

Q2, 2019

## Watch Your Tail-End



A preliminary examination of Tail-End private equity fund performance and secondary market alternatives

## Introduction

Over the last 20 years, private equity (“PE”), including growth and venture capital, has blossomed into a critical investment strategy for institutional investors. According to Cambridge Associates, endowments and foundations, which have historically been the largest investor in private equity as a percentage of their assets under management, increased their allocation to PE from 8.5% in 2000 to 13.4% as of June 2018<sup>1</sup>. Many of the largest endowments have exposure to private equity in excess of 20%. In addition to the mature US institutions that have invested in the strategy for over two decades, there has been a dramatic increase amongst foreign investors in PE, particularly fueled by the emergence of numerous sovereign wealth funds in this category. More recently, there has been a drive by PE managers to tap the enormous retail market for new investors, who have increasingly demonstrated a thirst for private equity.

The reasons behind the dramatic increase in private equity has been well documented as the institutional market – and now a growing retail market - seeks alpha that is hard to achieve through liquid equity strategies. And on an absolute basis, it is clear that investing in 1<sup>st</sup> and 2<sup>nd</sup> quartile US PE funds has delivered returns well in excess of public equities.<sup>2</sup>

However, it has been less clear whether such outsized returns should be expected on an annual basis in the mature years of any given fund’s life, regardless of a fund’s historic investment performance. For the purpose of this report, we analyzed how US PE funds perform beyond their 10-year mark, which we refer to as the Tail-End years. In conjunction with this performance analysis, we measure the opportunity costs incurred by institutional investors who do not rebalance their private equity programs in the Tail-End years.

According to Preqin, Tail-End private capital funds (funds older than 10 years) hold \$525 billion in unrealized value, as of December 2017. Nearly 75% of the unrealized value is held in private equity, venture, and growth funds, with other strategies such as private debt and real assets accounting for the remainder<sup>3</sup>. Historically, many Limited Partners have held partnerships until final dissolution. However, over the last 10 years, secondary sales have become a normalized portfolio management tool. As capital committed to secondary strategies continues to grow<sup>4</sup>, secondary investors clearly see the unrealized NAV in Tail-End positions as a buying opportunity. Which begs the question, should Limited Partners continue to hold these Tail-End investments or seek liquidity through a secondary sale and at what price?

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<sup>1</sup> Only includes the institutions that reported information for every year from 2000 through 2019

<sup>2</sup> Bain & Company Global Private Equity Report 2019

<sup>3</sup> Preqin Press Release July 10, 2018

<sup>4</sup> Greenhill’s Secondary Market Analysis, January 31, 2019

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**Given the unique nature of each portfolio and underlying investments, the findings that follow may not be universally applicable to every circumstance. They are intended to provide general parameters and guidance for investors to contemplate when considering a potential secondary sale.**

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## Summary

- Private equity funds, on average, lose value when held beyond 10 years, regardless of previous performance or quartile ranking.
- Top quartile funds have the highest opportunity cost to hold beyond 10 years, assuming their unrealized capital could be monetized and redeployed into other top quartile funds.
- There is more downside risk than upside potential by holding funds beyond 10 years relative to the initial 10 years of their life.
- **In certain situations, an investor may be better off selling a tail-end fund at a discount of 35% or more when compared to holding the same fund and letting it “wind down” without a pro-active rebalancing plan.**
- Stellar returns aren’t required to compensate for selling at a discount. **Even average private equity returns can make up for selling a tail-end fund at a double-digit discount.**
- Selling at a discount, even a large discount, after year 10 and reinvesting may be advantageous when any one or more of the following applies:
  - The expected timing of liquidity of the 10+ year old fund is greater than three years
  - New investments (even outside of private equity) with average or better return potential are readily available
  - The General Partner’s economic interests are no longer aligned with Limited Partners’ interests

Pitchbook was the primary data source used in our research to collect mean, median, 1st quartile and 4th quartile rankings measured by Total Value per Paid-In (TVPI), Distributions per Paid-In (DPI) and Remaining Value per Paid-In (RVPI) for US private equity funds with vintage years 1998 through 2011<sup>5</sup>. The data was used to analyze private equity returns from 1998 through 2018 and compare returns during the first ten years of an investment to investment returns beyond ten years.

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<sup>5</sup> Pitchbook data: US Buyout, Fund of Funds, Mezzanine, Growth and Venture Capital funds vintages 2000-2011; TVPI segmented into Mean, Median, 25<sup>th</sup> Percentile (4thQ), and 75<sup>th</sup> Percentile (1stQ)

## Definitions

**4thQ:** Fourth quartile or bottom quartile

**1stQ:** First quartile or top quartile

**TVPI:** Total Value to Paid-in-Capital

**DPI:** Distributions to Paid-in-Capital

**RVPI:** Remaining Value to Paid-in-Capital

**Normal Fund Life:** Vintage year plus ten ([Exhibit 1](#)) i.e. 2000 vintage would have a Normal Fund Life through 2010

**Tail-End Years:** Years after Normal Fund Life ([Exhibit 1](#)) i.e. 2011 would be Tail-End Year 1 for 2000 vintages

## Exhibit 1

	Normal Fund Life										Tail-End Years		
Vintage Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Tail-End Year 1	Tail-End Year 2	Tail-End Year n

## Methods

We gathered mean, median, 4th quartile, and 1st quartile TVPI information from 1998 through 2018 for US funds with vintage years 1998 through 2011. We averaged TVPI (weighted by fund count and respective of quartile ranking) to combine data across vintage years and calculate the average TVPI, segmented by quartile, in each year for years one through twenty. See [Exhibits 2 – 4](#).

### Exhibit 2

TVPI Vintages 1998 - 2011											
Years	0	1	2	3	4	5	6	7	8	9	10
TVPI Mean	0.92x	0.99x	1.02x	1.05x	1.13x	1.23x	1.33x	1.43x	1.45x	1.49x	1.50x
TVPI Median	0.93x	0.95x	0.97x	1.02x	1.08x	1.18x	1.26x	1.34x	1.39x	1.43x	1.43x
TVPI 4thQ	0.82x	0.85x	0.86x	0.87x	0.93x	0.99x	1.05x	1.10x	1.12x	1.13x	1.12x
TVPI 1stQ	1.01x	1.05x	1.12x	1.17x	1.28x	1.41x	1.54x	1.65x	1.70x	1.77x	1.77x
Fund Count	1,086	1,402	1,421	1,440	1,465	1,496	1,469	1,454	1,348	1,266	1,191

### Exhibit 3

TVPI Vintages 1998 – 2007										
Years	11	12	13	14	15	16	17	18	19	20
TVPI Mean	1.49x	1.45x	1.46x	1.42x	1.40x	1.38x	1.35x	1.35x	1.35x	1.37x
TVPI Median	1.43x	1.39x	1.41x	1.39x	1.37x	1.33x	1.30x	1.33x	1.30x	1.32x
TVPI 4thQ	1.09x	1.06x	1.05x	1.00x	1.02x	0.98x	0.92x	0.91x	0.88x	1.00x
TVPI 1stQ	1.78x	1.76x	1.78x	1.74x	1.73x	1.73x	1.70x	1.69x	1.72x	1.65x
Fund Count	1,050	882	691	551	461	389	298	218	99	33

Exhibit 4

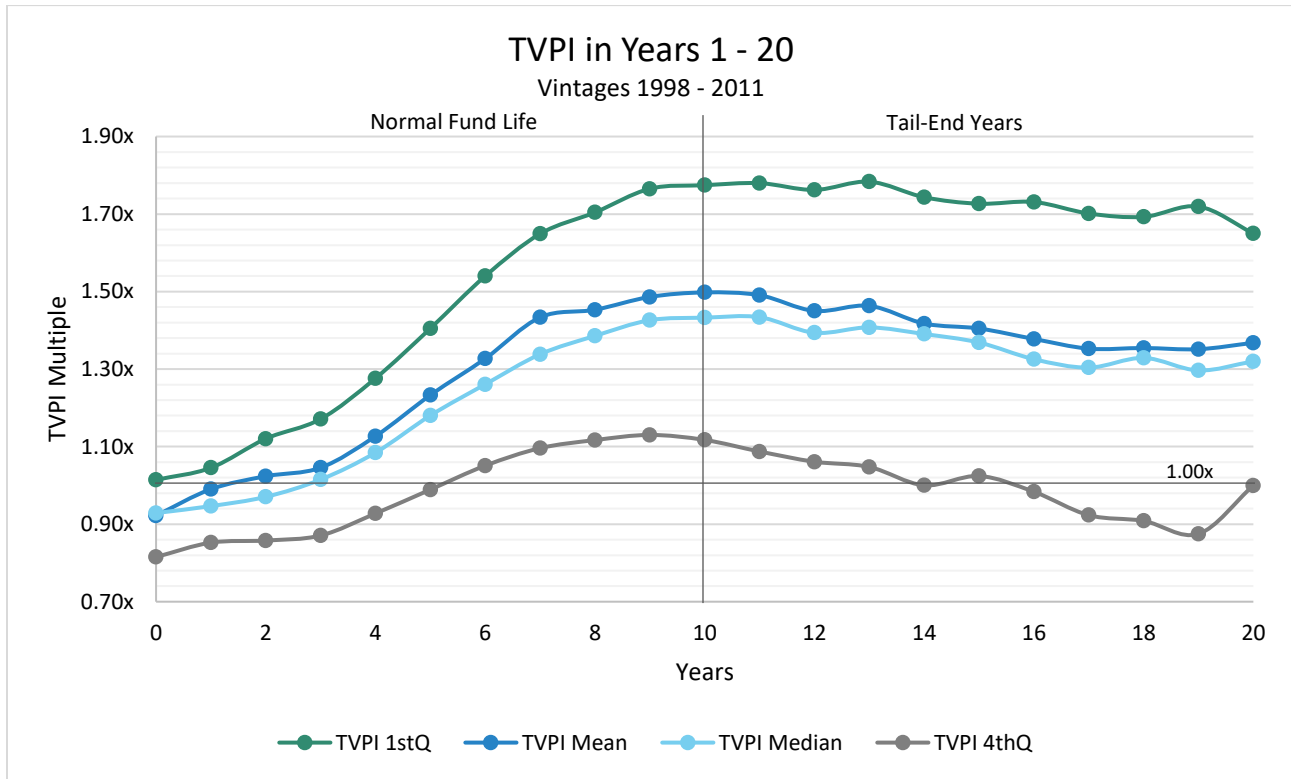


Exhibit 4 clearly shows the value creation in the first ten years and the gradual erosion of value after ten years. The decline in value in the Tail-End Years is particularly pronounced in the Mean, Median and 4thQ/bottom quartile funds. The J-Curve can also be seen in the Mean, Median, and bottom quartile TVPI figures beginning below 1.00x.

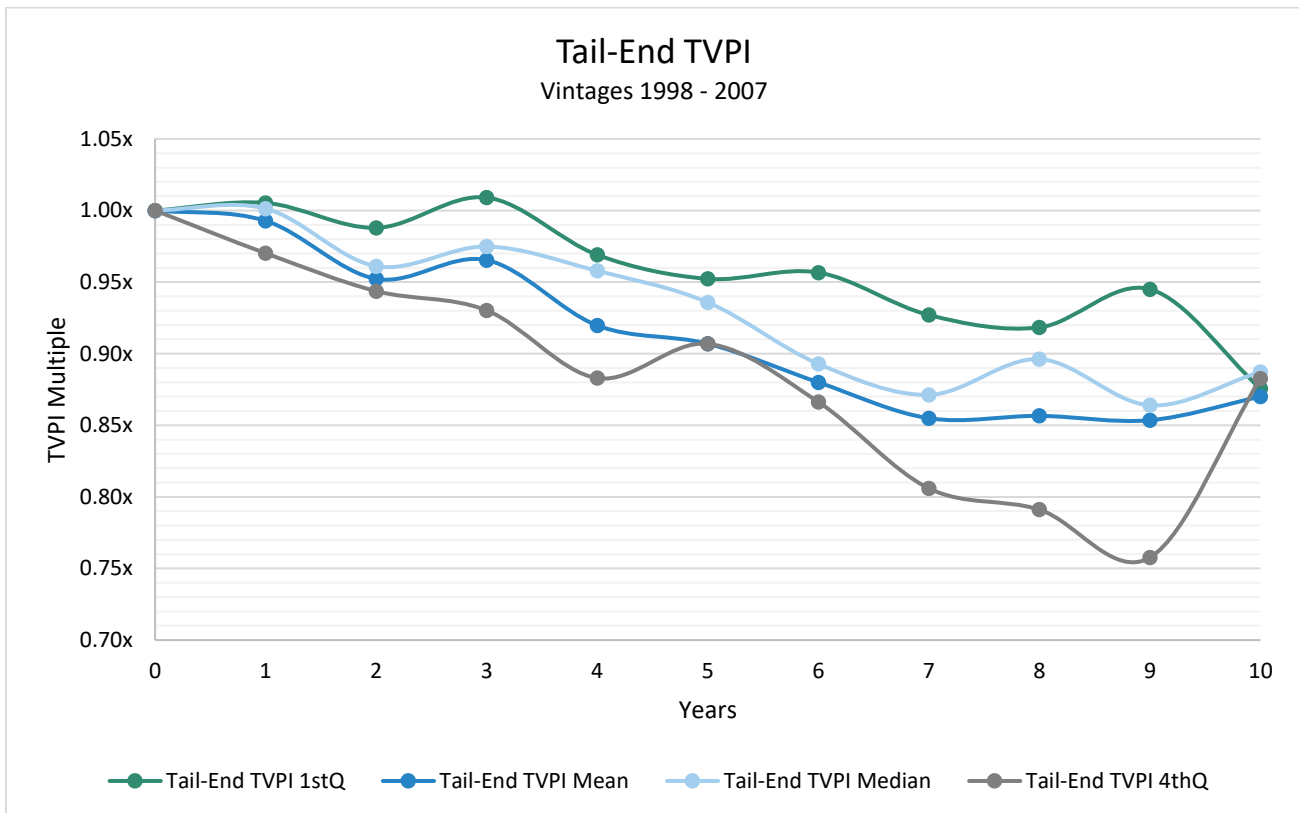
Note the dramatic increase in TVPI from year 19 to 20 for the bottom quartile and the drop in TVPI for top quartile is likely due to sample size error and survivor bias, rather than reflecting a change in performance. Only 1998 vintage funds yet to be fully realized provide data for year 20, with only 33 funds reporting TVPI information down from 99 funds in year 19. The small number of funds reporting, and vintage year concentration, could create a misleading change in TVPI for this period. This potential error is not isolated to TVPI and may impact other 20-year data. While we believe the explanation for this anomalous data is likely an error, we cannot say this definitively. We therefore kept the 20-year data in our analysis.

To calculate the incremental performance in the Tail-End Years, we reset the TVPI back to 1.00x in year ten for each quartile respectively so that only the performance after year ten is captured. It is important to note that the Mean, Median, 4thQ, and 1stQ designations are based on total performance in all years, while the Tail-End TVPI is a measure of performance only during Tail-End Years. As can be seen in [Exhibit 5 and 6](#), TVPI trends down for those funds that continue to hold assets after ten years.

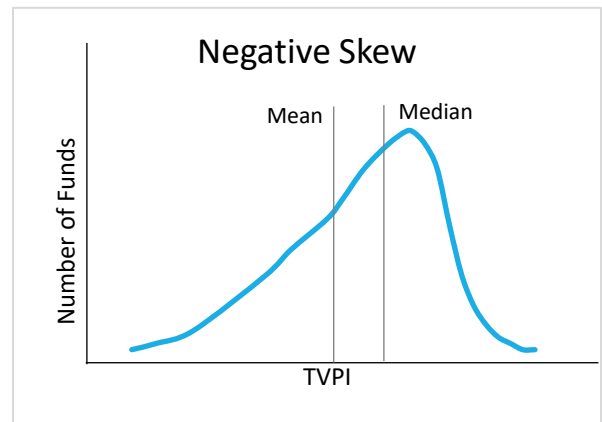
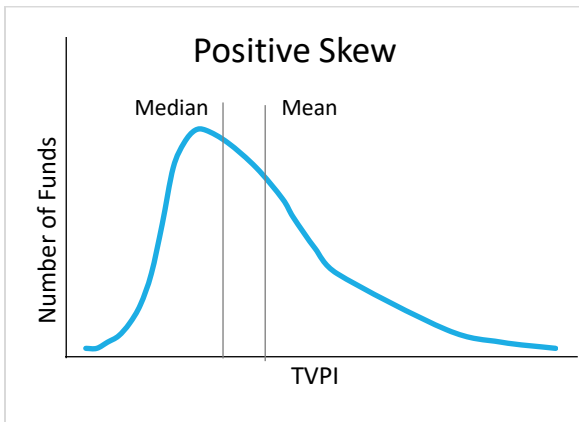
Exhibit 5

Tail-End TVPI Vintages 1998 – 2007										
Tail-End Years	1	2	3	4	5	6	7	8	9	10
Tail-End TVPI Mean	0.99x	0.95x	0.97x	0.92x	0.91x	0.88x	0.85x	0.86x	0.85x	0.87x
Tail-End TVPI Median	1.00x	0.96x	0.97x	0.96x	0.94x	0.89x	0.87x	0.90x	0.86x	0.89x
Tail-End TVPI 4thQ	0.97x	0.94x	0.93x	0.88x	0.91x	0.87x	0.81x	0.79x	0.76x	0.88x
Tail-End TVPI 1stQ	1.01x	0.99x	1.01x	0.97x	0.95x	0.96x	0.93x	0.92x	0.95x	0.88x
Fund Count	1,050	882	691	551	461	389	298	218	99	33

Exhibit 6

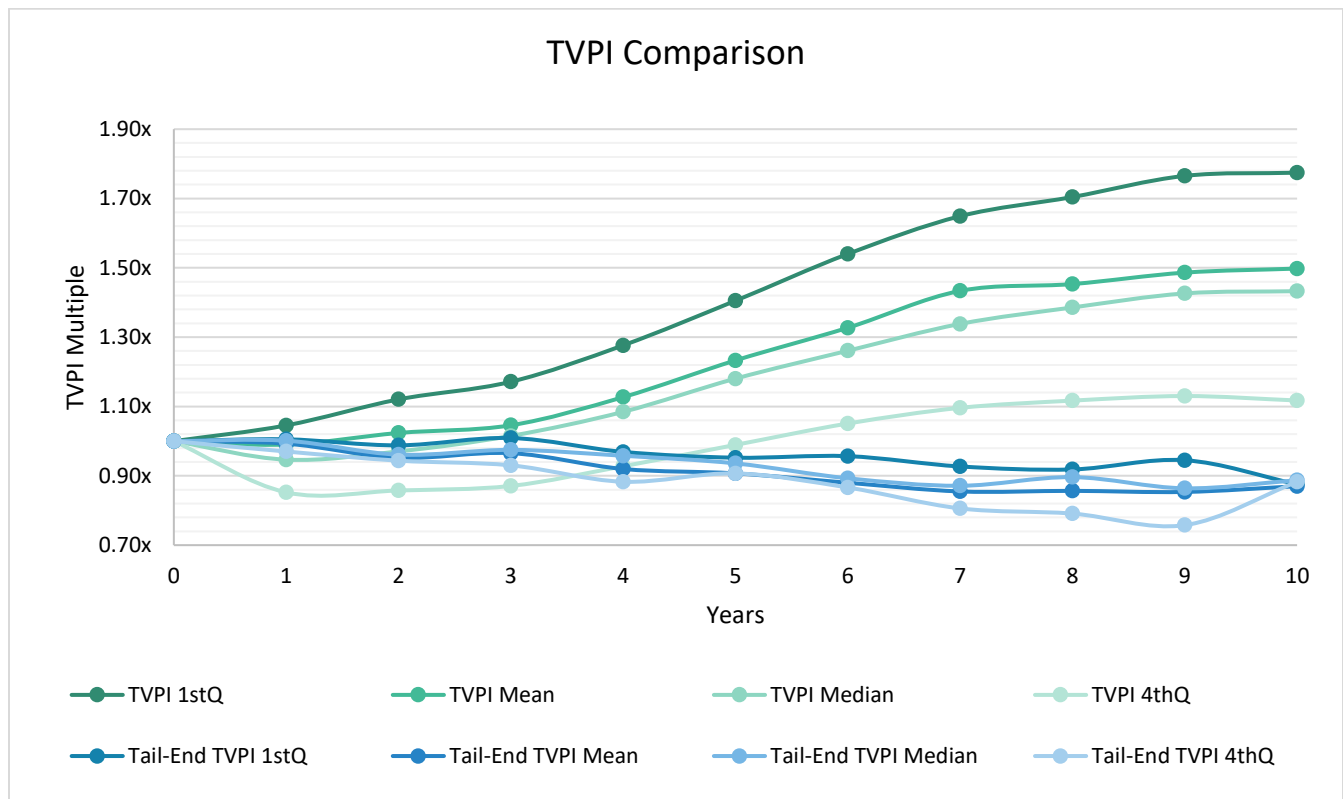


During the first ten years of the Normal Fund Life, the TVPI Mean is greater than the TVPI Median (see [Exhibit 4](#)). This means the data is positively skewed towards higher returning funds. However, the Tail-End TVPI Mean falls below the Tail-End TVPI Median (see [Exhibit 6](#)) during the Tail-End Years. This means the data is negatively skewed toward lower returning funds. To put this another way, there is more downside risk than upside potential when holding Tail-End funds compared to new commitments.



[Exhibit 7](#) combines and compares the first ten years of fund performance to ten years of Tail-End Performance, with shades of green representing the Normal Fund Life and shades of blue representing the Tail-End Years.

**Exhibit 7**



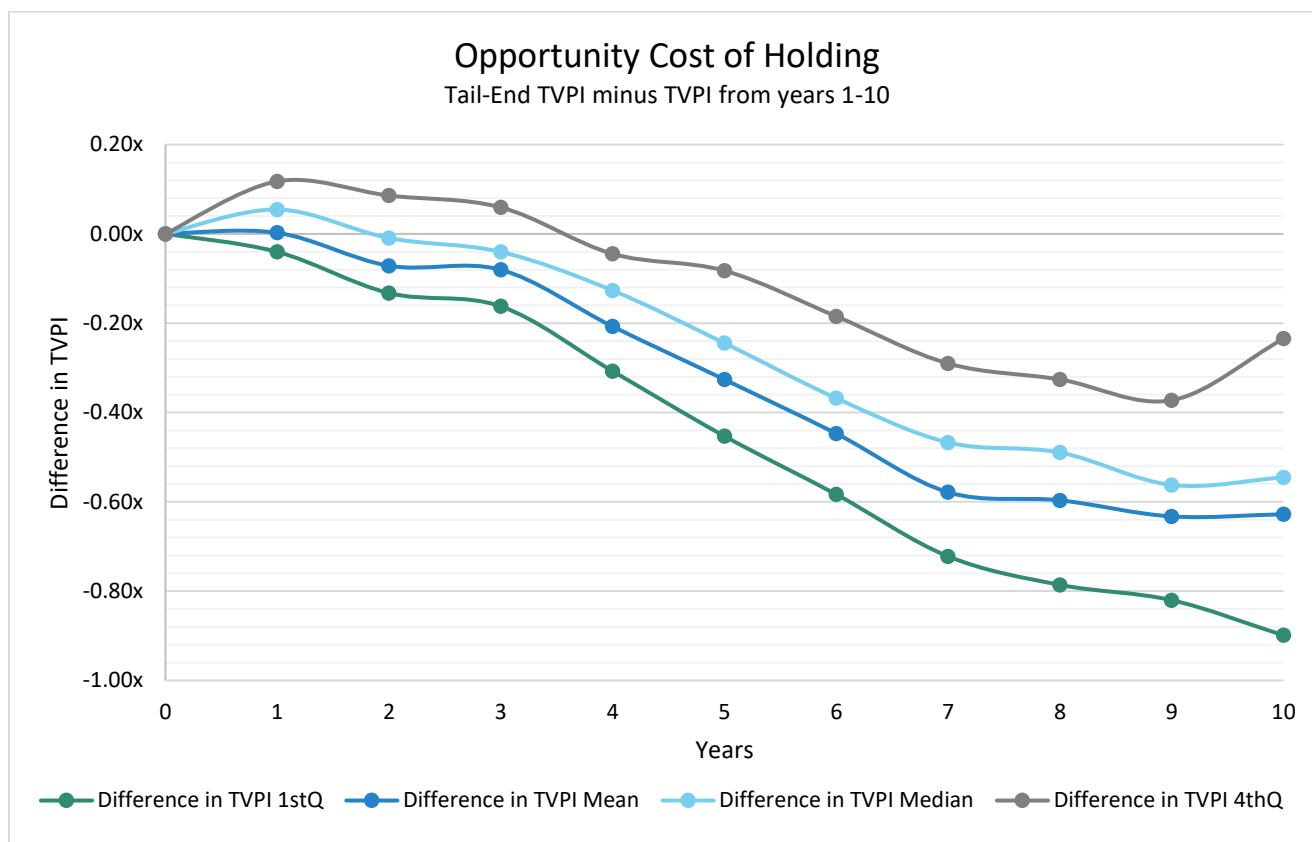


To calculate the relative outperformance or underperformance, we subtracted the TVPI during the Normal Fund Life from the Tail-End TVPI. Outperformance is shown in black and underperformance is in red. See [Exhibit 8 – 9](#). A value of -0.13x in year two for 1stQ funds means an investor is 13% worse off by holding a Tail-End top quartile fund for two years compared to a newer investment into a top quartile fund.

Exhibit 8

Outperformance/Underperformance from Holding Tail-End Funds										
Initial Years/Tail-End Years	1	2	3	4	5	6	7	8	9	10
Difference in TVPI Mean	0.00x	-0.07x	-0.08x	-0.21x	-0.33x	-0.45x	-0.58x	-0.60x	-0.63x	-0.63x
Difference in TVPI Median	0.05x	-0.01x	-0.04x	-0.13x	-0.24x	-0.37x	-0.47x	-0.49x	-0.56x	-0.55x
Difference in TVPI 4thQ	0.12x	0.09x	0.06x	-0.04x	-0.08x	-0.18x	-0.29x	-0.33x	-0.37x	-0.23x
Difference in TVPI 1stQ	-0.04x	-0.13x	-0.16x	-0.31x	-0.45x	-0.58x	-0.72x	-0.79x	-0.82x	-0.90x

Exhibit 9



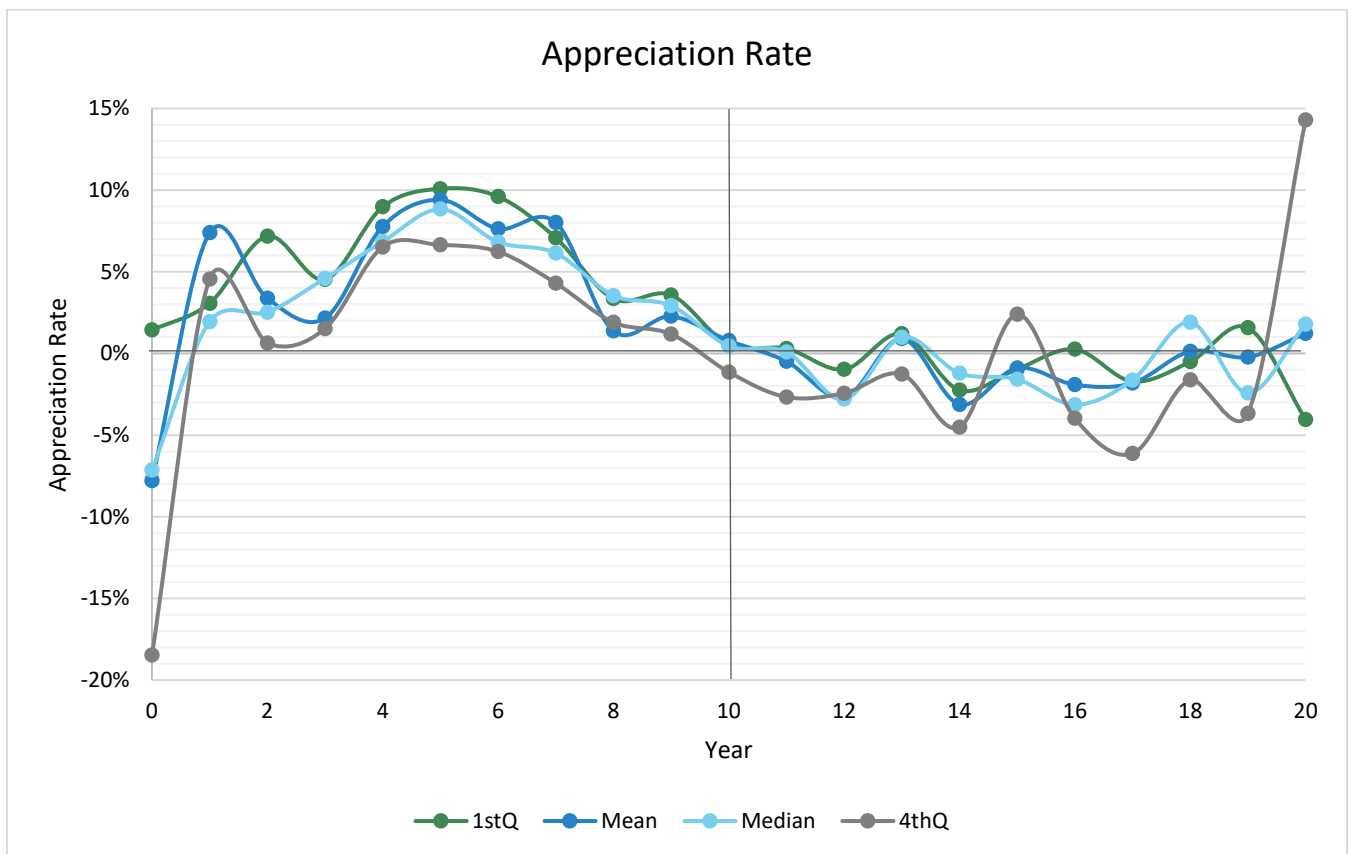
Since Tail-End TVPI is flat to negative even in top quartile managers, and the highest returns are achieved in top quartile managers during the first ten years, the opportunity cost of holding through Tail-End Years is highest for top quartile managers. This shown in [Exhibit 9](#) by the “Difference in TVPI 1stQ” (green line) being below all others.

Another way to examine the TVPI data is to look at the appreciation (or depreciation) of the investments from year to year. To calculate the appreciation (depreciation), we subtracted the prior year TVPI from the current year TVPI and divided by the prior year TVPI, for each respective quartile.

$$Appreciation = \frac{TVPI_t - TVPI_{t-1}}{TVPI_{t-1}}$$

We graphed the appreciation rate by year in [Exhibit 10](#). Appreciation is shown by any point above zero. A downward sloping line that remains above zero indicates appreciation at a decreasing rate (i.e. 13%, 8%, 5%, etc.). Similar to what was shown in [Exhibit 4](#), appreciation occurs during the first ten years. As the healthy and appreciating investments are sold, the remaining investments frequently depreciate in years 10 through 20, regardless of quartile<sup>6</sup>.

Exhibit 10



<sup>6</sup> As noted previously, the dramatic change from year 19 to 20 for the bottom and top quartiles is likely due to sample size error and survivor bias, rather than reflecting a change in performance. The small number of funds reporting (33, down from 99 in year 19), and vintage year concentration, could create a misleading change in performance for this period.

In addition to TVPI, we examined the DPI for years 1 – 20 shown in Exhibits 11 – 13

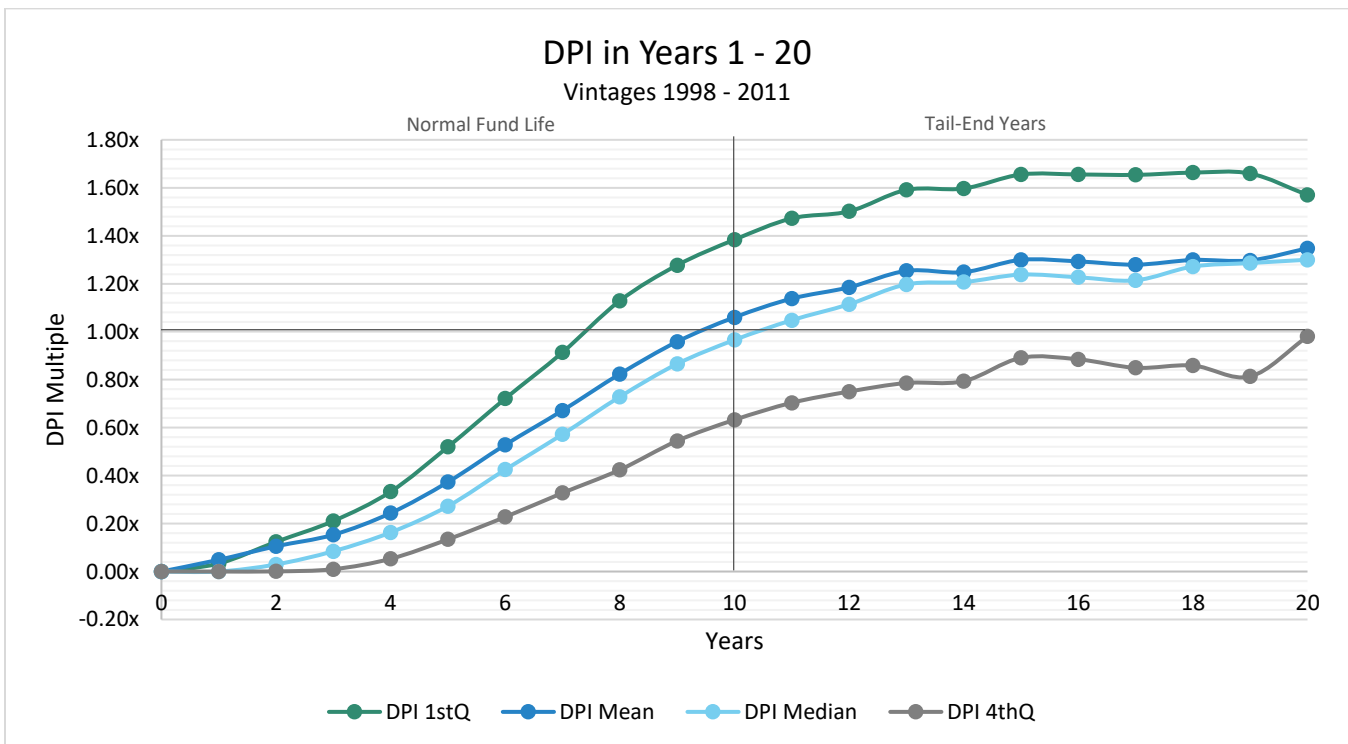
Exhibit 11

DPI Vintages 1998 – 2011											
Years	0	1	2	3	4	5	6	7	8	9	10
DPI Mean	0.00x	0.05x	0.11x	0.15x	0.24x	0.37x	0.53x	0.67x	0.82x	0.96x	1.06x
DPI Median	0.00x	0.00x	0.03x	0.08x	0.16x	0.27x	0.42x	0.57x	0.73x	0.87x	0.97x
DPI 4thQ	0.00x	0.00x	0.00x	0.01x	0.05x	0.13x	0.23x	0.33x	0.42x	0.54x	0.63x
DPI 1stQ	0.00x	0.03x	0.12x	0.21x	0.33x	0.52x	0.72x	0.91x	1.13x	1.28x	1.38x
Fund Count	1,109	1,423	1,457	1,487	1,518	1,552	1,521	1,504	1,409	1,324	1,240

Exhibit 12

DPI Vintages 1998 – 2007											
Years	11	12	13	14	15	16	17	18	19	20	
DPI Mean	1.14x	1.18x	1.25x	1.25x	1.30x	1.29x	1.28x	1.30x	1.30x	1.35x	
DPI Median	1.05x	1.11x	1.20x	1.21x	1.24x	1.23x	1.21x	1.27x	1.29x	1.30x	
DPI 4thQ	0.70x	0.75x	0.79x	0.79x	0.89x	0.88x	0.85x	0.86x	0.81x	0.98x	
DPI 1stQ	1.47x	1.50x	1.59x	1.60x	1.66x	1.66x	1.65x	1.66x	1.66x	1.57x	
Fund Count	1,096	929	732	588	499	424	317	223	102	34	

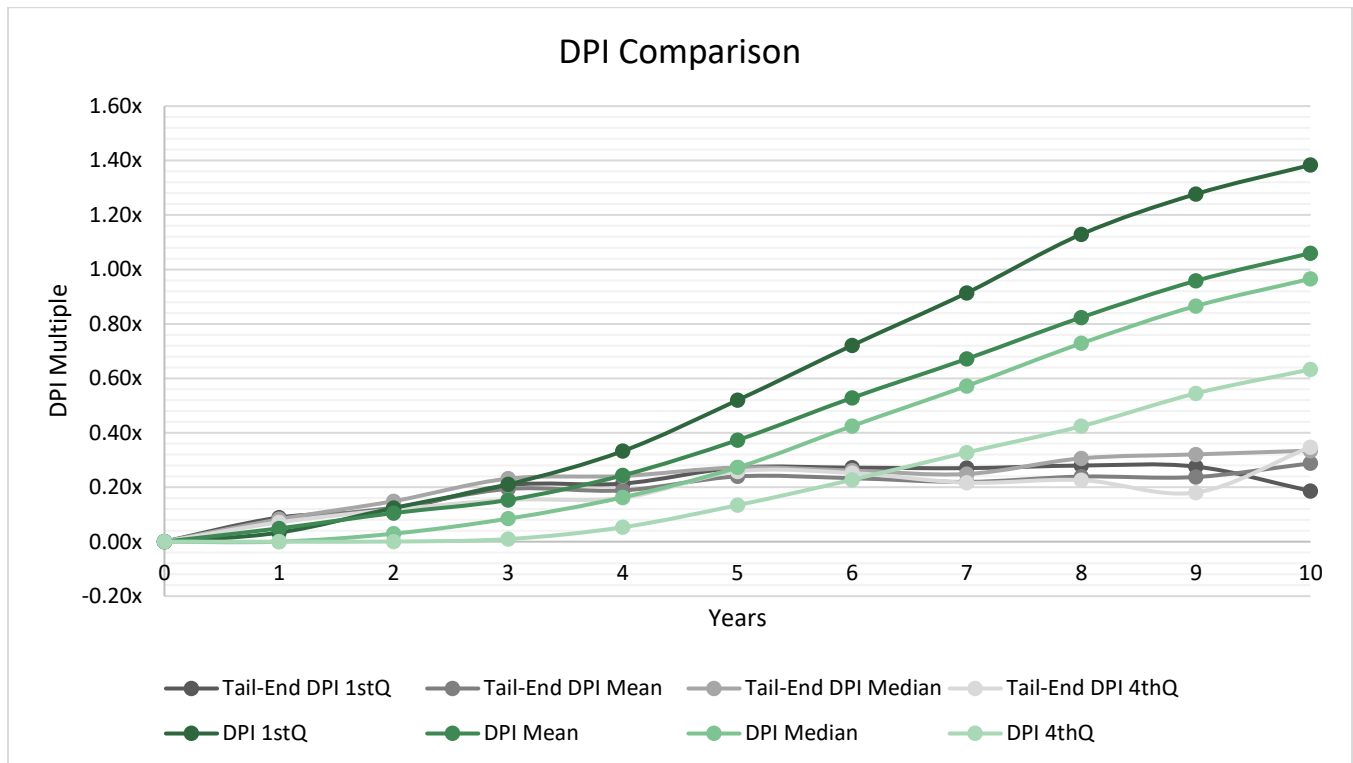
Exhibit 13



Interestingly, DPI continues to increase through year 13 for all quartiles but is basically flat thereafter, meaning little liquidity comes after 13 years. It should be noted that periodic decreases in DPI (as seen in the 4<sup>th</sup> quartile DPI from years 15 through 19) are likely due to survivor bias and decreasing sample size. For example, 1998 is the only vintage year reporting for year 20 and only 34 funds have reported DPI information. 102 funds have reported DPI information for 1998 and 1999 vintage years (year 19). With a small sample size, a single outsized result could impact averages and could skew results. DPI could decrease if capital is called and invested without additional distributions, however capital calls seem unlikely at this stage of the fund life.

To calculate the incremental distributions in the Tail-End Years, we reset the DPI back to 0.00x in year ten for each quartile respectively so that only the distributions after year ten are captured. We then compared this “Tail-End DPI” to the DPI in years one through ten, shown in [Exhibit 14](#).

Exhibit 14



Based on the TVPI, DPI and appreciation rate, it is easy to conclude that investment performance over the first 10 years of a private equity fund’s life is superior to performance after 10 years. The harder question to answer is at what price, measured by discount to NAV, would it make sense for an LP to sell their tail-end portfolio?

## Scenario Testing

We created three models to find the break-even points, where selling at a discount is equivalent to holding. All models use the DPI data from Exhibits 11 & 12 and RVPI data shown in Exhibits 15 & 16 to calculate the “Distributions” and “Remaining Value” each year.

### Exhibit 15

RVPI Vintages 1998 - 2011											
Years	0	1	2	3	4	5	6	7	8	9	10
RVPI Mean	0.92x	0.94x	0.92x	0.89x	0.88x	0.86x	0.80x	0.76x	0.63x	0.53x	0.44x
RVPI Median	0.93x	0.95x	0.94x	0.93x	0.92x	0.91x	0.84x	0.77x	0.66x	0.56x	0.47x
RVPI 4thQ	0.82x	0.85x	0.86x	0.86x	0.87x	0.86x	0.82x	0.77x	0.69x	0.59x	0.48x
RVPI 1stQ	1.01x	1.01x	1.00x	0.96x	0.94x	0.89x	0.82x	0.74x	0.58x	0.49x	0.39x
Fund Count	1098	1413	1439	1464	1492	1524	1495	1479	1379	1295	1216

### Exhibit 16

RVPI Vintages 1998 - 2007										
Years	11	12	13	14	15	16	17	18	19	20
RVPI Mean	0.35x	0.27x	0.21x	0.17x	0.11x	0.08x	0.07x	0.06x	0.05x	0.02x
RVPI Median	0.39x	0.28x	0.21x	0.18x	0.13x	0.10x	0.09x	0.06x	0.01x	0.02x
RVPI 4thQ	0.38x	0.31x	0.26x	0.21x	0.13x	0.10x	0.07x	0.05x	0.06x	0.02x
RVPI 1stQ	0.31x	0.26x	0.19x	0.15x	0.07x	0.08x	0.05x	0.03x	0.06x	0.08x
Fund Count	1073	906	712	570	480	407	308	221	101	34

Each model has three scenarios:

- Long Hold** - assumes the initial investment is held for 20 years, at which point the Remaining Value in year 20 is reinvested into a new private equity fund. This is intended to represent a worst-case hold scenario.
- Short Hold** - assumes the initial investment is held for 13 years<sup>7</sup>, at which point the Remaining Value in year 13 is reinvested into a new private equity fund (no discount is applied). This is intended to represent an optimistic hold scenario.
- Sell** - assumes the initial investment is held for 10 years, at which point the Remaining Value in year 10 is discounted and reinvested into a new private equity fund. Once this new investment is invested for ten years, another sale occurs, a discount is applied to the remaining value and is reinvested again. The discount used in the Sell Scenario is calculated so that the outcome from the Sell Scenario is equivalent to the Short Hold Scenario.

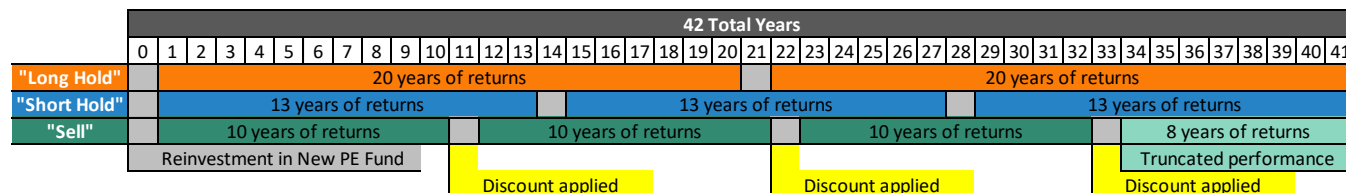
<sup>7</sup> Year 13 was selected because DPI continues to increase through year 13 and asset depreciation is minimal through year 13. This is intended to be representative of an “upside” or “optimistic” scenario for holding Tail-End funds.

All three of the models use a hypothetical \$100 million initial investment and assume distributions are reinvested at a constant 7% compounding annually. Each scenario "Total" is the sum of the Reinvested Distributions and Remaining Value for that year.

The discount used for each Sell scenario was calculated so that the Sell Total equals the Short Hold Total in year 41. This provides us with the largest discount that would make selling no worse than holding if the fund fully distributes the remaining NAV in year 13. Since funds may live longer than 13 years, this calculation was repeated (but not shown in Exhibits 18 - 29), comparing the Sell scenario to the Long Hold scenario. This provides us with the largest discount that would make selling no worse than holding for 20 years (a worst-case scenario).

Exhibit 17 shows the three scenarios' investment periods, with a new commitment to a private equity fund shown in grey and the three points in time when a discount is applied under the Sell Scenario shown in yellow. When a new commitment is made to a private equity fund, we assumed the capital was immediately invested. In reality, new commitments are drawn over multiple years, with undrawn capital being invested in liquid investments, which would likely earn a return high enough to offset the J-curve.

Exhibit 17



## Model 1 – Mean Returns and Measuring Opportunity Costs

We assumed an initial \$100 million investment is made into an average (mean) private equity fund. Over the first ten years, all scenarios are equal, since a sale hasn't occurred yet. See [Exhibit 18](#).

### Exhibit 18 – Mean Returns

Years		0	1	2	3	4	5	6	7	8	9	10
<b>Long Hold</b>	Distributions	0.00	4.89	5.63	4.81	9.04	12.94	15.52	14.32	15.22	13.46	10.15
	Remaining Value	92.21	94.13	91.85	89.25	88.34	86.00	79.89	76.20	62.95	52.80	43.81
	Reinvested Dist.	0.00	4.89	10.86	16.43	26.62	41.42	59.85	78.36	99.06	119.45	137.97
	<b>Long Hold - Total</b>	92.21	99.02	102.71	105.68	114.96	127.42	139.73	154.55	162.01	172.25	181.77
<b>Short Hold</b>	Distributions	0.00	4.89	5.63	4.81	9.04	12.94	15.52	14.32	15.22	13.46	10.15
	Remaining Value	92.21	94.13	91.85	89.25	88.34	86.00	79.89	76.20	62.95	52.80	43.81
	Reinvested Dist.	0.00	4.89	10.86	16.43	26.62	41.42	59.85	78.36	99.06	119.45	137.97
	<b>Short Hold - Total</b>	92.21	99.02	102.71	105.68	114.96	127.42	139.73	154.55	162.01	172.25	181.77
<b>Sell - 87.34% of NAV</b>	Distributions	0.00	4.89	5.63	4.81	9.04	12.94	15.52	14.32	15.22	13.46	10.15
	Remaining Value	92.21	94.13	91.85	89.25	88.34	86.00	79.89	76.20	62.95	52.80	43.81
	Reinvested Dist.	0.00	4.89	10.86	16.43	26.62	41.42	59.85	78.36	99.06	119.45	137.97
	<b>Sell - Total</b>	92.21	99.02	102.71	105.68	114.96	127.42	139.73	154.55	162.01	172.25	181.77

In [Exhibit 19](#), the Sell Scenario assumes the Remaining Value in year 10 is sold at 87.34% of NAV (a 12.66% discount). The Year 11 Remaining Value, therefore, is 87.34% of Year 10 Remaining Value multiplied by the year zero RVPI Mean from [Exhibit 15](#). This represents a new commitment in the amount of the sale proceeds to an average private equity fund. The Sell Scenario Distributions are calculated by taking 87.34% of the Year 10 Remaining Value and multiplying it by the year zero DPI Mean from [Exhibit 11](#). The effect of selling at a discount and reinvesting can be seen starting in year 11.

In year 14, the Short Hold scenario assumes the Remaining Value from year 13 is reinvested in a new average private equity fund (with no discount applied). This makes the Short Hold scenario begin to outperform the Long Hold scenario. At this time, the Sell Scenario Total has surpassed the Long Hold Total but has not surpassed the Short Hold Total, which occurs in year 16. To be clear, in the Sell Scenario, the investor takes a discount on the Remaining Value in year 10, which results in a lower total value starting year 11 relative to both Hold Scenarios. However, the investor who sells can reinvest and benefit from accelerated capital appreciation. The accelerated capital appreciation will provide a higher return than holding within four to six years of selling. **Red** indicates the lowest scenario Total and **bold** with a thick border indicates the highest scenario Total. See [Exhibit 19](#).

Exhibit 19 – Mean Returns

Years		10	11	12	13	14	15	16	17	18	19	20
Long Hold	Distributions	10.15	7.81	4.71	6.86	0.00	5.13	0.00	0.00	1.96	0.00	5.03
	Remaining Value	43.81	35.28	26.51	20.96	16.94	10.53	8.48	7.34	5.55	5.41	2.02
	Reinvested Dist.	137.97	155.43	171.02	189.85	203.14	222.50	238.07	254.74	274.53	293.75	319.34
	Long Hold - Total	181.77	190.71	197.54	210.82	220.09	233.03	246.56	262.08	280.08	299.16	321.36
Short Hold	Distributions	10.15	7.81	4.71	6.86	0.00	1.02	1.18	1.01	1.89	2.71	3.25
	Remaining Value	43.81	35.28	26.51	20.96	19.33	19.73	19.25	18.71	18.52	18.03	16.75
	Reinvested Dist.	137.97	155.43	171.02	189.85	203.14	218.39	234.86	252.30	271.86	293.60	317.41
	Short Hold - Total	181.77	190.71	197.54	210.82	222.47	238.12	254.11	271.01	290.38	311.63	334.16
Sell - 87.34% of NAV	Distributions	10.15	0.00	1.87	2.15	1.84	3.46	4.95	5.94	5.48	5.82	5.15
	Remaining Value	43.81	35.28	36.02	35.14	34.15	33.80	32.90	30.56	29.15	24.08	20.20
	Reinvested Dist.	137.97	147.62	159.83	173.17	187.13	203.69	222.90	244.44	267.03	291.54	317.10
	Sell - Total	181.77	182.90	195.84	208.31	221.28	237.49	255.80	275.00	296.18	315.63	337.30

In Exhibit 20, the Long Hold scenario assumes the Remaining Value in year 20 is reinvested in a new average private equity fund. The Remaining Value, at this point, has depreciated to a level that the Long Hold scenario remains the lowest returning scenario. The Sell Scenario is the highest returning scenario for years 20 and 21, until another discount is taken on the year 21 Remaining Value. Once again, the Remaining Value in year 21 is multiplied by 87.34% and the year zero RVPI Mean from Exhibit 15. In year 28, the Short Hold scenario reinvests the Remaining Value from year 27 and makes a new commitment to an average private equity fund. This also happens to be the year the Sell Scenario returns the highest scenario Total.

Exhibit 20 – Mean Returns

Years		20	21	22	23	24	25	26	27	28	29	30
Long Hold	Distributions	5.03	0.00	0.10	0.11	0.10	0.18	0.26	0.31	0.29	0.31	0.27
	Remaining Value	2.02	1.87	1.90	1.86	1.81	1.79	1.74	1.62	1.54	1.27	1.07
	Reinvested Dist.	319.34	341.69	365.71	391.43	418.92	448.43	480.08	514.00	550.27	589.10	630.61
	Long Hold - Total	321.36	343.56	367.62	393.28	420.73	450.22	481.82	515.62	551.81	590.37	631.68
Short Hold	Distributions	3.25	3.00	3.19	2.82	2.13	1.64	0.99	1.44	0.00	0.21	0.25
	Remaining Value	16.75	15.97	13.20	11.07	9.18	7.39	5.56	4.39	4.05	4.14	4.04
	Reinvested Dist.	317.41	342.63	369.80	398.51	428.54	460.17	493.37	529.34	566.40	606.26	648.95
	Short Hold - Total	334.16	358.60	383.00	409.58	437.72	467.57	498.93	533.74	570.45	610.40	652.98
Sell - 87.34% of NAV	Distributions	5.15	3.88	0.00	0.72	0.82	0.70	1.32	1.89	2.27	2.10	2.23
	Remaining Value	20.20	16.76	13.50	13.78	13.44	13.06	12.93	12.59	11.69	11.15	9.21
	Reinvested Dist.	317.10	343.18	367.21	393.63	422.00	452.25	485.23	521.09	559.84	601.12	645.43
	Sell - Total	337.30	359.94	380.70	407.40	435.45	465.31	498.16	533.68	571.53	612.28	654.64



The model continues through year 41, in [Exhibit 21](#). The Short Hold Total and Sell Scenario Total are effectively equal over this time period, with the Reinvested Distributions for contributing 99%+ of the value in the scenario Totals. At the end of year 41, on an original \$100 million fund commitment, the difference between the Long Hold and the Sell scenario is \$45 million. In present value terms (using a 7% discount rate), this is \$2.6 million or 2.6% of the original \$100 million investment.

#### Exhibit 21 – Mean Returns

	Years	31	32	33	34	35	36	37	38	39	40	41
Long Hold	Distributions	0.21	0.16	0.10	0.14	0.00	0.10	0.00	0.00	0.04	0.00	0.10
	Remaining Value	0.89	0.71	0.54	0.42	0.34	0.21	0.17	0.15	0.11	0.11	0.04
	Reinvested Dist.	674.96	722.36	773.02	827.27	885.18	947.25	1013.56	1084.50	1160.46	1241.69	1328.71
	Long Hold - Total	<b>675.84</b>	<b>723.08</b>	<b>773.56</b>	<b>827.70</b>	<b>885.52</b>	<b>947.46</b>	<b>1013.73</b>	<b>1084.65</b>	<b>1160.57</b>	<b>1241.80</b>	<b>1328.75</b>
Short Hold	Distributions	0.21	0.40	0.57	0.68	0.63	0.67	0.59	0.45	0.34	0.21	0.30
	Remaining Value	3.92	3.88	3.78	3.51	3.35	2.77	2.32	1.93	1.55	1.17	0.92
	Reinvested Dist.	694.58	743.60	796.22	852.64	912.96	977.53	1046.55	1120.26	1199.02	1283.15	1373.28
	Short Hold - Total	<b>698.51</b>	<b>747.49</b>	<b>800.00</b>	<b>856.15</b>	<b>916.30</b>	<b>980.30</b>	<b>1048.87</b>	<b>1122.18</b>	<b>1200.57</b>	<b>1284.32</b>	<b>1374.20</b>
Sell - 87.34% of NAV	Distributions	1.97	1.49	0.00	0.27	0.32	0.27	0.51	0.72	0.87	0.80	0.85
	Remaining Value	7.73	6.41	5.16	5.27	5.14	5.00	4.95	4.82	4.47	4.27	3.53
	Reinvested Dist.	692.58	742.54	794.52	850.41	910.26	974.24	1042.95	1116.68	1195.72	1280.22	1370.69
	Sell - Total	<b>700.31</b>	<b>748.96</b>	<b>799.69</b>	<b>855.68</b>	<b>915.40</b>	<b>979.24</b>	<b>1047.90</b>	<b>1121.50</b>	<b>1200.19</b>	<b>1284.49</b>	<b>1374.21</b>

When an LP is considering the decision to sell or hold a Tail-End fund until final distribution, the LP cannot know with certainty when the final distribution will occur. The fund may sell its final asset in year 12, year 15, or retain assets in year 20 with no prospects for liquidity. The most likely outcome would be somewhere in between the Long Hold scenario and the Short Hold scenario. The 87.34% of NAV (12.66% discount) was calculated so that the Short Hold Total and Sell Total for year 41 were equal. A different break-even point could be used to calculate a different discount. For example, if we changed the break-even point for selling to be equal to the Long Hold total in year 41, the discount would be 25%. This means LPs could accept discounts between 12% and 25% and would likely be in a better position than if they continued holding Tail-End funds.

### Model 2 – Top Quartile Returns and Measuring Opportunity Costs

Model 2 is similar to Model 1, except that the initial investment is in a top quartile private equity fund. In this model, we assume the investor reinvests the Remaining Value into another top quartile fund. The 1stQ DPI data from [Exhibit 11](#) and 1stQ RVPI data from [Exhibit 15](#) were used to calculate the Distributions and Remaining Values respectively for all scenarios. Additionally, a discount of 15.8% (84.2% of NAV) was modeled under the “Sell” scenario.

As was the case in Model 1, during the first ten years all scenarios are equal, since a sale has yet to occur. See [Exhibit 22](#).

### Exhibit 22 – Top Quartile Returns

	Years	0	1	2	3	4	5	6	7	8	9	10
Long Hold	Distributions	0.00	3.33	9.04	8.68	12.24	18.68	20.13	19.28	21.52	14.81	10.65
	Remaining Value	101.43	101.21	99.68	96.08	94.35	88.54	81.90	73.53	57.53	48.82	39.08
	Reinvested Dist.	0.00	3.33	12.60	22.17	35.96	57.16	81.29	106.25	135.21	159.48	181.30
	Long Hold - Total	101.43	104.55	112.28	118.25	130.31	145.70	163.19	179.78	192.74	208.31	220.38
Short Hold	Distributions	0.00	3.33	9.04	8.68	12.24	18.68	20.13	19.28	21.52	14.81	10.65
	Remaining Value	101.43	101.21	99.68	96.08	94.35	88.54	81.90	73.53	57.53	48.82	39.08
	Reinvested Dist.	0.00	3.33	12.60	22.17	35.96	57.16	81.29	106.25	135.21	159.48	181.30
	Short Hold - Total	101.43	104.55	112.28	118.25	130.31	145.70	163.19	179.78	192.74	208.31	220.38
Sell - 84.2% of NAV	Distributions	0.00	3.33	9.04	8.68	12.24	18.68	20.13	19.28	21.52	14.81	10.65
	Remaining Value	101.43	101.21	99.68	96.08	94.35	88.54	81.90	73.53	57.53	48.82	39.08
	Reinvested Dist.	0.00	3.33	12.60	22.17	35.96	57.16	81.29	106.25	135.21	159.48	181.30
	Sell - Total	101.43	104.55	112.28	118.25	130.31	145.70	163.19	179.78	192.74	208.31	220.38

In [Exhibit 23](#), the Sell Scenario assumes the Remaining Value in year 10 is sold at 84.2% of NAV (a 15.8% discount) and reinvested into a new top quartile manager. The effect of the discount and reinvestment can be seen in year 11 in the “Sell – Total” being less than the other two scenarios. The Sell scenario continues to have the lowest total until year 15, where the Short Hold scenario is the best outcome and the Long Hold scenario is the worst outcome. The Sell scenario surpasses the Short Hold scenario in year 17.

Exhibit 23 – Top Quartile Returns

Years		10	11	12	13	14	15	16	17	18	19	20
Long Hold	Distributions	10.65	8.88	2.92	8.95	0.59	5.84	0.00	0.00	0.94	0.00	0.00
	Remaining Value	39.08	30.73	26.07	19.24	14.65	7.13	7.56	4.77	2.96	6.01	8.00
	Reinvested Dist.	181.30	202.88	219.99	244.34	262.04	286.22	306.26	327.70	351.59	376.20	402.53
	Long Hold - Total	220.38	233.61	246.07	263.58	276.68	293.35	313.83	332.47	354.55	382.21	410.53
Short Hold	Distributions	10.65	8.88	2.92	8.95	0.00	0.64	1.74	1.67	2.35	3.59	3.87
	Remaining Value	39.08	30.73	26.07	19.24	19.51	19.47	19.18	18.48	18.15	17.03	15.76
	Reinvested Dist.	181.30	202.88	219.99	244.34	261.45	280.39	301.76	324.55	349.62	377.69	408.00
	Short Hold - Total	220.38	233.61	246.07	263.58	280.96	299.86	320.93	343.03	367.77	394.72	423.76
Sell – 84.2% of NAV	Distributions	10.65	0.00	1.10	2.97	2.86	4.03	6.15	6.62	6.34	7.08	4.87
	Remaining Value	39.08	33.38	33.31	32.80	31.62	31.05	29.14	26.95	24.20	18.93	16.07
	Reinvested Dist.	181.30	193.99	208.67	226.25	244.95	266.12	290.90	317.88	346.48	377.81	409.13
	Sell - Total	220.38	227.37	241.98	259.05	276.56	297.17	320.03	344.83	370.67	396.74	425.20

Exhibit 24 shows the Sell Scenario total drops below the Short Hold scenario total in year 22 due to another 15.5% discount being applied to the Remaining Value of the Sell scenario in year 22. Once again, as time progresses, the Short Hold scenario and the Sell scenario totals become effectively equivalent.

Exhibit 24 – Top Quartile Returns

Years		20	21	22	23	24	25	26	27	28	29	30
Long Hold	Distributions	0.00	0.00	0.27	0.72	0.69	0.98	1.49	1.61	1.54	1.72	1.18
	Remaining Value	8.00	8.11	8.10	7.97	7.69	7.55	7.08	6.55	5.88	4.60	3.91
	Reinvested Dist.	402.53	430.71	461.12	494.12	529.41	567.45	608.66	652.88	700.12	750.85	804.60
	Long Hold - Total	410.53	438.82	469.22	502.10	537.09	574.99	615.74	659.43	706.00	755.45	808.50
Short Hold	Distributions	3.87	3.71	4.14	2.85	2.05	1.71	0.56	1.72	0.00	0.12	0.33
	Remaining Value	15.76	14.15	11.07	9.39	7.52	5.91	5.02	3.70	3.75	3.75	3.69
	Reinvested Dist.	408.00	440.27	475.23	511.34	549.19	589.34	631.15	677.06	724.45	775.29	829.89
	Short Hold - Total	423.76	454.42	486.30	520.74	556.71	595.25	636.17	680.76	728.20	779.03	833.58
Sell – 84.2% of NAV	Distributions	4.87	3.51	0.00	0.40	1.10	1.05	1.49	2.27	2.44	2.34	2.61
	Remaining Value	16.07	14.41	12.31	12.28	12.10	11.66	11.45	10.75	9.94	8.92	6.98
	Reinvested Dist.	409.13	441.28	472.16	505.62	542.11	581.11	623.28	669.17	718.46	771.09	827.68
	Sell - Total	425.20	455.69	484.48	517.91	554.21	592.77	634.73	679.92	728.40	780.01	834.66

Exhibit 25 – Top Quartile Returns

	Years	31	32	33	34	35	36	37	38	39	40	41
Long Hold	Distributions	0.85	0.71	0.23	0.72	0.05	0.47	0.00	0.00	0.08	0.00	0.00
	Remaining Value	3.13	2.46	2.09	1.54	1.17	0.57	0.60	0.38	0.24	0.48	0.64
	Reinvested Dist.	861.77	922.80	987.63	1057.48	1131.56	1211.23	1296.02	1386.74	1483.89	1587.76	1698.90
	<b>Long Hold - Total</b>	<b>864.90</b>	<b>925.26</b>	<b>989.72</b>	<b>1059.02</b>	<b>1132.73</b>	<b>1211.80</b>	<b>1296.62</b>	<b>1387.12</b>	<b>1484.12</b>	<b>1588.24</b>	<b>1699.54</b>
Short Hold	Distributions	0.32	0.45	0.69	0.74	0.71	0.80	0.55	0.39	0.33	0.11	0.33
	Remaining Value	3.56	3.49	3.28	3.03	2.72	2.13	1.81	1.45	1.14	0.96	0.71
	Reinvested Dist.	888.30	950.94	1018.19	1090.21	1167.24	1249.74	1337.77	1431.81	1532.37	1639.74	1754.86
	<b>Short Hold - Total</b>	<b>891.86</b>	<b>954.43</b>	<b>1021.47</b>	<b>1093.24</b>	<b>1169.96</b>	<b>1251.87</b>	<b>1339.58</b>	<b>1433.26</b>	<b>1533.51</b>	<b>1640.71</b>	<b>1755.57</b>
Sell – 84.2% of NAV	Distributions	1.80	1.29	0.00	0.13	0.36	0.35	0.49	0.75	0.80	0.77	0.86
	Remaining Value	5.93	4.74	4.05	4.04	3.98	3.84	3.77	3.54	3.27	2.94	2.30
	Reinvested Dist.	887.41	950.82	1017.38	1088.73	1165.30	1247.22	1335.02	1429.21	1530.06	1637.94	1753.45
	<b>Sell - Total</b>	<b>893.34</b>	<b>955.57</b>	<b>1021.43</b>	<b>1092.77</b>	<b>1169.29</b>	<b>1251.06</b>	<b>1338.79</b>	<b>1432.75</b>	<b>1533.33</b>	<b>1640.87</b>	<b>1755.75</b>

The 15.8% discount (84.2% of NAV) was calculated so that the Short Hold Total and Sell Total for year 41 were equal. Changing the break-even point for selling to be equal to the Long Hold total in year 41, the discount would be 30% (70% of NAV). This means LPs could accept discounts between 15% and 30% on top quartile tail-end funds and be no worse off, if other potentially top quartile investments are available. At the end of year 41, the difference between the Long Hold and the Sell scenario Total is \$56 million. In present value terms (using a 7% discount rate), this is \$3.27 million or 3.27% of the original \$100 million investment.

### Model 3 – Bottom Quartile to Top Quartile Performance and Measuring Opportunity Costs

Model 3 examines an initial investment in a bottom quartile private equity fund and the Remaining Value in each scenario is reinvested into a top quartile fund. As was the case in the previous two models, the first ten years are identical for each scenario. See [Exhibit 26](#).

#### Exhibit 26 – Bottom Quartile to Top Quartile Performance

Years		0	1	2	3	4	5	6	7	8	9	10
Long Hold	Distributions	0.00	0.00	0.05	0.91	4.34	8.10	9.33	10.02	9.65	12.06	8.78
	Remaining Value	81.53	85.24	85.73	86.12	87.45	85.51	82.35	76.85	69.28	58.54	48.48
	Reinvested Dist.	0.00	0.00	0.05	0.97	5.38	13.86	24.16	35.87	48.04	63.46	76.68
	Long Hold - Total	81.53	85.24	85.78	87.09	92.83	99.37	106.51	112.72	117.31	122.00	125.16
Short Hold	Distributions	0.00	0.00	0.05	0.91	4.34	8.10	9.33	10.02	9.65	12.06	8.78
	Remaining Value	81.53	85.24	85.73	86.12	87.45	85.51	82.35	76.85	69.28	58.54	48.48
	Reinvested Dist.	0.00	0.00	0.05	0.97	5.38	13.86	24.16	35.87	48.04	63.46	76.68
	Short Hold - Total	81.53	85.24	85.78	87.09	92.83	99.37	106.51	112.72	117.31	122.00	125.16
Sell – 72.34% of NAV	Distributions	0.00	0.00	0.05	0.91	4.34	8.10	9.33	10.02	9.65	12.06	8.78
	Remaining Value	81.53	85.24	85.73	86.12	87.45	85.51	82.35	76.85	69.28	58.54	48.48
	Reinvested Dist.	0.00	0.00	0.05	0.97	5.38	13.86	24.16	35.87	48.04	63.46	76.68
	Sell - Total	81.53	85.24	85.78	87.09	92.83	99.37	106.51	112.72	117.31	122.00	125.16

In year 11, the Sell Scenario sells the Remaining Value from year ten for 72.34% of NAV. The proceeds are then reinvested into a top quartile fund. The Short Hold scenario dissolves in year 13 and the Remaining Value is reinvested in a top quartile fund starting year 14. Due to the improved performance of the top quartile compared to the bottom quartile manager being held in the Long Hold scenario, the Short Hold scenario is the best returning scenario in year 14. However, the Sell scenario appreciates and surpasses the Short Hold scenario by year 16.

#### Exhibit 27 – Bottom Quartile to Top Quartile Performance

Years		10	11	12	13	14	15	16	17	18	19	20
Long Hold	Distributions	8.78	7.10	4.68	3.57	0.75	9.73	0.00	0.00	0.95	0.00	16.67
	Remaining Value	48.48	38.40	31.07	26.15	20.67	13.33	9.89	7.39	4.95	6.17	2.00
	Reinvested Dist.	76.68	89.14	100.06	110.64	119.14	137.21	146.81	157.09	169.03	180.86	210.19
	Long Hold - Total	125.16	127.54	131.13	136.79	139.81	150.54	156.70	164.47	173.98	187.03	212.19
Short Hold	Distributions	8.78	7.10	4.68	3.57	0.00	0.87	2.36	2.27	3.20	4.88	5.26
	Remaining Value	48.48	38.40	31.07	26.15	26.52	26.47	26.07	25.12	24.67	23.15	21.42
	Reinvested Dist.	76.68	89.14	100.06	110.64	118.39	127.54	138.84	150.83	164.58	180.99	198.92
	Short Hold - Total	125.16	127.54	131.13	136.79	144.91	154.01	164.90	175.95	189.25	204.14	220.34
Sell – 72.34% of NAV	Distributions	8.78	0.00	1.17	3.17	3.05	4.29	6.55	7.06	6.76	7.55	5.19
	Remaining Value	48.48	35.57	35.49	34.96	33.69	33.09	31.05	28.72	25.79	20.18	17.12
	Reinvested Dist.	76.68	82.05	88.96	98.36	108.29	120.16	135.12	151.64	169.01	188.39	206.77
	Sell - Total	125.16	117.62	124.45	133.31	141.98	153.24	166.17	180.36	194.80	208.56	223.89

As noted in the previous two models, the Short Hold scenario and Sell scenario quickly become effectively equal while the Long Hold scenario remains the worst scenario after year 14.

#### Exhibit 28 – Bottom Quartile to Top Quartile Performance

	Years	20	21	22	23	24	25	26	27	28	29	30
Long Hold	Distributions	16.67	0.00	0.07	0.18	0.17	0.24	0.37	0.40	0.39	0.43	0.30
	Remaining Value	2.00	2.03	2.02	1.99	1.92	1.89	1.77	1.64	1.47	1.15	0.98
	Reinvested Dist.	210.19	224.91	240.72	257.75	275.97	295.53	316.59	339.15	363.28	389.14	416.67
	Long Hold - Total	<b>212.19</b>	<b>226.94</b>	<b>242.74</b>	<b>259.74</b>	<b>277.89</b>	<b>297.42</b>	<b>318.36</b>	<b>340.79</b>	<b>364.75</b>	<b>390.29</b>	<b>417.65</b>
Short Hold	Distributions	5.26	5.04	5.63	3.87	2.79	2.32	0.76	2.34	0.00	0.17	0.45
	Remaining Value	21.42	19.23	15.04	12.77	10.22	8.04	6.82	5.03	5.10	5.09	5.01
	Reinvested Dist.	198.92	217.89	238.77	259.35	280.29	302.24	324.15	349.19	373.63	399.95	428.40
	Short Hold - Total	<b>220.34</b>	<b>237.11</b>	<b>253.81</b>	<b>272.12</b>	<b>290.51</b>	<b>310.27</b>	<b>330.97</b>	<b>354.22</b>	<b>378.73</b>	<b>405.04</b>	<b>433.42</b>
Sell – 72.34% of NAV	Distributions	5.19	3.74	0.00	0.37	1.00	0.96	1.36	2.08	2.24	2.14	2.39
	Remaining Value	17.12	15.36	11.27	11.25	11.08	10.68	10.48	9.84	9.10	8.17	6.39
	Reinvested Dist.	206.77	224.98	240.73	257.95	277.01	297.36	319.54	343.98	370.30	398.36	428.64
	Sell - Total	<b>223.89</b>	<b>240.34</b>	<b>252.00</b>	<b>269.19</b>	<b>288.08</b>	<b>308.04</b>	<b>330.02</b>	<b>353.82</b>	<b>379.40</b>	<b>406.53</b>	<b>435.03</b>

#### Exhibit 29 – Bottom Quartile to Top Quartile Performance

	Years	31	32	33	34	35	36	37	38	39	40	41
Long Hold	Distributions	0.21	0.18	0.06	0.18	0.01	0.12	0.00	0.00	0.02	0.00	0.00
	Remaining Value	0.78	0.61	0.52	0.38	0.29	0.14	0.15	0.10	0.06	0.12	0.16
	Reinvested Dist.	446.06	477.46	510.94	546.88	585.17	626.25	670.09	717.00	767.21	820.91	878.38
	Long Hold - Total	<b>446.84</b>	<b>478.07</b>	<b>511.46</b>	<b>547.27</b>	<b>585.47</b>	<b>626.40</b>	<b>670.24</b>	<b>717.09</b>	<b>767.27</b>	<b>821.03</b>	<b>878.54</b>
Short Hold	Distributions	0.44	0.62	0.94	1.01	0.97	1.08	0.74	0.54	0.45	0.15	0.45
	Remaining Value	4.83	4.75	4.45	4.12	3.70	2.89	2.46	1.97	1.55	1.31	0.97
	Reinvested Dist.	458.83	491.56	526.91	564.81	605.31	648.77	694.92	744.10	796.64	852.55	912.68
	Short Hold - Total	<b>463.66</b>	<b>496.31</b>	<b>531.36</b>	<b>568.93</b>	<b>609.01</b>	<b>651.66</b>	<b>697.38</b>	<b>746.07</b>	<b>798.18</b>	<b>853.86</b>	<b>913.65</b>
Sell – 72.34% of NAV	Distributions	1.65	1.18	0.00	0.10	0.28	0.27	0.38	0.59	0.63	0.61	0.68
	Remaining Value	5.43	4.34	3.19	3.18	3.13	3.02	2.96	2.78	2.57	2.31	1.81
	Reinvested Dist.	460.29	493.69	528.25	565.33	605.19	647.83	693.56	742.69	795.32	851.59	911.88
	Sell - Total	<b>465.71</b>	<b>498.03</b>	<b>531.44</b>	<b>568.51</b>	<b>608.32</b>	<b>650.84</b>	<b>696.52</b>	<b>745.48</b>	<b>797.89</b>	<b>853.90</b>	<b>913.69</b>

Once again, the 27.66% discount (72.34% of NAV) was calculated so that the Sell scenario and Short Hold scenario would be equal in year 41. If we were to recalculate the discount so that the Sell scenario was equal to the Long Hold scenario in year 41, the discount would be 35% (65% of NAV). This shows how detrimental holding poor performing funds over long periods of time drag down total returns. At the end of year 41, the difference between the Long Hold and the Sell scenario Total is \$35 million or \$2 million in present value terms.

One question that arises from these models is, on average, how many years does it take a private equity fund to dissolve? Is it realistic to think funds would continue holding assets beyond 13 years?

**Adams Street Partners, a firm founded in 1972 that has over \$36 billion of AUM and has invested in thousands of PE funds**, provided data as of September 30, 2018. This includes 372 US PE funds in which Adams Street Partners invested on a primary basis from 1979 – 2008. For the US PE funds in the dataset:

- 7.8% dissolved in 10 years or less
- 18.6% dissolved in 12 years or less
- **54.4% dissolved in 15 years or less**
- **94.9% dissolved in 20 years or less, leaving 5.1% still open after 20 years**

While many funds are established with a 10-year life (plus 2 years of extensions), data suggests that nearly half of funds continue to hold assets beyond 15 years. Without a plan to systematically address long-lived funds, Limited Partners could see overall returns impacted by drag from Tail-End funds.

## Preliminary Recommendations

Our analysis clearly highlights some risks and opportunity costs associated with maintaining ownership of Tail-End investments. Therefore, Limited Partners (LPs) should create a systematic approach to addressing their Tail-End investments in order to maximize value and minimize administrative and transactional costs. Whether done internally or with the assistance of a financial advisory firm, a review of each position should include:

- Materiality of positions relative to overall private equity program
- Determination of each investment's intrinsic value
  - Growth prospects of remaining assets
  - Potential capital constraints and need for additional capital
  - Timing of possible sale(s)
  - Portfolio risk (i.e. debt burden, sector or regional market risk)
- Consideration of transfer rights, including General Partner (GP) and LP rights of first refusal (ROFR), and other hurdles that may negatively impact pricing

In order to gather the appropriate information for this analysis, LPs and/or their advisors should communicate with their respective Tail-End fund managers and conduct tertiary market research to validate key elements of the portfolio (i.e. purchase price multiples, market share of portfolio companies, and company and GP stability). Simultaneously, investors should reflect on new opportunities that may be available for redeploying capital while considering the impact of portfolio rebalancing on their asset allocation targets, if applicable.

Should an LP move forward, there are a variety of options available to them with regard to optimizing the outcome of their rebalancing strategies. In addition to a straight secondary purchase, secondary buyers offer a range of structured solutions for investors that help narrow the nominal purchase price discount (or widen the premium). By utilizing different structural options, LPs can further increase value creation as they rebalance their portfolios.

In summary, LPs would benefit from rebalancing their private equity portfolio in the same way liquid strategy portfolio managers rebalance their portfolio periodically. Such benefits can occur even if significant discounts are incurred, assuming an LP can reinvest the capital into attractive new opportunities. As the pool of Tail-End investments aggregate in one's portfolio, the negative impact of these stale assets can be significant. Prudently monetizing Tail-End funds through the secondary market and re-investing the sale proceeds appropriately may prove to be a major contributor to any private equity program's ability to outperform its corresponding benchmarks.



## Appendix

### About Upwelling Capital Group

Founded in 2011, Upwelling Capital Group (“Upwelling”) serves as a trusted strategic advisor to sophisticated private market investors. We recognize complex issues present opportunities to deliver value. Services include strategic portfolio reviews, liquidity solutions for private investment portfolios, active portfolio management and restructurings, and private equity and private debt sourcing and due diligence. Upwelling’s clients include global investment management organizations, endowments, foundations, insurance companies, family offices and middle market private equity and venture capital firms. We examine and inform our clients on an array of options and craft bespoke solutions that align with their long-term interests. Principals have cumulatively overseen over \$50 billion in global private equity commitments and have successfully managed over \$5 billion in legacy, tail-end commitments, transfers and workouts for leading institutional investors. Securities offered through Bridge Capital Associates, Inc. Member [FINRA](#) / [SIPC](#)

### Limitations

Past performance is not predictive of future results. Since data collected is backward looking, it may not be representative of future economic conditions. This analysis does not consider the impact of credit lines prevalent today that are used to fund management fees and expenses, which impact RVPI.

Data selection could impact results. 1998 – 2011 vintage funds were used in this analysis such that sample funds contain performance impacted by the 2000 market correction and the Global Financial Crisis. The funds may also have benefited from the subsequent market improvement between cycles. A separate cross-section of sample funds may generate different results when using the same analytical methodology used in this report.

Sample size and survivor bias could impact results. There were 99 funds with 19-year performance data gathered from 1998 and 1999 vintage funds. This group drops to only 33 funds with 20-year performance data (represented by 1998 vintage funds). The Tail-End data may skew towards lower returns if higher returning funds liquidate promptly at 10 years, leaving only lower returning funds to report, bringing down the performance for all quartiles.

Quartile rankings disguise outlier risks and do not capture movement between quartiles of individual funds from year to year. A single fund’s performance within a quartile (particularly top and bottom quartiles) may deviate significantly from the quartile demarcation. Another study could be done to track investment results to determine if a fund that achieves top quartile performance in the early years finishes as a top quartile performer in the Tail-End years.

### Areas for Refinement

A dataset that tracks a constant sample of funds would improve the model by removing survivor bias. This may not be possible since the number of funds with a twenty-year history is small. The private equity reinvestment could be made according to a draw-down schedule, rather than immediate deployment, to make the model more reflective of reality. Uncalled capital could be modeled as being invested in liquid markets. The constant 7% reinvestment rate used in the model as a proxy for public markets could be refined by using Monte Carlo analysis with a diversified portfolio of liquid investments.

### Disclosures

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