

CO-INVESTMENTS

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Overview

Using an extensive Pavilion Alternatives Group database of investment transactions, we apply Monte Carlo simulation to a sample of realized transactions from buyout and growth funds to estimate the risk of co-investment portfolios. We find that co-investments with growth funds do not generate an attractive return profile under any circumstances. Conversely, buyout funds can offer appealing returns on both an IRR and a multiple basis. However, the dispersion of returns indicates that there is a substantial probability that returns could be poor, even across an entire portfolio. Further, incorporating a modest level of adverse selection causes a leftward shift of the return distribution that makes co-investments with buyouts funds more risky and less attractive. While there may be important strategic reasons for institutional investors to establish or expand co-investment programs, care should be exercised to avoid the issues of intentional or unintentional adverse selection. Even if adverse selection can be avoided, there should be an appreciation for the nature of the risk inherent in a portfolio that contains a small number of risky investments that are likely to be highly correlated.

Introduction

Increasingly, institutional investors are expressing interest in establishing or expanding co-investment programs with their private equity fund managers. They are attracted to these opportunities for several reasons: 1) avoidance of annual fund management fees; 2) capturing the full upside of investments by not paying carry; 3) mitigation of the “J” curve phenomena; 4) immediate deployment of capital, and; 5) control of investment/sector exposure.

Private equity fund managers may also benefit from co-investment programs. Offering co-investments to LPs may create a stronger relationship with the LP and thereby increase the likelihood of participation in future fund raising. And, co-investments effectively increase the footprint of the fund and may permit them to participate in deals that would be too large for their existing fund size.

While there are clearly benefits for both LPs and GPs to participating in co-investments, it is also important

to understand the inherent risks. Firstly, LPs may face an adverse selection problem. That is, GPs may have an incentive to keep the highest expected return investments wholly within their fund structure. By doing so they increase their personal benefit by increasing the amount of return that is subject to carry. As a result, they may offer co-investments in the deals that they are less optimistic about. Additional adverse selection may occur when funds offer co-invest in deals that exceed fund capacity. If returns are better in deals that fit within the fund limitations, co-invest may expose LPs to an undesirable return profile. Usually a fund manager’s experience is based on deals that are the same or smaller in size as are expected to be made in the fund. Thus, there is a very real possibility that investing above the fund limitations may put the fund manager in a market segment for which past returns are not representative and are more uncertain.

A second issue with co-investments is portfolio concentration. Independent of the adverse selection issue, private equity fund managers rarely offer co-investment in all companies in their portfolio. As a result, LPs usually only co-invest in a subset of a manager’s portfolio. This may lead to an over-concentration of investment into a small number of companies. In a portfolio with a more concentrated number of investments the returns of a single investment can dominate performance, positively or negatively. This, in turn, can create a portfolio with a substantial amount of risk. This risk may partially be offset if co-investments are solicited from several managers and the investments are considered part of the same portfolio.

Sample

The objective of this research is to empirically examine the risk of building a concentrated portfolio of private equity co-investments. We accomplish this with a sample of historical private equity realized investments that cover several economic cycles. The sample for this research was obtained from the proprietary Pavilion Deals database. The Deals database was constructed from two sources: 1) PPM data of funds that were considered for investment by the Pavilion team, and; 2) quarterly reports from funds tracked by Pavilion. The Deals database contains transaction data

for over a 1,000 funds, with 300 of those funds being actively monitored by Pavilion Alternatives Group.

To narrow the focus of the research and make the analysis consistent with the co-investment opportunities most likely to be available to LPs, we limited the sample to buyout and growth funds that are located and invest in the United States. To make the return calculation more meaningful and avoid debate on the appropriate carrying value for unrealized investments, we further limited the sample to investments that were fully realized. Two final filters applied were that investments had to be held for at least a year and a minimum investment size of \$1,000,000.¹ Arguably the minimum investment size could be set at a higher threshold. To simplify the return calculations, all cash proceeds are assumed to occur at the exit date and an annualized Internal Rate of Return (IRR) is calculated from the holding period return.²

Applying the filters described above resulted in a sample of 886 private equity realized transactions (594 Buyout and 292 Growth deals) with initial investment dates ranging from 1979 to 2010. We used the entire dataset as a single sample and did not stratify it by investment year to avoid market-timing issues. As might be expected from the lower level of exits following the global financial crisis, most of the initial investment dates were prior to 2008. (see table 1)

The table below presents sample statistics for the firms used in this analysis. Most investments in the dataset were realized at about the five-year mark with the longest investment period spanning almost 17 years. Note that the sample construction required fully realized investments, so

it is possible that the sample is biased towards shorter-term investments. However, the five-year investment holding period is consistent with the timeframe most private equity fund managers cite when discussing investment horizons. The IRR statistics show positive skewness in the distribution while the distribution of the multiples return measure is negatively skewed. This is likely due to the effect of short investment periods amplifying IRR as a measure of return. Both return measures show significant variability in their distributions as shown by their standard deviations.

Co-Investment Portfolio Simulations

From the sample described previously, we randomly selected portfolios of 5, 10, and 20 investments and calculated the returns of an equally weighted portfolio as the average IRR across the portfolio. We then applied a Monte Carlo engine and generated 10,000 iterations for each of these portfolios. So, for example, we generated 10,000 5-company portfolios drawn randomly from the realized transactions. We then calculate statistics on that sample of 10,000 5-company portfolios. The advantage of this approach is that allows us to observe the sensitivity of the results to various input variables across a wide range of possible portfolios. A single 5-company portfolio has a negligible impact on the overall results while the distribution of all the portfolios give us insight into the dominant factors. The results for each of the three sized portfolios are shown in table 2.

For all three portfolios shown in the table above, the mean return approaches that of the entire sample. As the number of companies increases in the portfolio, the distribution of returns becomes tighter. This can be seen

Table 1: Individual Company Realized Returns

Type	Measure	Mean	Median	Standard Deviation	Minimum	Maximum
All (N=886)	IRR	8.8%	14.1%	73.7%	-100.0%	711.8%
	Multiple	2.2x	2.0x	3.9x	0.0x	60.9x
Buyout (N=594)	IRR	16.5%	17.2%	75.8%	-100.0%	711.8%
	Multiple	3.0x	2.2x	3.4x	0.0x	28.1x
Growth (N=292)	IRR	-0.1%	0.0%	66.8%	-100.0%	293.9%
	Multiple	2.3x	1.2x	4.6x	0.0x	60.9x

Table 2: Simulated Portfolio Returns of Various Sizes

Portfolio size	Measure	Mean	Median	Standard Deviation	Minimum	Maximum
5	IRR	8.8%	6.1%	33.2%	-90.0%	243.2%
	Multiple	2.8x	2.4x	1.7x	0.0x	17.6x
10	IRR	9.0%	7.5%	23.5%	-81.3%	151.3%
	Multiple	2.7x	2.5x	1.2x	0.4x	16.5x
20	IRR	8.9%	7.8%	16.6%	-46.5%	129.9%
	Multiple	2.7x	2.6x	0.9x	0.7x	8.9x

in the decreasing standard deviation as well as the higher minimums and lower maximums. Of note is that even with a 20-company portfolio it is still possible to lose significant capital as measured either by IRR or multiples. Thus even the construction of a large co-investment program does not eliminate the probability of losing capital.

To make the discussion more tractable the remainder of this analysis focuses on 10-company co-investment portfolios. The histogram of returns for this portfolio is shown in Chart 1.

The IRR histogram shows a long right tail, characteristic of investment returns, which theoretically, can be infinitely positive while the maximum loss is limited to 100%. There is an attractive zone of investment returns with reasonable probability from 20% to 60%. However, there is also a significant part of the distribution below 0%. Thus, even with 10 investments in the co-investment portfolio there is a substantial probability that the entire portfolio would generate an IRR below 0%.

The Multiple histogram below shows a similar right tail skewness with substantial areas of attractive returns above 2x. What is particularly appealing about multiple skewness relative to IRR skewness is that multiples are not artificially affected by shorter time horizons. On the other hand a 3x multiple that takes 15 years to generate may not be seen as particularly desirable by investors (see Chart 2).

In table 3 below, we separate the 10-company co-investment portfolio into buyout and growth portfolios. As in the full sample the results for the growth transactions underperform those of the buyout transactions (see table 3).

On an IRR basis, the risk of both buyout and growth portfolios are comparable (23.9% vs. 21.2%). However, the buyout returns (14.2%) far dominate those of the growth sample (-8.1%). The one bright spot for the growth transactions is that significantly higher maximum multiple (14.2x) as compared to the buyout maximum of (8.7x). Given these results, it would be hard to justify establishing or expanding

Chart 1: Simulated 10-Company Portfolio IRRs

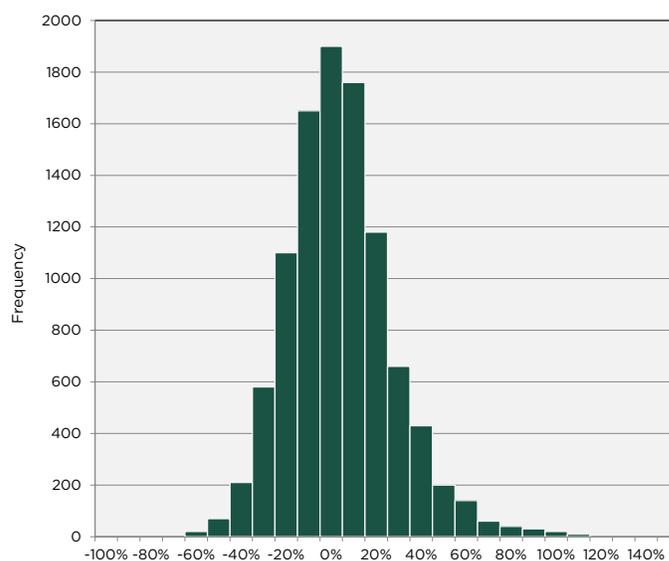


Chart 2: Simulated 10-Company Portfolio Multiples

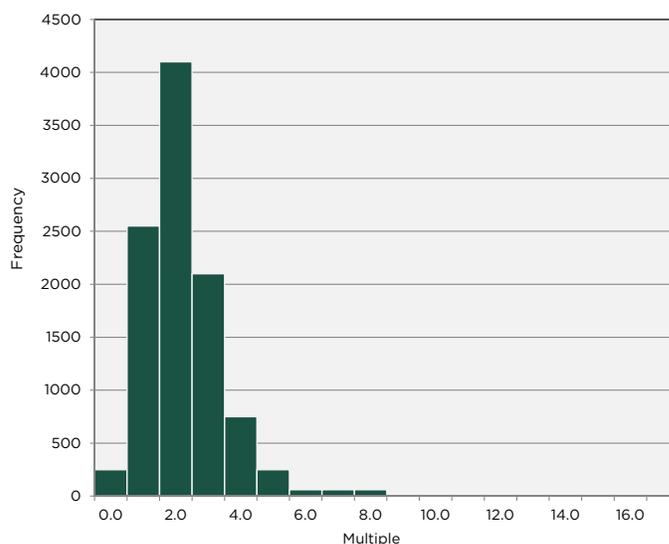


Table 3: Simulated 10-Company Portfolio Returns

Type	Measure	Mean	Median	Standard Deviation	Minimum	Maximum
All	IRR	9.0%	7.5%	23.5%	-81.3%	151.3%
	Multiple	2.7x	2.5x	1.2x	0.4x	16.5x
Buyout	IRR	16.6%	14.2%	23.9%	-58.0%	171.8%
	Multiple	3.0x	2.8x	1.1x	0.2x	8.7x
Growth	IRR	-7.0%	-8.1%	21.2%	-72.8%	105.2%
	Multiple	2.3x	1.9x	1.5x	0.0x	14.2x

a growth co-investment program unless the institutional investor has strong belief in their ability to select the best investments offered to them by fund managers.

Table 4 below presents summary statistics for the distributions of returns for each of the three portfolios. As could be expected, the standard deviation of returns decreases as the number of portfolio companies increases. Similarly, the probability of the fund not returning capital ($Pb < 0\%$) decreases, as does the probability of attractive returns ($20\% < Pb < 60\%$). Of note is that the probability of not returning capital decreases faster than does the attractive returns. Again, this is likely due to the inherent skewness of investment returns.

Incorporating Adverse Selection

From the analysis above, it is clear that a 10-company portfolio of co-investments with buyout funds has a reasonable probability of generating attractive returns if investors have the opportunity to invest in all opportunities that fund managers invest in. However, if the institutional investor faces adverse selection either intentionally by fund managers or from managers investing above their “sweet spot,” the returns may not be as attractive. We model adverse selection as investors not having access to the top 10% performing transactions, independently on an IRR and multiple basis. Table 5 presents the sample statistics with the best deals removed from the sample.³

The obvious observation from table 4 as compared to the full sample panel is the contribution of a relatively few exits to the overall returns for private equity portfolios. The result of excluding just the top 10% performing transactions shifts all of the distributions significantly to the left. While the maximums remain interesting, those are the result of getting very lucky a few times in ten thousand iterations – not an approach prudent portfolio managers use.

For buyout funds, the dispersion (as measured by standard deviation) decreases from 1.1x in the full sample to 0.5x in the adverse selection sample, but that decrease comes from losing the upper right tail of the distribution. As a result, the median multiple decreases from 2.8x in the full sample to 2.1x in the adverse selection sample. Some investors may find this attractive, especially given that this is equivalent to a net return in comparison to fund level gross performance.

In table 5 below we present the same return categorization as we did in the full sample. The effect of excluding the top 10% performing transactions can be seen in both the multiple and IRR results for buyout funds. For IRR, the most populous category for the full sample was between 20-60% (33.6%) whereas for the adverse selection sample the most populous category is between -20-0% (37.1%). Similarly for the multiple, the most populous category was between 3-4x (27.3%) while for the adverse selection sample is dropped to between 2-3x (55.7%). The differences between these shifts explains why co-investments with buyout funds remain

Table 4: Simulated 10-Company Portfolio Probabilities

Type	IRR					
	Below -20%	Between -20% and 0%	Between 0% and 10%	Between 10% and 20%	Between 20% and 60%	Above 60%
All	8.7%	27.5%	18.8%	17.5%	24.6%	2.9%
Buyout	3.5%	20.0%	18.0%	19.8%	33.6%	5.2%
Growth	27.9%	37.0%	14.8%	9.8%	10.1%	0.3%
Type	Multiple					
	Below 0.8x	Between 0.8x and 1.0x	Between 1.0x and 2.0x	Between 2.0x and 3.0x	Between 3.0x and 4.0x	Above 4.0x
All	0.5%	0.8%	23.9%	40.9%	22.6%	11.4%
Buyout	0.2%	0.2%	15.1%	40.1%	27.3%	17.0%
Growth	4.1%	4.0%	42.6%	30.7%	10.3%	8.3%

Table 5: Simulated 10-Company Portfolio Probabilities with 10% Adverse Selection

Type	Measure	Mean	Median	Standard Deviation	Minimum	Maximum
All	IRR	-6.7%	-6.1%	15.4%	-65.8%	38.4%
	Multiple	1.9x	1.8x	0.5x	0.3x	4.1x
Buyout	IRR	0.7%	1.5%	14.9%	-65.7%	39.3%
	Multiple	2.1x	2.1x	0.5x	0.4x	4.3x
Growth	IRR	-21.5%	-21.4%	15.3%	-77.7%	28.3%
	Multiple	1.3x	1.3x	0.5x	0.0x	3.2x

somewhat attractive on a multiple basis, but not on an IRR one (Table 6).

Limitations

Our intent with this research was to replicate the co-investment opportunity set available to an investor over several economic cycles. Any research is subject to some inherent limitations, we describe a few of the limitations in our research below.

Scale – The portfolios were constructed solely on the basis of random selection of their returns. There was no attempt to take scale into consideration. A GP may not offer co-investment in smaller investments such as the \$1,000,000 investment threshold used in the sample selection. On the upper end of the investment size, GPs may offer co-investment opportunities only to their largest LPs that are capable of making substantial co-investments. Thus, the returns of those investments may not be available to any co-investment investors. Again, not all co-investments may be available to all co-investment investors.

Economic Cycle – The sample was purposely constructed across a thirty-year period to minimize the influence of macro-economic cycles. This was done to characterize the nature of co-investments independent of economic cycle. An LP starting or expanding a co-investment program will be exposed to the economic cycle as the investments are made. In all likelihood, that will lead to a higher correlation in returns in the portfolio than generated in this analysis. This could be either beneficial or detrimental to the return distribution depending on the economic cycle. If an investor believes they have superior macroeconomic forecasting capability, they may be able to generate superior returns by expanding or contracting their co-investment program based on their economic forecasts.

Horizon – The sample was constructed independent of the holding period of the investment. The portfolio return was calculated as the equally weighted average of the returns in the portfolio. A high return over a short period of time is attractive, but also increases the re-investment risk. Our return calculation likely creates an upward bias to reported portfolio returns as we did not model reinvestment so short-term returns factor into the calculation equally with longer-term returns.

Historical Analysis – The sample construction we used for this analysis was based on historical realized transactions that were dependent on private equity market conditions over the 30-year sample period. If private equity market conditions going forward deviate from those in the past, our results may not be representative of the returns co-investors could expect.

Realized Transactions – The sample was based on only realized transactions. It is possible that this sample does not reflect the results of the actual co-investments available to institutional investors. If, for example, fund managers carry investments that will be eventually written off at some valuation for long periods of time, our sample may not have a representative number of write-offs in the later years of the sample. If this is so, our results will likely be upwardly biased and the actual returns to investors will be lower than our results indicate.

Conclusion

Co-investments appear to be an attractive way for LPs to increase their exposure to private equity investments at lower cost than the traditional 2/20 fund structure and offers other benefits such as quicker capital deployment and control of where that deployment is allocated. However, our analysis using actual returns for a sample of private equity investments covering a thirty-year period demonstrates

Table 6: Simulated 10-Company Portfolio Probabilities with 10% Adverse Selection

Type	IRR					
	Below -20%	Between -20% and 0%	Between 0% and 10%	Between 10% and 20%	Between 20% and 60%	Above 60%
All	19.2%	45.9%	20.6%	10.8%	3.5%	0.0%
Buyout	8.9%	37.1%	25.7%	19.1%	9.2%	0.0%
Growth	53.5%	38.3%	6.4%	1.6%	0.1%	0.0%
Type	Multiple					
	Below 0.8x	Between 0.8x and 1.0x	Between 1.0x and 2.0x	Between 2.0x and 3.0x	Between 3.0x and 4.0x	Above 4.0x
All	1.1%	2.4%	54.7%	39.8%	2.0%	0.0%
Buyout	0.2%	0.6%	37.7%	55.7%	5.8%	0.0%
Growth	12.3%	11.7%	67.1%	8.9%	0.0%	0.0%

that even a relatively large co-investment portfolio has substantial risk of not returning capital to investors (as measured by IRR). When adverse selection is incorporated into the analysis, not surprisingly, the return distributions as measured by both IRR and multiples deteriorate, reflecting the increased riskiness of the resulting portfolio. As with most aspects of private equity, selectivity is one of the most important components of driving returns for investors. Even with good selectivity, co-investment portfolios may be subject to additional risk due to the impact, positively or negatively, of a small number of transactions in the portfolio

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Notes

- 1 - The one-year minimum investment horizon was implemented to avoid the issues of elevated IRR calculations for investments held for short periods of time.
- 2 - Many investments, but not all, in the database had reported IRR's. For those that did, the IRR calculated in this analysis were generally within a percent or two of the reported IRR.
- 3 - Note that performance is measured ex post and is meant to determine the sensitivity of the results to missing the best deals. An investor that is able to identify the best deals ex ante would not need to build a portfolio. Also, the 10% threshold is arbitrary and arguments could be made that higher or lower thresholds would be more appropriate.

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