)	(0.006)		2020	(0.125)	(0.121)	(0.009)	(0.012)		2020	(0.133)	(0.170)	(0.011)	(0.010)	
2020	0.9%	1.133	0.525	0.076	0.479	2020	2.5%	1.087	0.530	0.116	0.470	2020	5.0%	1.100	0.524	0.076	0.505
2025	(0.829)	(0.421)	(0.004)	(0.509)		2025	(0.511)	(0.621)	(0.003)	(0.310)		2025	(0.194)	(0.555)	(0.003)	(0.463)	

Beta for Mkt-RF is the sum of a contemporaneous Mkt-RF beta plus one Mkt-RF lag, tested against a null of 1, p-values in parentheses. Starting months are July and ending months are June.

For the full sample, we find statistically significant and positive loadings on both the small stock factor (SMB) and the value factor (HML). Typically there are small effects on estimated βs and αs. However, the adjusted R-squareds generally increase, especially in periods with substantial market declines, such as the 2005-2010 period that includes the GFC; and the 2015-2020 period that includes the COVID-19 meltdown. Furthermore, including the FF factors reduces the market β markedly during the GFC period while the SMB and HML factor loadings jump to very high levels. This suggests that a good fraction of what the 1-factor CAMP-style regressions measure as market risk can be attributed to small stock and value stock risk factors.[13] Taken together the evidence in Tables 5 and 6 indicates that the CAPM is not a sufficient model for capturing the risks of LPE. Finally, we note that the increased power of the FF estimations results in some estimates of α that are positive and statistically different from zero (and none that are statistically less than zero).

3.4 Sharpe Ratios

To properly consider the impact of LPE on portfolio risk and return we construct portfolios that mix ACWI returns, LPE returns, and global bond returns in various proportions and examine the portfolio Sharpe Ratios.[14] Our global bond series is the Bloomberg Global-Aggregate Total Return Index (Bloomberg: LEGATRUU). The weight in bonds is always 40%, but the weight in ACWI and LPE varies respectively to consider investments that have 0%, 5%, 10%, and 20% in LPE. The annualized total return, volatility, and Sharpe Ratio of these four portfolios are shown in Table 7, with three different starting dates of July 2000, July 2008, and July 2015 to capture the effects from 25-, 17-, and 10-year trailing periods.

[13] We also examined the Pastor-Stambaugh liquidity risk factor, but all estimates were both small and statistically insignificant so we do not report those results.

[14] E&R.1 examines LPE Sharpe Ratios though E&R.2 drops this analysis. E&R.1 states that "The Sharpe ratio of LPE is 0.13, compared to 0.39 for ACWI. LPE underperformed publicly traded stocks by a wide margin when returns are adjusted for risk." This suggests that they are comparing Sharpe ratios between LPE and the market benchmark to conclude that LPE has provided poor risk-adjusted performance. Asset pricing theory suggests that Sharpe Ratios should be used to compare the risk-return profile of diversified portfolios. For a detailed analysis of Sharpe Ratios in portfolios with private assets see Brown et al. (2024). As shown in Table 1, estimated R-squareds from CAPM models are substantially below 1.0 suggesting that the LPE indices have a non-trivial amount of idiosyncratic risk. To understand why this is important intuitively, consider evaluating almost any individual tech stock using its Sharpe Ratio. The high idiosyncratic risk of tech stocks would make them look like poor investments on a (risk-adjusted) Sharpe Ratio basis which, of course, has not been the case historically when they were part of a diversified portfolio.

TABLE 7: PORTFOLIO MIX PERFORMANCE WITH LPE

Panel A: Value-Weighted LPE Index

Portfolio Mix (ACWI/LPE/Bonds)	Return	Volatility	Sharpe Ratio
July 2000 – June 2025			
0% LPE	6.1%	9.4%	0.492
5% LPE	6.2%	9.2%	0.510
10% LPE	6.3%	9.1%	0.524
20% LPE	6.5%	9.1%	0.544
July 2008 – June 2025			
0% LPE	8.4%	9.2%	0.798
5% LPE	8.3%	9.1%	0.799
10% LPE	8.3%	9.1%	0.793
20% LPE	8.1%	9.2%	0.764
July 2015 – June 2025			
0% LPE	8.3%	8.2%	0.780
5% LPE	8.4%	8.0%	0.800
10% LPE	8.4%	7.9%	0.816
20% LPE	8.5%	7.8%	0.840

Panel B: Equal-Weighted LPE Index

Portfolio Mix (ACWI/LPE/Bonds)	Return	Volatility	Sharpe Ratio
July 2000 – June 2025			
0% LPE	6.1%	9.4%	0.492
5% LPE	6.3%	9.2%	0.520
10% LPE	6.5%	9.2%	0.543
20% LPE	6.8%	9.2%	0.573
July 2008 – June 2025			
0% LPE	8.4%	9.2%	0.798
5% LPE	8.4%	9.1%	0.807
10% LPE	8.5%	9.1%	0.806
20% LPE	8.5%	9.6%	0.775
July 2015 – June 2025			
0% LPE	8.3%	8.2%	0.780
5% LPE	8.3%	8.0%	0.797
10% LPE	8.3%	7.9%	0.811
20% LPE	8.3%	7.7%	0.828

Panel C: Equal-Weighted LPE Index with 3i

Portfolio Mix (ACWI/LPE/Bonds)	Return	Volatility	Sharpe Ratio
July 2000 – June 2025			
0% LPE	6.1%	9.4%	0.492
5% LPE	6.3%	9.3%	0.517
10% LPE	6.5%	9.2%	0.539
20% LPE	6.8%	9.3%	0.568
July 2008 – June 2025			
0% LPE	8.4%	9.2%	0.798
5% LPE	8.5%	9.1%	0.810
10% LPE	8.5%	9.1%	0.813
20% LPE	8.6%	9.5%	0.793
July 2015 – June 2025			
0% LPE	8.3%	8.2%	0.780
5% LPE	8.4%	8.0%	0.803
10% LPE	8.5%	7.9%	0.823
20% LPE	8.6%	7.8%	0.854

Public market portfolio weights are always 40% bonds and 60%, 55%, 50%, and 40% equity (ACWI), respectively.

Panel A of Table 7 shows results over the full sample from July 2000 to June 2025, the annualized total return increases from 6.1% to 6.4% when shifting 20 percentage points of weight away from ACWI into LPE-VW. Volatility decreases somewhat from 9.4% to 9.1%, and the Sharpe Ratio increases about 10% from 0.492 to 0.541. With a starting month of July 2008, return falls mildly with the higher LPE weight from 8.4% to 8.1%, volatility remains at 9.2%, and the Sharpe Ratio decreases slightly from 0.798 to 0.764. With a starting month of July 2015, return is essentially the same at 8.3-8.5%, volatility decreases somewhat from 8.2% to 7.8%, and the Sharpe Ratio increases about 8% from 0.780 to 0.840.

Panels B and C of Table 7 show results from the same analysis but using the LPE-EW and LPE-EW+ indices. For these indices the Sharpe Ratios always increase with a 5% or 10% allocation to LPE. Only for the 2008-2025 time frame and for an allocation of 20% to LPE are the Sharpe Ratios lower than for no allocation to LPE.

The analysis of Sharpe Ratios presented in this section show that a modest allocation to LPE (10% or less of total portfolio value) would have always increased, or left essentially unchanged, the portfolio's Sharpe ratio over the last 10, 17, or 25 years.

4 Conclusion

We examine methodological (and some possible data) weaknesses in the analysis of listed private equity (LPE) by Ennis and Rasmussen (2025a) and draw substantially different conclusions from our results. Specifically, we find that LPE has tended to outperform global public-equity returns over trailing 25-, 15-, 10- and 5-year periods when examining three different LPE indices. While we find that point estimates of risk-adjusted returns are dependent on the method used for risk adjustment, the confidence intervals for αs always include zero, so there is little that can be concluded with confidence. That said, the systematic risk (i.e., CAPM β) of LPE is on par with broad public benchmarks even though LPE has higher idiosyncratic risk and includes an additional risk related to public-market CEF discounts (that buy-and-hold direct PE investors do not face). And most importantly, LPE has typically been additive to diversified portfolios of public stocks and bonds on a Sharpe Ratio basis.

Our analysis addresses what we beleive are some fundamental shortcomings in E&R.1. For example, we show convincingly that annual data is less precise, not more precise, for estimating risk – analysis of monthly data that accounts for statistical issues like autocorrelated returns generates much more reliable and precise estimates. Perhaps more importantly, it is hard to know what to conclude from an analysis of LPE given that the market does not even meet the requirements of weak-form efficiency. In addition, at least some of the estimated risk (β) of investing in LPE is related to CEF-discount risk, not the underlying portfolio risk of PE investments. A proper analysis to understand the risk on non-traded PE would adjust LPE returns for the market-wide variation in CEF discounts. We hope to provide such an analysis in a future draft of this paper.

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5 Appendix

TABLE A1: STATISTICS FOR LISTED PRIVATE EQUITY FUNDS

Ticker	Listed	Delisted	Total Return	Beta Contemp	Alpha Contemp	Beta Dimson	Alpha Dimson	Avg. Mkt Cap (mil GBP)	NA/US Share	NA/US Share Date
HGT	Dec-1989	-	14.4%	0.53	10.5%	0.85	8.0%	612	28%	Dec-2024
HVPE	May-2010	-	13.2%	0.69	5.7%	1.25	0.2%	1072	61%	Jun-2025
PIN	Sep-1987	-	7.3%	0.90	3.6%	1.29	0.8%	576	52%	May-2025
OCI	Aug-2007	-	10.4%	0.48	6.4%	0.98	1.9%	375	12%	Mar-2025
ICGT	Jul-1981	-	9.1%	1.01	4.3%	1.16	2.5%	420	45%	Apr-2025
PPET	May-2001	-	9.4%	0.72	6.0%	1.27	2.0%	382	23%	Sep-2024
NBPE	Jun-2009	-	15.5%	1.04	4.1%	1.45	-0.6%	455	76%	May-2025
APAX	Jun-2015	-	6.1%	0.80	-2.0%	0.97	-3.6%	757	58%	Mar-2025
PEY	Nov-2007	-	7.9%	1.20	-0.9%	1.71	-5.2%	572	45%	Jan-2025
CTPE	Mar-1999	-	10.1%	0.71	5.8%	1.27	1.5%	186	17%	Mar-2025
SVI	May-1996	Jun-2017	3.0%	0.72	2.6%	1.63	-2.1%	702	2%	Dec-2012
CDI	Dec-1984	Apr-2018	-9.0%	1.27	2.5%	1.76	0.4%	202	9%	Sep-2004
BCAP	Dec-2009	Jun-2020	-0.2%	0.03	1.4%	0.88	-7.5%	172	3%	Aug-2025
III	Jul-1994	-	8.5%	1.43	2.5%	1.84	-0.8%	7772	31%	Mar-2024

Statistics are for Jul-2000 through Jun-2025 when applicable, or shorter when listing/delisting dates are binding.
Alpha and beta estimated against ACWI
Mean NA/US Share (excluding 3i): 33%
Time $\times$ Cap Weighted NA/US Share (excluding 3i): 38%