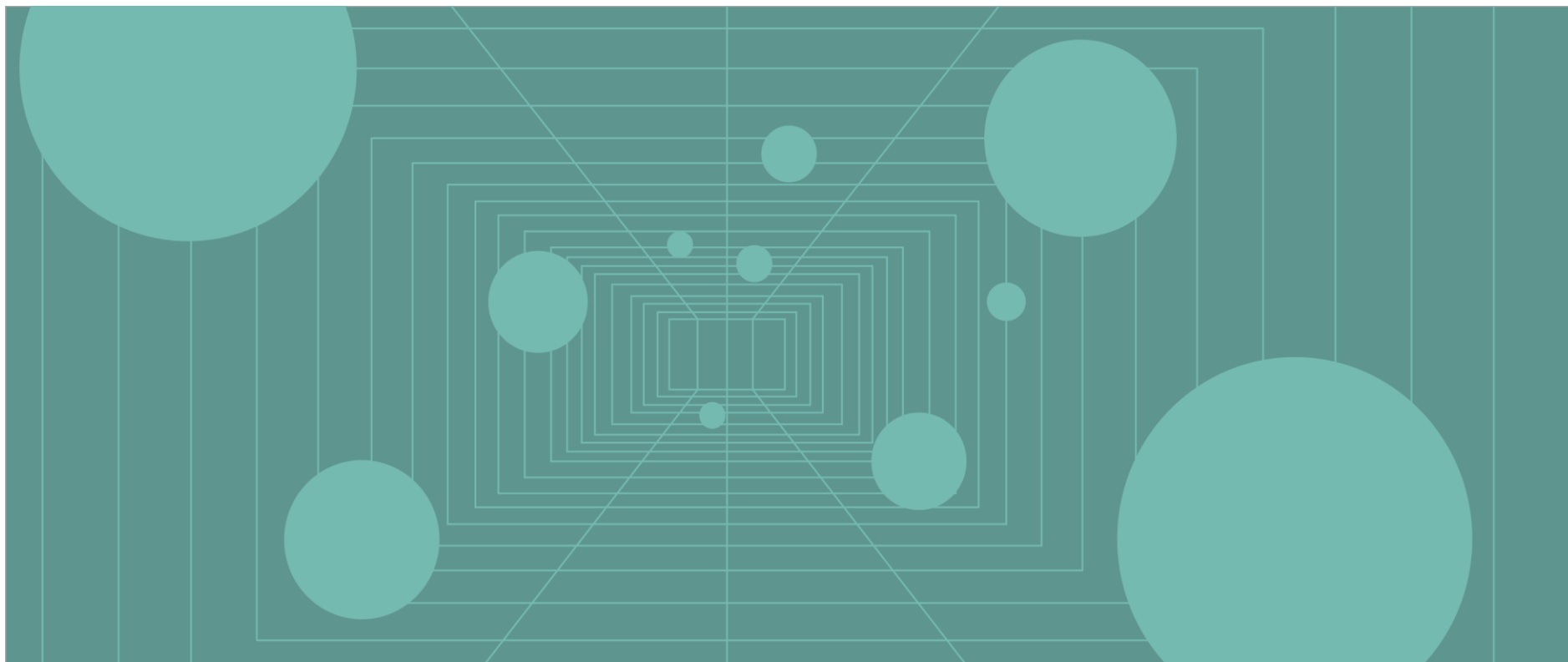


A FRAMEWORK FOR BENCHMARKING PRIVATE INVESTMENTS

PMAR CONFERENCE

RICH CARSON - JILL SHAW



Cambridge Associates' PI benchmarking best practices

- Original research paper published in 2014:

<https://www.cambridgeassociates.com/insight/a-framework-for-benchmarking/>

- Refresh of paper, “Portfolio Benchmarking: Best Practices for Private Investments” published in 2018:

<https://www.cambridgeassociates.com/insight/portfolio-benchmarking-best-practices-for-private-investments/>

- Accompanying 2018 paper focuses on private investments in the context of the policy benchmark and Total Portfolio

<https://www.cambridgeassociates.com/insight/policy-benchmarking-best-practices-for-private-investments/>

Don't try to fit a round peg in a square hole

TWRs and IRRs can lead to very different results

PERFORMANCE MEASURES	ALSO KNOWN AS	SUITABLE FOR
TWR (Time-weighted Returns)	<ul style="list-style-type: none"> Geometric Return AACR 	Public Investments where INVESTORS control the investment decision
IRR (Internal Rate of Return)	<ul style="list-style-type: none"> Money-weighted Return End-to-end Horizon Return 	Private Investments where MANAGERS control the investment decision

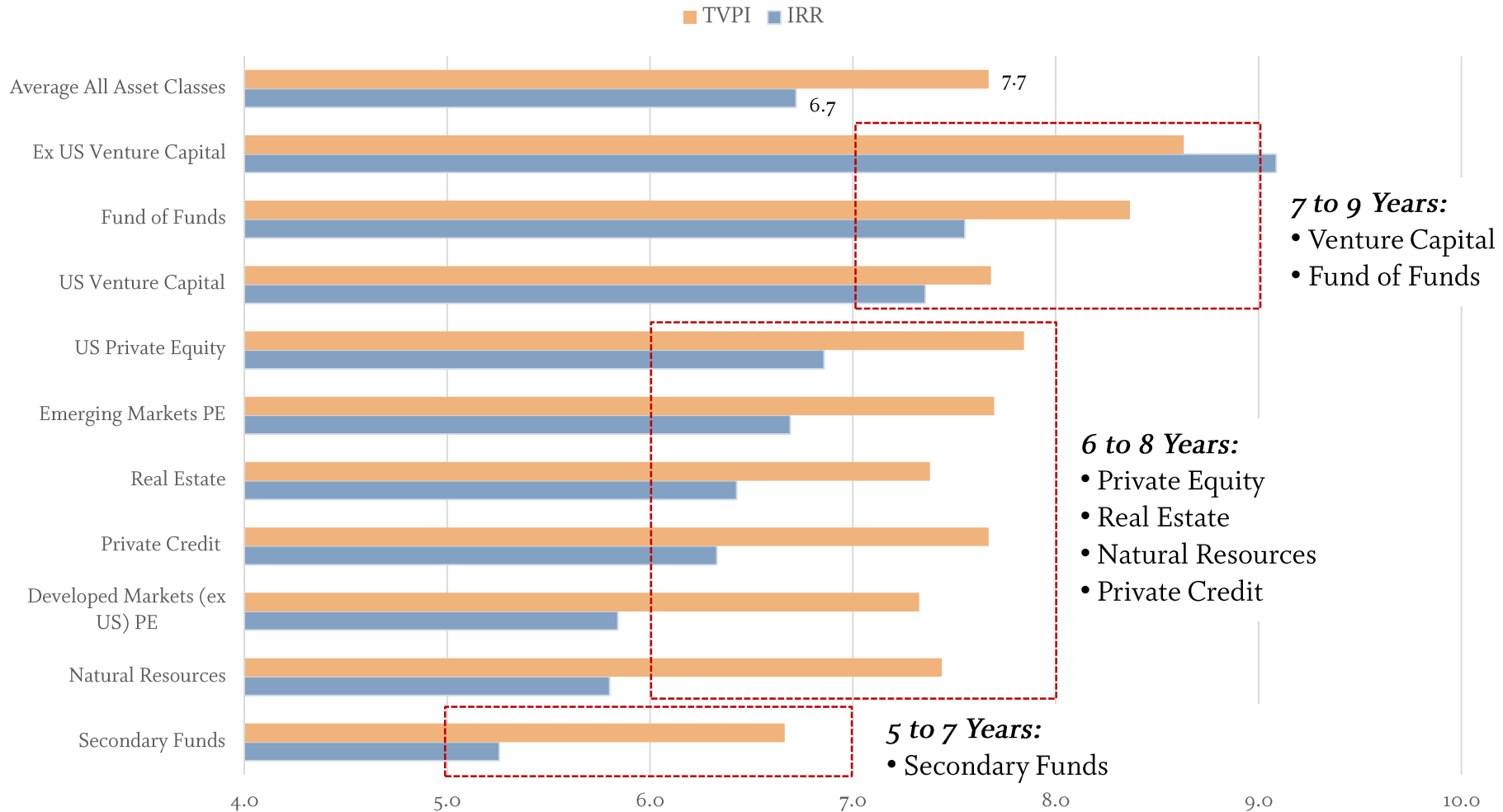
THE DISCONNECT BETWEEN IRRS AND TWRs FOR A SINGLE PRIVATE INVESTMENT

Hypothetical Example

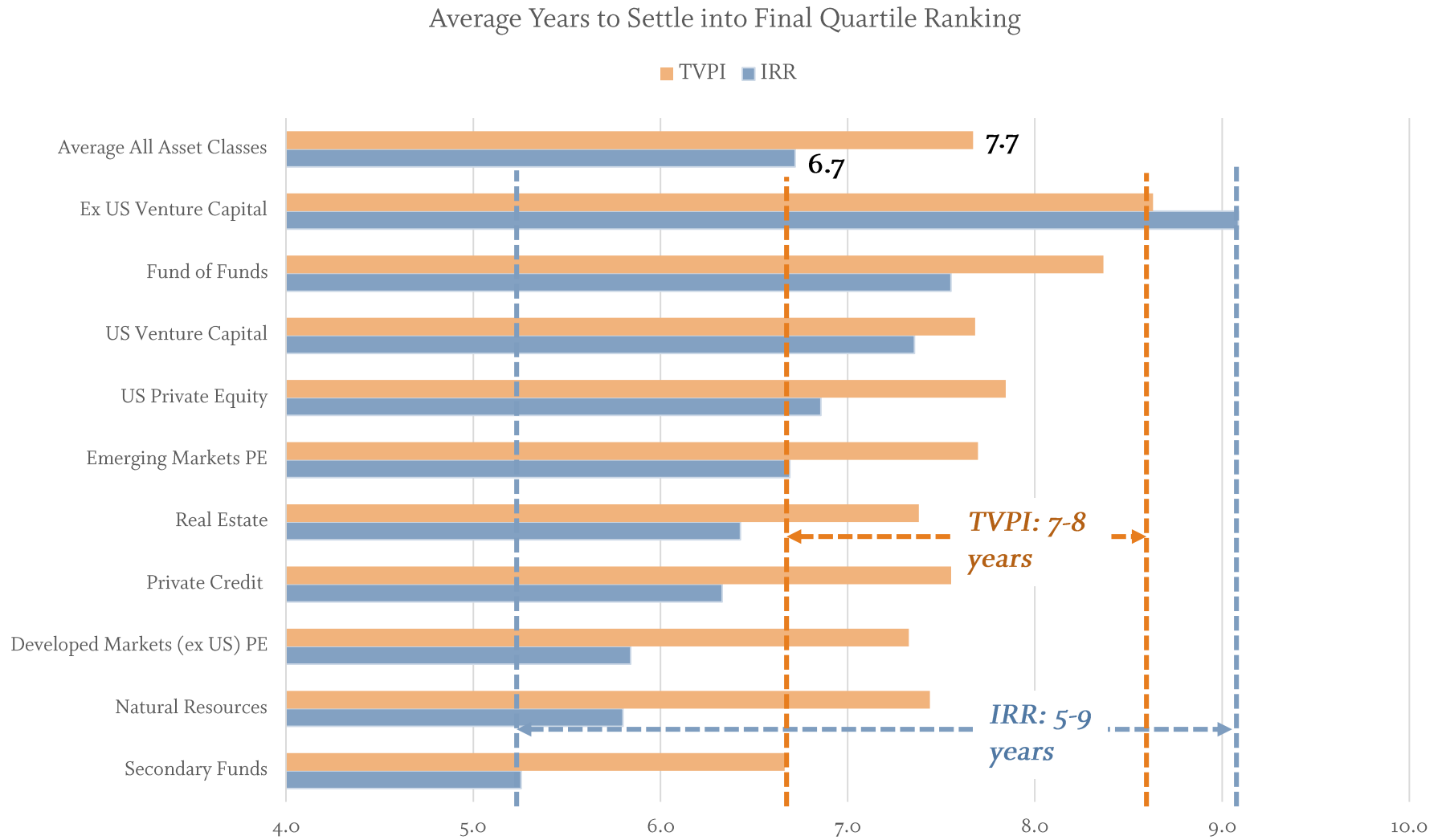
PERIOD DATE	QUARTERLY CONTRIBUTION	QUARTERLY DISTRIBUTION	QUARTERLY NET CASH FLOW	QUARTERLY ENDING NAV	ONE-QUARTER RETURN
Quarter 1	-150,000	---	-150,000	143,864	-8.0%
Quarter 2	-150,000	---	-150,000	278,709	-6.9%
Quarter 3	-100,000	---	-100,000	362,427	-4.9%
Quarter 4	-300,000	---	-300,000	645,672	-3.3%
Quarter 5	-200,000	---	-200,000	831,179	-1.9%
Quarter 6	-150,000	---	-150,000	999,139	2.0%
Quarter 7	-333,000	---	-333,000	1,570,269	20.6%
Quarter 8	-266,667	136,137	-130,530	1,733,789	2.0%
	-1,649,667	136,137			
			IRR	15.3%	
			TVPI	1.1x	
			TWR		-1.6%

The long road to fund maturity

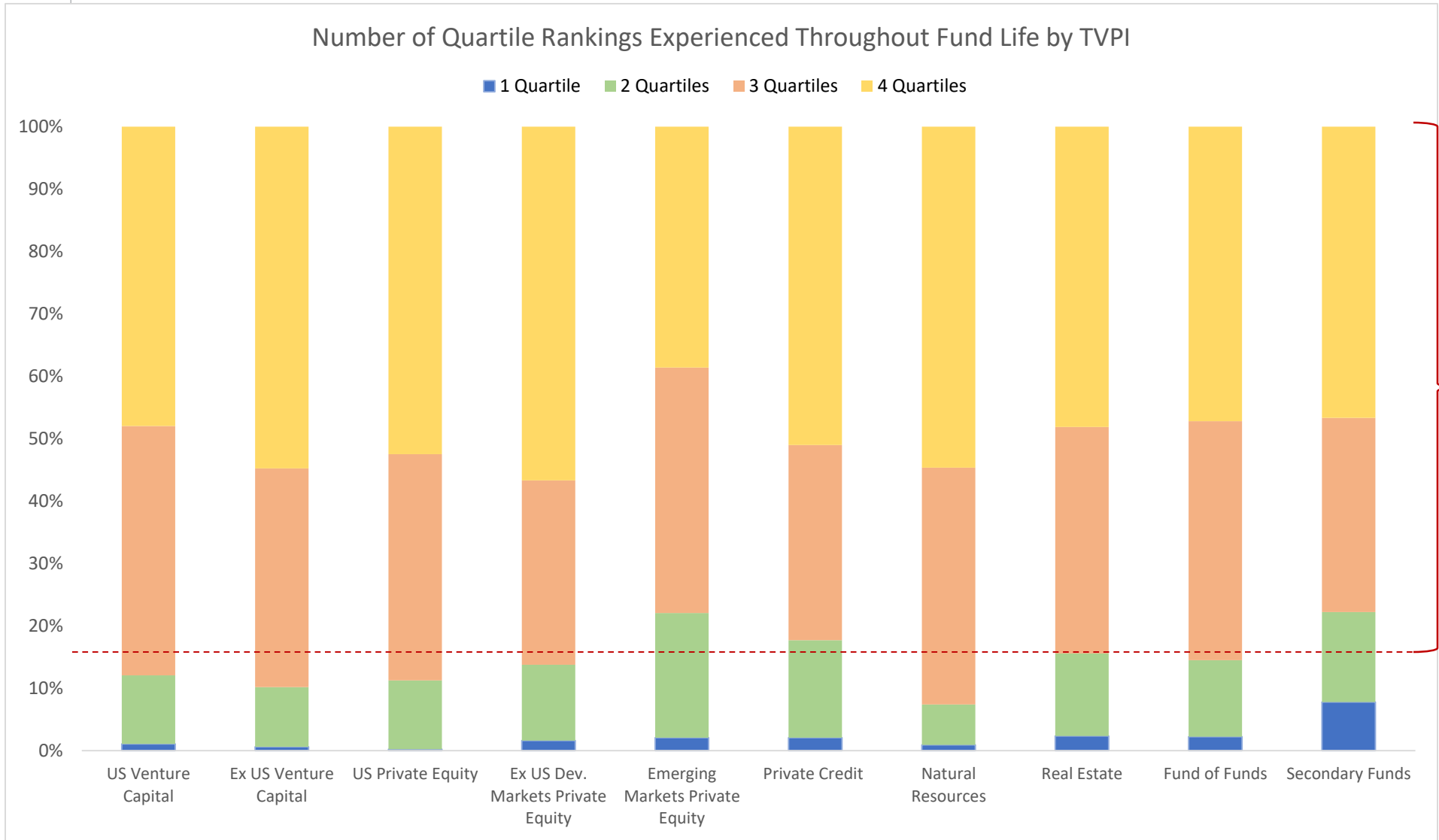
Average Years to Settle into Final Quartile Ranking



The long road to fund maturity: IRR versus TVPI

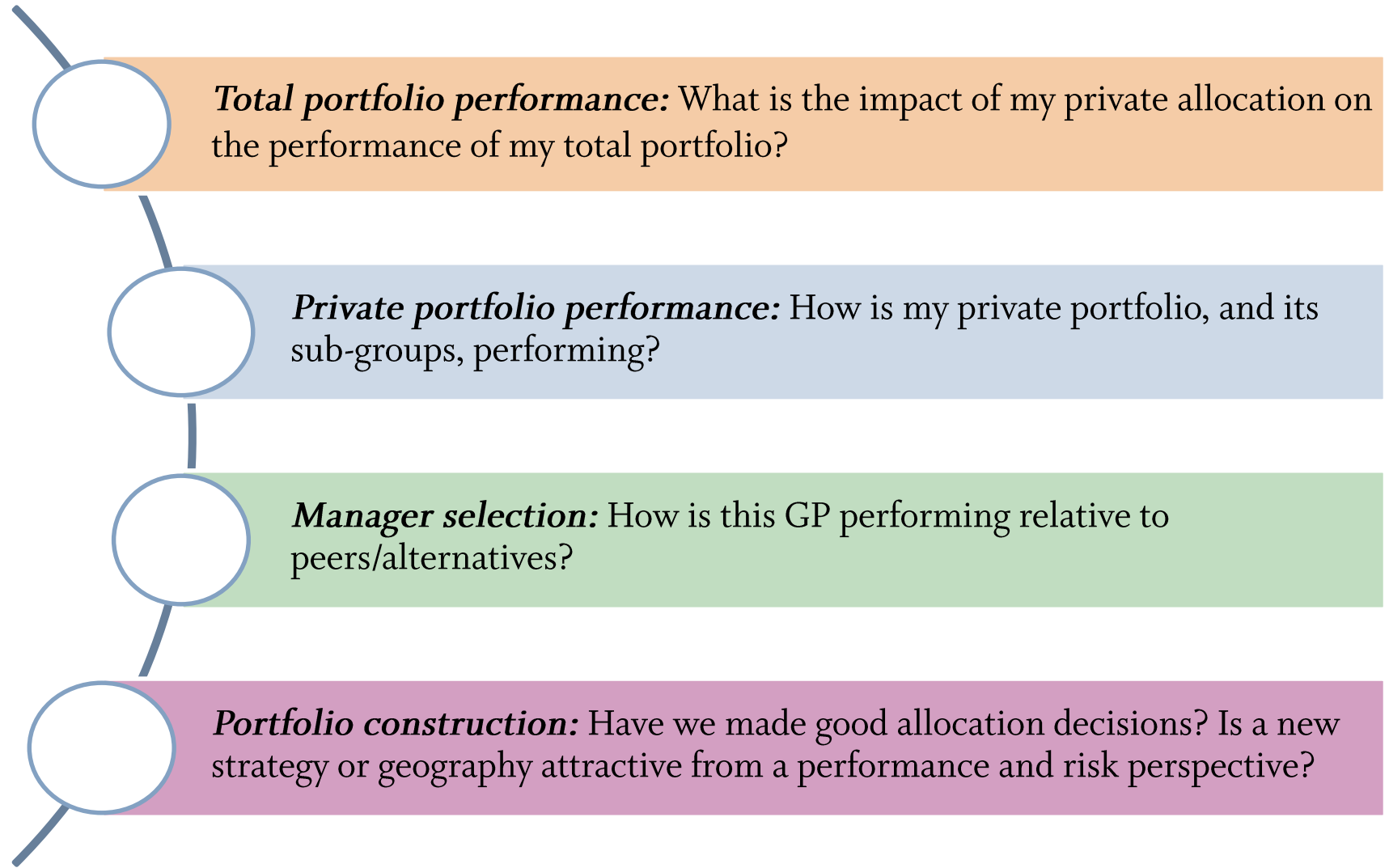


The long and winding road: 85% of funds move through 3 or 4 different quartiles



85%

It's complicated . . . You need different benchmarks for different issues



Evaluating the performance of a private investments portfolio

Questions	Recommendations
1 Was the decision to allocate capital to private investments a good one?	<ul style="list-style-type: none">• Benchmark against the public market equivalent (PME)• Select the public market index that represents the source of funding• Some investors choose to supplement PME with a private index benchmark

Evaluating the performance of a private investments portfolio

Questions	Recommendations
<p>1 Was the decision to allocate capital to private investments a good one?</p>	<ul style="list-style-type: none">• Benchmark against the public market equivalent (PME)• Select the public market index that represents the source of funding• Some investors choose to supplement PME with a private index benchmark
<p>2 Did we select good private managers?</p>	<ul style="list-style-type: none">• Compare a fund against private index fund performance from comparable strategy and vintage year once the fund is sufficiently seasoned• Focus on median and quartile rankings

Reporting: PME at the level of funds and strategic groups

Exhibit 1
CLIENT XYZ
PRIVATE INVESTMENTS FUNDING STATUS & PERFORMANCE SUMMARY
Inception Through March 31, 2017¹

Reporting Currency: U.S. Dollars (\$)

	Cash Flow & Valuation							Multiples				IRR		
	Fund Inception Date	Commitment	Paid-In Capital	Unfunded Commitment	Distributions at Market	Current Net Asset Value (NAV)	Total Value Creation	Distributed / Paid In ² Fund CA ⁴	Total Value / Paid In ² Fund CA ⁴	Fund Quartile Rank	Fund IRR ³	CA Median ⁴	Fund Quartile Rank	
Private Investments Partnerships														
Venture Capital														
Venture Capital Fund I, L.P.	06/07	2,400,000	2,268,000	132,000	1,520,309	2,547,574	1,799,883	0.67 0.84	1.79 1.58	1	11.8%	9.8%	2	
Venture Capital Fund II, L.P.	01/09	2,500,000	2,306,250	193,750	990,902	4,087,084	2,771,736	0.43 0.43	2.20 1.46	1	23.7%	9.8%	1	
Venture Capital Fund III, L.P.	03/12	1,000,000	827,500	172,500	48,060	1,148,718	369,278	0.06 0.04	1.45 1.22	1	17.9%	10.7%	1	
Venture Capital Fund IV, L.P.	04/13	1,000,000	790,000	210,000	0	880,465	90,465	0.00 0.04	1.11 1.09	2	6.0%	6.1%	3	
Venture Capital Fund V, L.P.	07/15	1,250,000	237,500	1,012,500	0	216,391	-21,109	0.00 0.00	0.91 0.97	3	-15.2%	-3.0%	4	
Total Venture Capital		8,150,000	6,429,250	1,720,750	2,559,271	8,880,232	5,010,253	0.40	1.78		15.9%			
mPME Benchmark									1.33		8.1%			
Private Equity														
Private Equity Fund I, L.P.	07/00	1,500,000	1,500,000	0	1,948,068	139,104	487,172	1.23 1.32	1.32 1.37	3	4.0%	5.5% ⁶	3	
Private Equity Fund II, L.P.	02/01	750,000	731,250	18,750	1,221,427	121,929	612,106	1.67 1.55	1.84 1.70	1	13.0%	10.2% ⁶	2	
Private Equity Fund III, L.P.	01/02	1,500,000	1,434,000	66,000	2,287,682	350,928	1,204,610	1.60 1.50	1.84 1.64	2	11.2%	10.1% ⁶	2	
Private Equity Fund IV, L.P.	05/04	248,506	241,218	12,599	281,215	47,948	87,945	1.17 1.12	1.36 1.47	4	6.3%	6.3% ⁶	2	
Private Equity Fund V, L.P.	05/04	1,275,000	1,206,621	68,379	1,469,720	327,513	560,612	1.22 1.12	1.49 1.47	2	6.4%	6.3% ⁶	2	
Private Equity Fund VI, L.P.	02/07	2,400,000	2,152,800	247,200	1,701,728	1,960,476	1,509,404	0.79 0.84	1.70 1.58	2	12.8%	9.8% ⁶	1	
Private Equity Fund VII, L.P.	09/13	1,000,000	349,235	715,707	90,849	305,930	47,544	0.26 0.03	1.14 1.19	3	9.9%	9.4%	2	
Private Equity Fund VIII, L.P.	09/14	1,000,000	533,967	514,264	48,231	476,414	-9,322	0.09 0.00	0.98 1.11	4	-2.4%	10.0%	4	
Private Equity Fund IX, L.P.	02/15	1,000,000	127,865	872,135	0	101,136	-26,729	0.00 0.00	0.79 0.98	4	-27.9%	-3.5%	4	
Private Equity Fund X, L.P.	05/15	1,000,000	541,988	464,144	97,471	710,511	265,994	0.18 0.00	1.49 0.98	1	30.2%	-3.5%	1	
Private Equity Fund XI, L.P.	03/16	1,000,000	145,368	854,632	0	131,366	-14,002	0.00 NA	0.90 NA	NA	NA	NA	NA	
Private Equity Fund XII, L.P.	08/16	1,000,000	0	1,000,000	0	0	0	NA NA	NA NA	NA	NA	NA	NA	
Total Private Equity		13,671,506	8,964,312	4,833,810	9,046,390	4,673,255	4,755,333	1.01	1.53		8.6%			
mPME Benchmark									1.32		6.2%			

Fund- Level

Strategic Group

Reporting: Implementing patience at the individual fund and group levels

PRIVATE INVESTMENTS PERFORMANCE REPORT

As of 12/31/2017

(continued from previous page)

<u>Partnership</u>	<u>Fund Inception Date</u>	<u>Commitment</u>	<u>Fund IRR</u>	<u>CA Benchmark Median IRR</u>	<u>Fund Quartile IRR Rank</u>
Opportunistic					
Opportunistic Fund I, L.P.	Aug-00	2,000,000	14.8%	5.5%	1
Opportunistic Fund II, L.P.	Aug-03	2,000,000	12.8%	11.8%	2
Opportunistic Fund III, L.P.	Dec-06	2,000,000	-4.5%	10.3%	4
Opportunistic Fund IV, L.P.	Sep-09	2,000,000	10.7%	7.9%	2
Opportunistic Fund V, L.P.	Dec-13	3,000,000	8.4%	12.8%	3
Opportunistic Fund VI, L.P.	Aug-15	3,000,000	3.5%	7.7%	3
Opportunistic Fund VII, L.P.	Jun-17	3,000,000	NA	NA	NA
Total Opportunistic		17,000,000	8.6%		
<i>mPME Benchmark</i>			<i>7.7%</i>		
Natural Resources					
Natural Resources Fund I, L.P.	Dec-04	2,000,000	-1.2%	10.2%	3
Natural Resources Fund II, L.P.	Nov-10	2,000,000	-17.8%	4.8%	4
Natural Resources Fund III, L.P.	Dec-12	2,000,000	18.9%	4.8%	1
Natural Resources Fund IV, L.P.	Dec-14	3,000,000	4.0%	7.0%	3
Natural Resources Fund V, L.P.	Aug-16	3,490,000	NA	NA	NA
Total Natural Resources		12,490,000	-1.6%		
<i>mPME Benchmark</i>			<i>5.2%</i>		
TOTAL PORTFOLIO		102,402,651	4.6%		
<i>mPME Benchmark</i>			<i>7.3%</i>		
TOTAL MATURE PORTFOLIO		36,641,180	8.3%		
<i>mPME Benchmark</i>			<i>6.7%</i>		

Evaluating the performance of a private investments portfolio

	Questions	Recommendations
1	Was the decision to allocate capital to private investments a good one?	<ul style="list-style-type: none">• Benchmark against the public market equivalent (PME)• Select the public market index that represents the source of funding• Some investors choose to supplement PME with a private index benchmark
2	Did we select good private managers?	<ul style="list-style-type: none">• Compare a fund against private index fund performance from comparable strategy and vintage year once the fund is sufficiently seasoned• Focus on median and quartile rankings
3	Did we make good private allocation decisions across strategies, sectors, geographies and vintages?	<ul style="list-style-type: none">• Create custom-weighted private benchmarks to perform “what if” analysis under different allocation scenarios within and across strategic groups in the private portfolio

Best practices for custom-weighted private benchmarks

