

# Private Markets Asset Class Review Year-End 2018

**Charles Spiller, CPM**

**Darren Foreman, CAIA, MBA**

**Patrick Knapp, CFA**

**Mike Tyler, MBA**

**Tony Meadows, CAIA, CPA, CITP**

**October 10, 2019**

# Table of Contents

- **Org Chart, Executive Summary, Performance Overview - Charlie**
- Performance Summary – Darren
- Portfolio and Industry Summary – Patrick and Mike
- Co-Investment Review - Tony
- Management Fees, Carried Interest, & Other Expenses - Charlie
- Appendix

# Non-Traditional Investments – Organizational Chart by Function



**Charlie Spiller, BS, CPM**  
Deputy CIO  
Non-Traditional Investments  
25 years at PSERS



**Pat Lorenz, BS**  
Administrative Assistant  
1 year at PSERS, 23 as public teacher

**•Private Equity / Venture Capital**  
**•\$7.0 billion AUM**



**Darren Foreman, MBA, CAIA**  
• Director  
• 23 years at PSERS



**Luke Jacobs, MBA, CFA**  
• Portfolio Manager  
• 20 years at PSERS



**Patrick Knapp, CFA**  
• Portfolio Manager  
• 1 year at PSERS



**Mike Tyler, MBA**  
• Portfolio Manager  
• 11 years at PSERS



**Mike Benson, BS, CPA, CGMA**  
• Sr. Investment Professional  
• 4 years at PSERS



**Tony Meadows, BS, CPA, CITP, CAIA**  
• Sr. Investment Professional  
• 8 years at PSERS

**•Real Assets / Infrastructure**  
**•\$5.1 billion AUM**



**Bill Stalter, MBA**  
• Sr. Portfolio Manager  
• 17 years at PSERS



**Melissa Quackenbush, BA**  
• Sr. Portfolio Manager  
• 1 year at PSERS



**Melanie Cubias, MBA**  
• Sr. Investment Professional  
• 11 years at PSERS



**Carolyn Harley, BS**  
• Int. Investment Professional  
• 25 years at PSERS

**Vacant Position**  
• Int. Investment Professional

**•Private Credit / Special Situations**  
**•\$6.3 billion AUM**



**James Del Gaudio, MBA**  
• Sr. Portfolio Manager  
• 4 years at PSERS

**Vacant Position**  
• Int. Investment Professional

**•Absolute Return**  
**•\$6.0 billion AUM**



**Bob Little, BS, CPA**  
• Sr. Portfolio Manager  
• 20 years at PSERS

**Vacant Position**  
• Sr. Investment Professional

# Executive Summary – As of December 31, 2018

## Update:

- \$8.2B NAV, 223 active funds, 71 GP's (managers)
- Distributions of \$1.9B outpaced contributions of \$1.8B CY18
- 9.1% Net IRR for the one-year ending 12/31/18 versus -7.8% for the \*Custom Index (1,690 bps of outperformance)
- 11.4% since inception Net IRR performance vs. Burgiss All Private Markets Benchmark of 6.3% and the \*Custom Index return of 8.8%
- 2009 to 2018 commitments have a 14.9% Net IRR and a 1.6% Alpha over the Burgiss PE benchmark
- Private Markets Co-Investments (including the PENN portfolio) have a 24.3% Net IRR since inception and a 15.5% Direct Alpha over the \*Custom Index

**\*Custom Index = 70% Russell 3000/30% MSCI ACWI x US**

# Private Markets Quarterly Update as of December 31, 2018

Performance	1-QTR <sup>1</sup>	1-YR <sup>1</sup>	3-YR <sup>1</sup>	5-YR <sup>1</sup>	10-YR <sup>1</sup>	Since-Inception <sup>1</sup>
Final - 4Q18	(0.10%)	9.11%	13.01%	8.69%	11.84%	11.36%
Blended Benchmark - 70% Russell 3000 / 30% MSCI ACWI x US Index as of 12/31/2018 <sup>2</sup>	(13.43%)	(7.80%)	7.80%	5.87%	11.41%	8.82%
Burgiss Benchmark <sup>3</sup>	(0.69%)	9.17%	12.40%	10.86%	12.56%	6.28%
Preliminary - 1Q19	3.50%	10.82%	13.88%	8.59%	12.87%	11.38%

<sup>1</sup> Dollar-weighted (IRR)

<sup>2</sup> Post-12/31/1998, the PSERS Blended Public Benchmark reflects a 70%/30% blend of the Russell 3000 and MSCI ACWI x US Indices, respectively. Prior to this date, the MSCI ACWI x US Index was unavailable, thus the MSCI World x US Net Total Return Index has been used in its place

<sup>3</sup> Burgiss Index All Private Markets - 12/31/2018 - Source: AON (As provided by PSERS)

<sup>4</sup> 1Q19 metrics reflect preliminary data and may be changed due to increased information received by the general partners of the underlying investments

## Cash Flow Activity - Final - 4Q18 (\$M)

	New Commitments	Contributions	Distributions	Residual Value	Unfunded
Quarter	\$242.2	\$575.9	\$592.1		
YTD	\$1,420.7	\$1,754.9	\$1,871.5		
ITD	\$31,507.9	\$28,202.1	\$34,063.0	\$8,219.3	\$4,519.5

Asset Allocation (\$M)	Total Fund	Target	NAV	Outstanding Commitment	NAV + Outstanding Commitment
Final - 4Q18	\$53,578.6	14.5%	15.3%	8.4%	23.7%
Preliminary - 1Q19	\$55,763.0	14.5%	15.1%	7.8%	22.9%

# Private Markets Quarterly Update as of December 31, 2018

Performance	1-QTR <sup>1</sup>	1-YR <sup>1</sup>	3-YR <sup>1</sup>	5-YR <sup>1</sup>	10-YR <sup>1</sup>	Since-Inception <sup>1</sup>
Final - 4Q18	(0.10%)	9.11%	13.01%	8.69%	11.84%	11.36%
Burgiss Benchmark <sup>2</sup>	(0.69%)	9.17%	12.40%	10.86%	12.56%	6.28%
Blended Benchmark - 70% Russell 3000 / 30% MSCI ACWI x US Index as of 12/31/2018 <sup>4</sup>	(13.43%)	(7.80%)	7.80%	5.87%	11.41%	8.82%
Preliminary - 1Q19 <sup>3</sup>	3.51%	10.81%	13.88%	8.59%	12.87%	11.38%

<sup>1</sup> Dollar-weighted (IRR)

<sup>2</sup> Burgiss Index All Private Markets - 12/31/2018 - Source: AON (As provided by PSERS)

<sup>3</sup> 1Q19 metrics reflect preliminary data and may be changed due to increased information received by the general partners of the underlying investments

<sup>4</sup> Post-12/31/1998, the PSERS Blended Public Benchmark reflects a 70%/30% blend of the Russell 3000 and MSCI ACWI x US Indices, respectively. Prior to this date, the MSCI ACWI x US Index was unavailable.

thus the MSCI World x US Net Total Return Index has been used in its place

## Cash Flow Activity - Final - 4Q18 (\$M)

	New Commitments	Contributions	Distributions	Residual Value	Unfunded
Quarter	\$242.2	\$575.9	\$592.1		
YTD	\$1,420.7	\$1,754.9	\$1,871.5		
ITD	\$31,507.9	\$28,202.1	\$34,063.0	\$8,218.3	\$4,519.5

Asset Allocation (\$M)	Total Fund	Target	NAV	Outstanding Commitment	NAV + Outstanding Commitment
Final - 4Q18	\$53,578.6	14.5%	15.3%	8.4%	23.7%
Preliminary - 1Q19	\$55,763.0	14.5%	15.1%	7.8%	22.9%

# Table of Contents

---

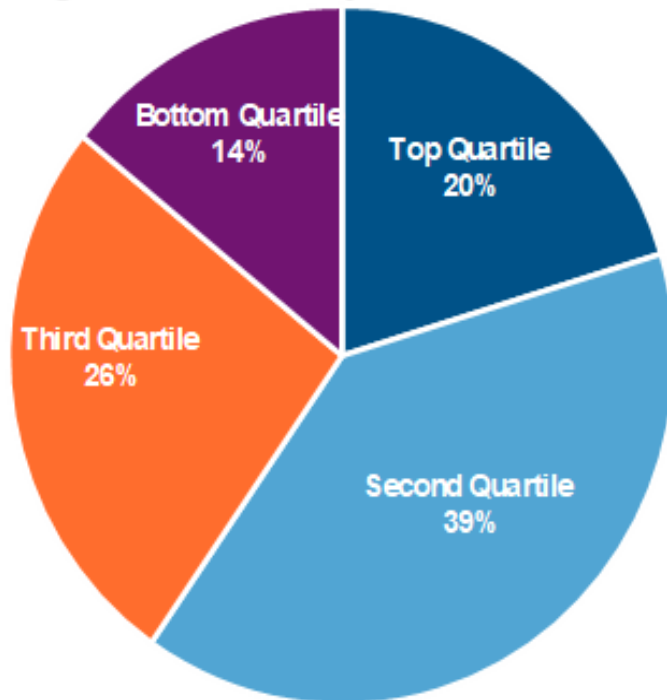
- Org Chart, Executive Summary, Performance Overview - Charlie
- **Performance Summary – Darren**
- Portfolio and Industry Summary – Patrick and Mike
- Co-Investment Review - Tony
- Management Fees, Carried Interest, & Other Expenses - Charlie
- Appendix

# Quartile Rankings: PM Fund Commitments 2003-08 vs 2011-16

As of December 31, 2018

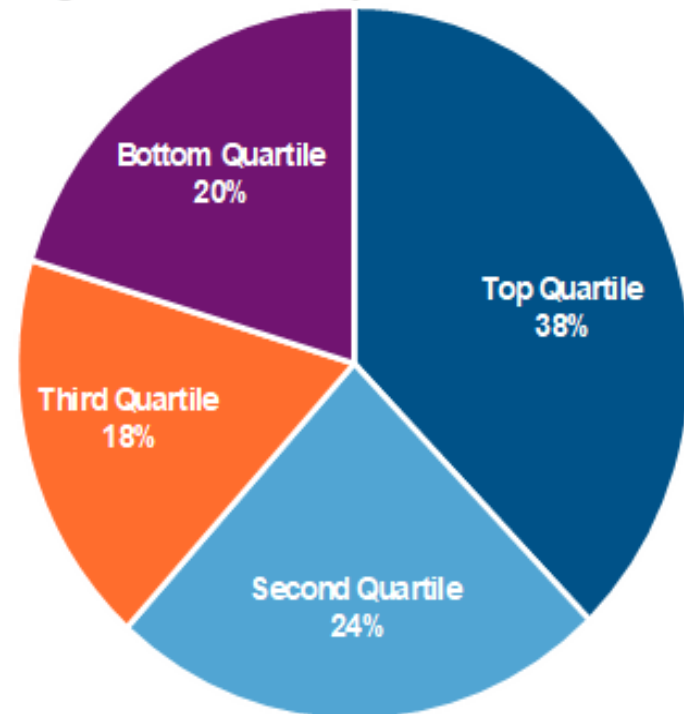
## PSERS Portfolio Exposure by Quartile

Vintage Years 2003-2008 By Commitment Amount



## PSERS Portfolio Exposure by Quartile

Vintage Years 2011-2016 By Commitment Amount



Source: Hamilton Lane Data.



## PM Fund commitments last 10 years performing strong As of December 31, 2018

Vintage Year	Total Exposure PSERS	MoC	PSERS Vintage IRR	Burgiss PM BM IRR	Alpha	PSERS Blended Benchmark PME	Alpha
2009	\$ 103.00	1.6x	12.92%	12.69%	0.23%	11.58%	1.34%
2010	\$ 5.30	1.1x	1.42%	10.61%	(9.19%)	11.75%	(10.33%)
2011	\$ 792.70	1.5x	13.10%	14.66%	(1.56%)	9.07%	4.03%
2012	\$ 1,195.80	1.6x	16.80%	13.92%	2.88%	8.97%	7.83%
2013	\$ 1,036.30	1.5x	16.20%	11.47%	4.73%	7.11%	9.09%
2014	\$ 840.90	1.4x	17.17%	15.20%	1.97%	5.96%	11.21%
2015	\$ 1,647.80	1.2x	9.25%	14.56%	(5.31%)	4.87%	4.38%
2016	\$ 1,515.80	1.3x	25.13%	14.09%	11.04%	2.40%	22.73%
2017	\$ 1,623.20	1.1x	15.27%	10.06%	5.21%	(5.58%)	20.85%
2018	\$ 1,431.20	1.0x	5.95%	(3.23%)	9.18%	(19.70%)	25.65%
<b>Total</b>	<b>\$ 10,192.00</b>	<b>1.4x</b>	<b>14.86%</b>	<b>13.23%</b>	<b>1.63%</b>	<b>7.39%</b>	<b>7.47%</b>



Note:

- Burgiss PM BM IRR is the Burgiss Index All Private Markets benchmark.
- Total Exposure PSERS is NAV plus unfunded commitments

# Portfolio by Core, Evaluating and Legacy as per Hamilton Lane's review

PSERS Portfolio Review – By Relationship Type	
Relationship Type	Description
Core Relationships	Strong performing, well-positioned General Partners; likely re-up
Evaluating Relationships	Based on strategic goals and objectives, in addition to future performance, these managers could be moved to "Core" or "Legacy" Relationships
Legacy Relationships	Challenged General Partners, potential franchise and/or performance issues; re-up is unlikely

# Portfolio by Core, Evaluating and Legacy

as per Hamilton Lane at December 31, 2018

Relationship Type	NAV (\$M) / % of Total NAV <sup>2</sup>	Periodic Performance vs. Direct Alpha & KS PME				
		1-Year	3-Year	5-Year	10-Year	Since Inception
Core	\$3,976.4 / 47.9%	13.1%	20.2%	14.6%	14.7%	20.4%
Direct Alpha Spread <sup>1</sup>		22.4%	11.0%	8.0%	1.6%	10.3%
KS PME Ratio <sup>1</sup>		1.17x	1.19x	1.19x	1.06x	1.35x
Evaluating	\$1,758.1 / 21.2%	3.1%	8.1%	6.3%	14.1%	12.5%
Direct Alpha Spread <sup>1</sup>		11.2%	(1.1%)	(0.1%)	0.7%	3.0%
KS PME Ratio <sup>1</sup>		1.10x	0.98x	1.00x	1.03x	1.10x
Legacy	\$1,403.4 / 16.9%	10.6%	6.7%	4.8%	9.0%	8.0%
Direct Alpha Spread <sup>1</sup>		19.1%	(1.7%)	(1.4%)	(4.4%)	1.4%
KS PME Ratio <sup>1</sup>		1.16x	0.97x	0.97x	0.85x	1.06x



Direct Alpha Spread <0.0%  
KS PME Ratio <1.0x



Direct Alpha Spread 0%-3%  
KS PME Ratio 1.0x-1.1x



Direct Alpha Spread >3%  
KS PME Ratio >1.1x

Note: Based on initial Hamilton Lane manager rankings as defined in this Strategic Plan. Manager Rankings are subject to ongoing reevaluation following Strategic Planning.

<sup>1</sup> Post-12/31/1998, the PSERS public benchmark reflects a 70%/30% blend of the Russell 3000 and MSCI ACWI x US Indices, respectively. Prior to this date, the MSCI ACWI x US Index was unavailable, thus the MSCI World x US Net Total Return Index has been used in its place

<sup>2</sup> Totals do not add up to 100% of Portfolio NAV as PEIP and energy-focused funds are not classified by Relationship Type

# Performance Summary by Strategy

## As of December 31, 2018

Strategy	NAV	MoC	1-QTR IRR	1-YR IRR	3-YR IRR	5-YR IRR	10-YR IRR	Since Inception IRR
<b>Special Situations</b>	14.2%	1.5x	(2.73%)	1.69%	7.34%	5.38%	15.05%	12.97%
<b>Venture Capital</b>	13.0%	1.4x	1.70%	19.16%	13.12%	11.23%	9.66%	7.73%
Private Equity								
Large Buyout	12.4%	1.4x	(0.30%)	14.33%	16.52%	6.74%	12.07%	9.88%
Middle Market Buyout	43.7%	1.6x	0.26%	7.26%	13.85%	8.98%	11.42%	11.58%
Secondary	7.8%	1.5x	(2.08%)	8.90%	9.11%	7.45%	8.33%	19.60%
PE Internal Program	9.0%	1.6x	1.87%	10.06%	18.11%	20.96%	N/A	23.82%
<b>Subtotal Private Equity</b>	72.9%	1.5x	0.08%	8.83%	14.10%	8.87%	11.48%	11.85%
<b>Total Portfolio</b>	<b>100.0%</b>	<b>1.5x</b>	<b>(0.10%)</b>	<b>9.11%</b>	<b>13.01%</b>	<b>8.69%</b>	<b>11.84%</b>	<b>11.36%</b>
<b>Private Equity Domestic</b>	43.1%	1.5x	(0.69%)	10.01%	14.53%	8.97%	10.85%	11.06%
<b>Private Equity International</b>	29.7%	1.6x	1.24%	7.34%	13.59%	8.77%	12.53%	14.01%

Note: PE Internal Program excludes Wilson currency hedge

# Private Markets Net IRR Performance by Geography

PSERS Private Markets Portfolio Performance Summary by Geography as of December 31, 2018								
Fund Geography	NAV	1-QTR IRR	1-YR IRR	3-YR IRR	5-YR IRR	10-YR IRR	Since Inception IRR	MoC
Asia	\$703.0	(0.42%)	1.01%	11.15%	8.32%	14.46%	14.03%	1.5x
Global	\$1,595.1	(0.31%)	6.48%	9.54%	3.90%	10.16%	8.46%	1.3x
North America	\$4,615.4	(0.81%)	10.37%	13.06%	9.98%	11.50%	10.85%	1.5x
Western Europe	\$1,304.8	2.87%	12.48%	18.18%	10.85%	13.60%	17.19%	1.7x
<b>Total Portfolio</b>	<b>\$ 8,218.3</b>	<b>(0.10%)</b>	<b>9.11%</b>	<b>13.01%</b>	<b>8.69%</b>	<b>11.84%</b>	<b>11.36%</b>	<b>1.5x</b>

# Private Markets Portfolio by Investment Style and Geography

## As of December 31, 2018

### Industry Exposure by Exposed Market Value <sup>1</sup>

Sector	9/30/2018	12/31/2018	Change
Information Technology	18%	19%	1%
Industrials	15%	15%	-
Health Care	14%	14%	-
Consumer Discretionary	14%	14%	-
Financials	8%	8%	-
FoF Holding	7%	8%	1%
Energy	7%	7%	-
Consumer Staples	5%	5%	-
Materials	4%	4%	-
Communication Services	4%	4%	-
Real Estate	2%	2%	-
Utilities	1%	1%	-

### Geographic Exposure by Exposed Market Value <sup>1</sup>

Region	9/30/2018	12/31/2018	Change
North America	66%	66%	-
Western Europe	18%	18%	-
Asia	9%	8%	(1%)
Rest of World	7%	7%	-

### Public/Private Holdings by Exposed Market Value <sup>1</sup>

Public/Private	9/30/2018	12/31/2018	Change
Private	91%	92%	1%
Public	9%	8%	(1%)

<sup>1</sup> Exposed Market Value is LP's share of Market Value at the Portfolio Holding Level. May not sum to 100% due to rounding.

## Approximate Jobs Figures PSERS' Core General Partners (81 PM Funds)



725,000 Net Jobs Created  
or Added



2.7 Million Total Jobs Supported

# Table of Contents

---

- Org Chart, Executive Summary, Performance Overview - Charlie
- Performance Summary – Darren
- **Portfolio and Industry Summary – Patrick and Mike**
- Co-Investment Review - Tony
- Management Fees, Carried Interest, & Other Expenses - Charlie
- Appendix



# Private Markets Portfolio Impact on PA

December 31, 2018 (Values in Millions)	Private Equity*	Venture Capital	Special Situations	Total
Funds Headquartered in PA – Commitments Total	\$14,148	\$862	\$7,414	\$22,424
Funds Headquartered in PA – Commitments PSERS' Share	\$892	\$173	\$200	\$1,265
PA-based Investments – Total Value	\$24,159	\$916	\$11,078	\$36,153
PA-based Investments – PSERS' Market Share	\$1,441	\$146	\$289	\$1,876
Number of people employed <sup>1</sup>	37,988	2,371	9,998	50,357
Payroll	\$499	\$84	\$71	\$654

\* Includes Private Equity Internal Program

<sup>1</sup> Actual number of employees

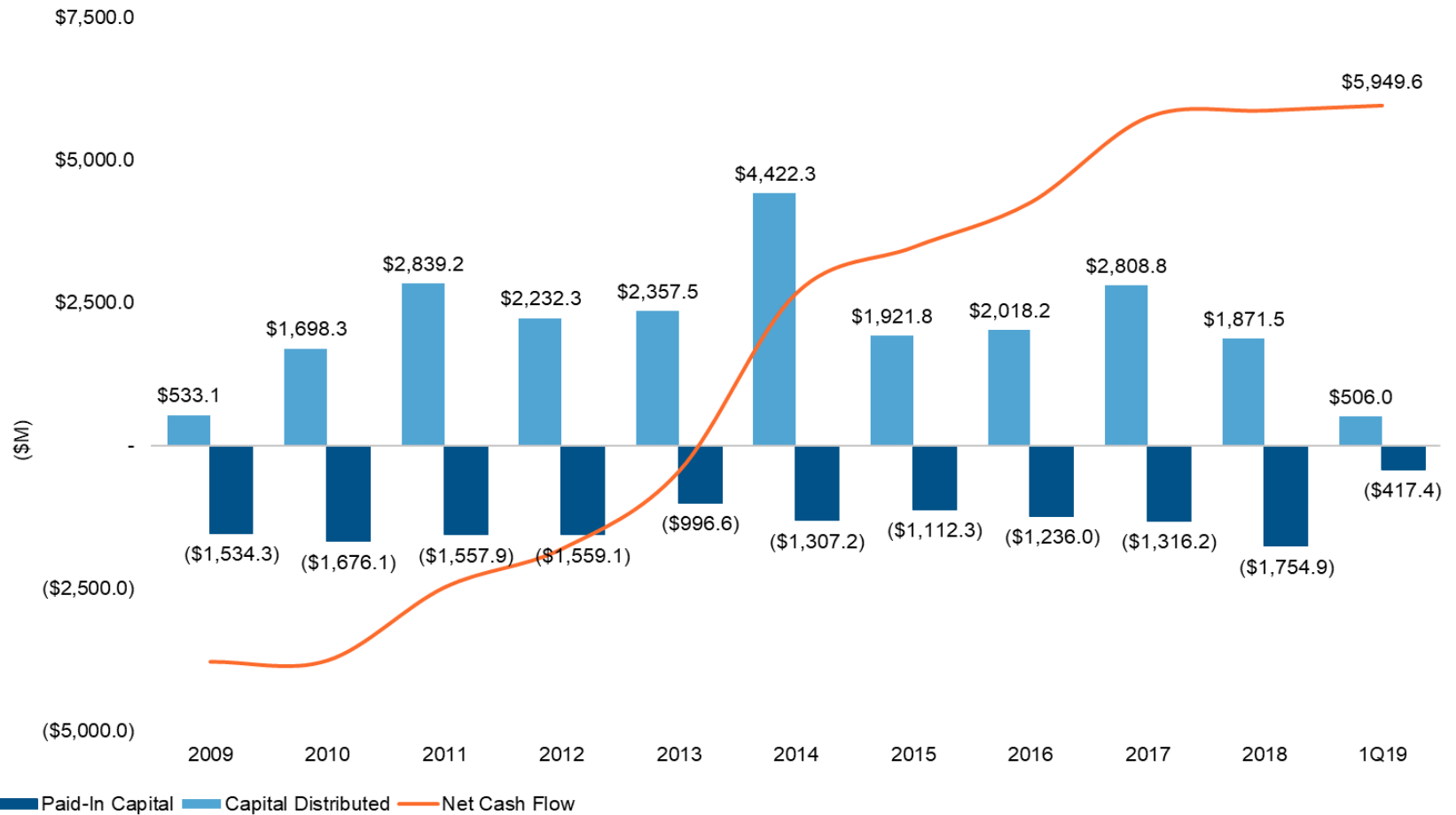
Source: PSERS

# New Commitment Summary – 2018

2018 Commitment Summary		
Fund	Strategy	Capital Committed
<b>1Q18 Closings:</b>		
Blue Point Capital Partners IV, L.P..	Private Equity	\$70.0
Insight Venture Partners X, L.P..	Venture Capital	\$100.0
PAI Europe VII.	Private Equity	€100.0
Equistone Partners Europe Fund VI, L.P.	Private Equity	€75.0
<b>2Q18 Closings:</b>		
Bridgepoint Europe VI, L.P.	Private Equity	€100.0
K4 Private Investors, L.P.	Private Equity	\$100.0
Platinum Equity Small Cap Fund, L.P.	Private Equity	\$160.0
Webster Capital IV, L.P.	Private Equity	\$75.0
<b>3Q18 Closings:</b>		
Trilantic Capital Partners VI (North America), L.P.	Private Equity	\$150.0
<b>4Q18 Closings:</b>		
Bain Capital Asia Fund IV, L.P.	Private Equity	\$150.0

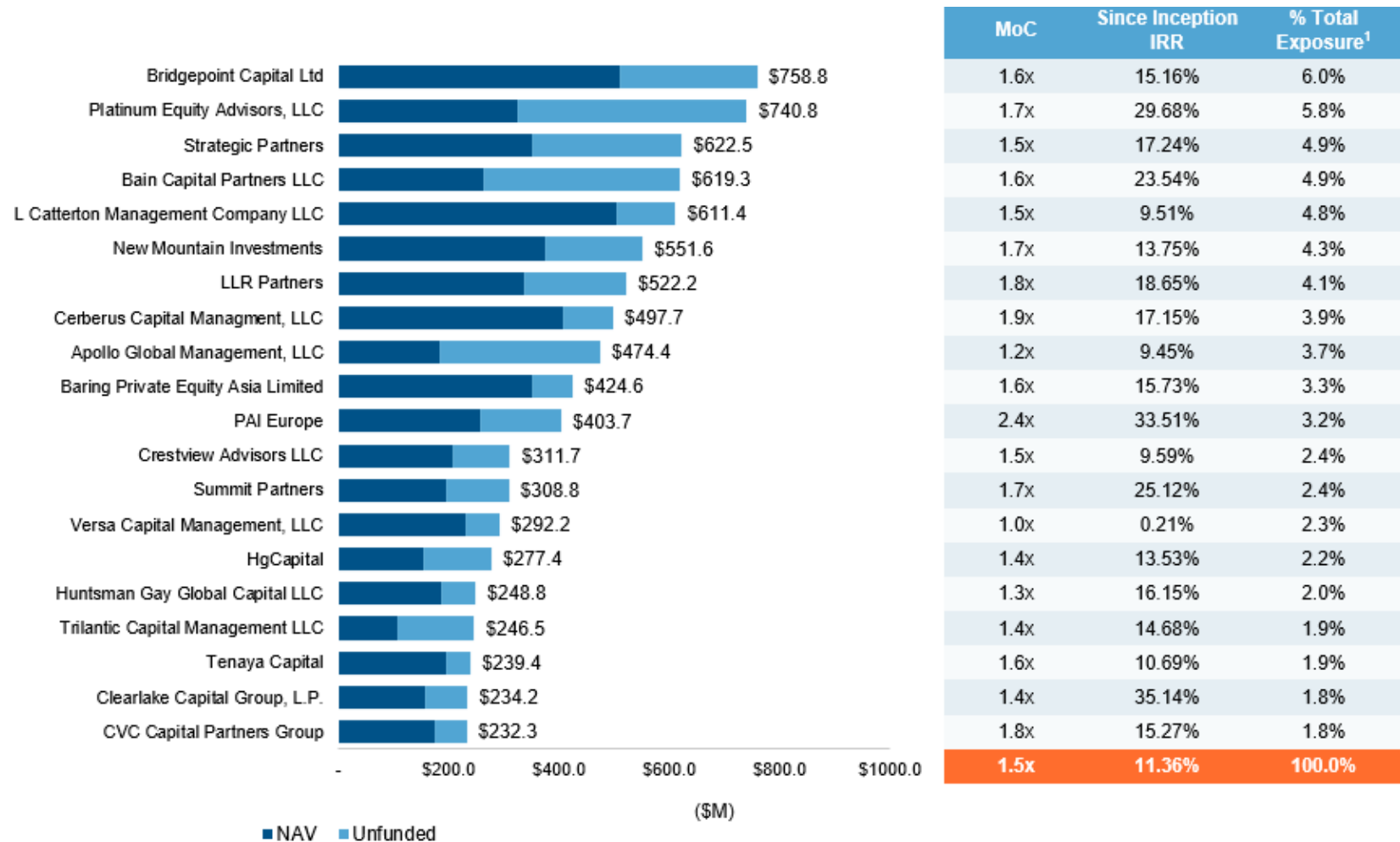
# Cash Flow Summary: Last 10 Years

## Private Markets Portfolio Cash Flow



# Top 20 Total Exposures by General Partner

## As of December 31, 2018



<sup>1</sup> % Total Exposure reflective of GP Total Exposure as a percentage of PSERS Total PM Portfolio Total Exposure (Total Exposure = NAV + Unfunded Commitments)

# Top LTM (last 12 months 2018) Contributors and Distributors As of December 31, 2018

## Funds that Called the Most Capital During the LTM (\$M)

Investment	VY	Strategy	Contributions	% of Total
Platinum Equity Capital Partners IV, L.P.	2016	Private Equity	\$117.2	6.7%
Cerberus Institutional Partners VI, L.P.	2015	Special Situations	\$109.1	6.2%
Strategic Partners Fund VII, L.P.	2016	Private Equity	\$69.0	3.9%
Bridgepoint Europe V, L.P.	2015	Private Equity	\$58.7	3.3%
LLR Equity Partners V, L.P.	2017	Venture Capital	\$56.0	3.2%
<b>Total</b>			<b>\$410.0</b>	<b>23.4%</b>

## Funds that Distributed the Most Capital During the LTM (\$M)

Investment	VY	Strategy	Distributions	% of Total
Bridgepoint Europe III, L.P.	2005	Private Equity	\$88.3	4.7%
Blue Point Capital Partners II, L.P.	2007	Private Equity	\$67.8	3.6%
CVC European Equity Partners V, L.P.	2008	Private Equity	\$66.0	3.5%
Cinven Fifth Fund, L.P.	2012	Private Equity	\$64.8	3.5%
Platinum Equity Capital Partners III, L.P.	2012	Private Equity	\$61.3	3.3%
<b>Total</b>			<b>\$348.2</b>	<b>18.6%</b>

# Last Twelve Months 2018 (LTM) Net Value Drivers

## As of December 31, 2108

### Top LTM Contributors as Measured by Net Value Change (\$M)

Investment	VY	LTM Appreciation	NAV	1-YR IRR	Since Inception IRR
LLR Equity Partners IV, L.P.	2013	\$59.9	\$191.3	35.46%	27.69%
CVC European Equity Partners V, L.P.	2008	\$58.2	\$134.3	49.07%	16.51%
Platinum Equity Capital Partners IV, L.P.	2016	\$53.0	\$201.8	41.66%	36.07%
LLR Equity Partners III, L.P.	2008	\$48.2	\$77.1	70.86%	16.85%
Summit Partners Growth Equity Fund VIII, L.P.	2012	\$34.9	\$78.9	51.49%	26.03%
Appreciation (Top 5)		\$254.2	\$683.4	46.22%	18.47%
Appreciation (Remaining 131)		\$775.5	\$5,619.5	16.45%	13.15%
<b>Total Appreciation (136)</b>		<b>\$1,030.9</b>	<b>\$6,304.1</b>	<b>19.04%</b>	<b>13.44%</b>

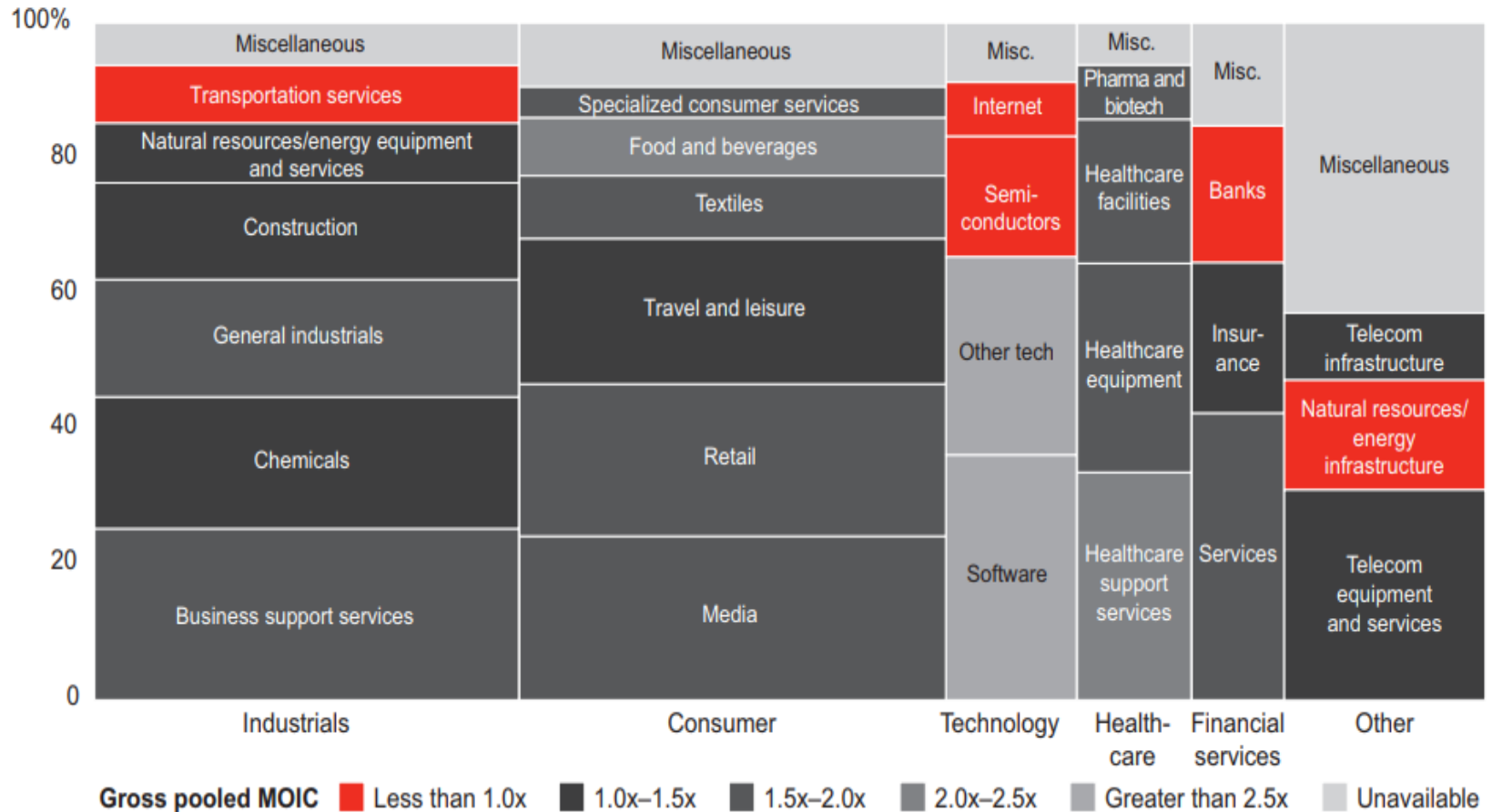
### Top LTM Detractors as Measured by Net Value Change (\$M)

Investment	VY	LTM Appreciation	NAV	1-YR IRR	Since Inception IRR
Crestview Partners II, L.P.	2009	(\$67.4)	\$76.5	(40.61%)	12.92%
Platinum Equity Capital Partners III, L.P.	2012	(\$24.9)	\$73.6	(16.68%)	28.17%
Cerberus Institutional Partners VI, L.P.	2015	(\$24.9)	\$178.6	(19.36%)	(2.08%)
Co-Investment Fund II, L.P.	2006	(\$20.8)	\$81.6	(20.28%)	(0.30%)
Apollo Investment Fund VIII, L.P.	2013	(\$18.5)	\$186.5	(9.30%)	10.01%
Depreciation (Top 5)		(\$156.5)	\$596.8	(20.97%)	9.49%
Depreciation (Remaining 81)		(\$180.0)	\$1,305.9	(12.18%)	8.53%
<b>Total Depreciation (86)</b>		<b>(\$336.5)</b>	<b>\$1,902.7</b>	<b>(15.45%)</b>	<b>8.60%</b>

<b>Total Portfolio (223)</b>		<b>\$693.1</b>	<b>\$8,219.4</b>	<b>9.13%</b>	<b>11.36%</b>
------------------------------	--	----------------	------------------	--------------	---------------

# Returns during the GFC – by PE sectors

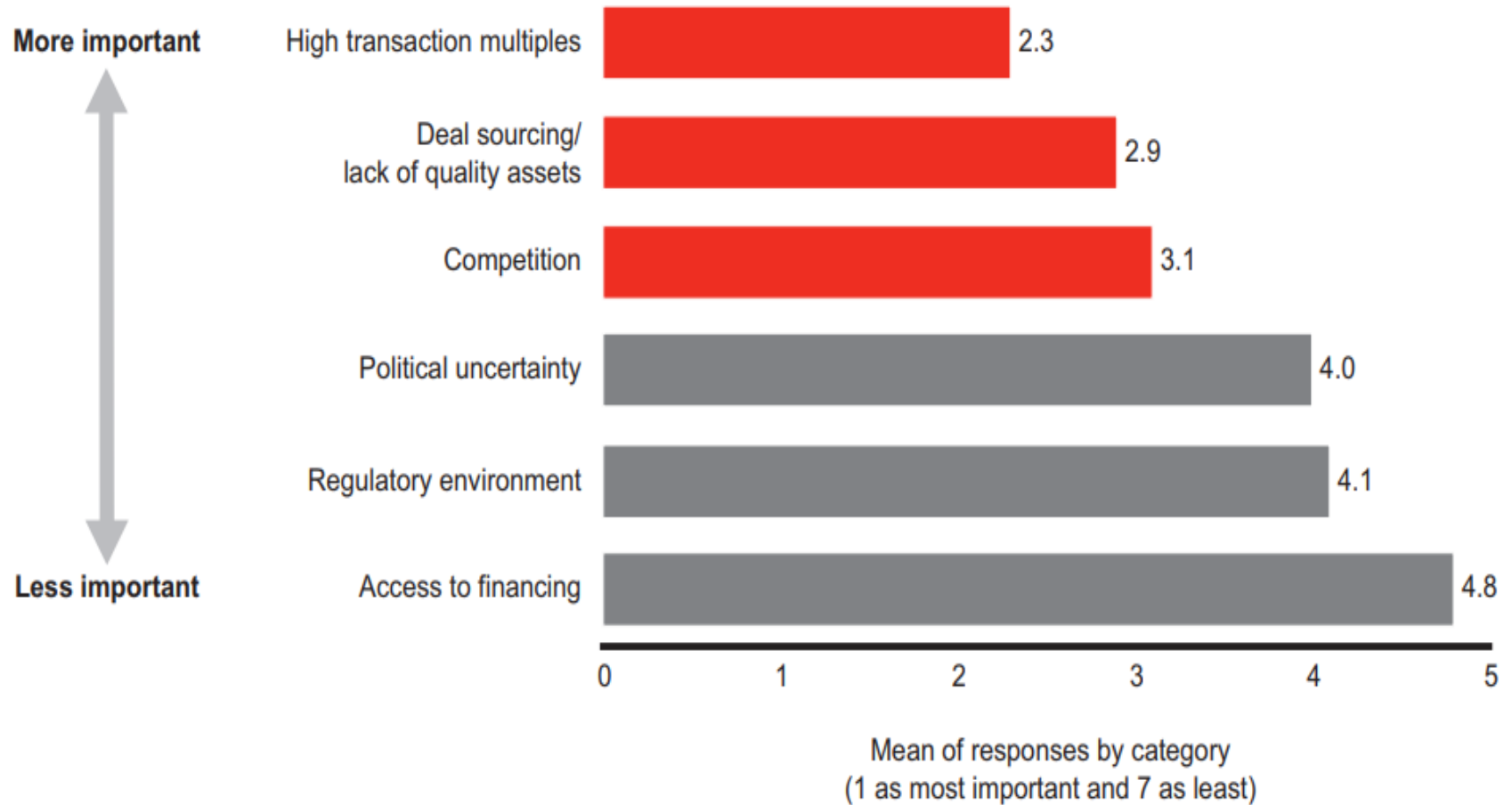
Global buyout equity capital invested, by sector and subsector (2006–08)



Notes: Includes realized and unrealized buyout deals with invested equity capital of \$50 million or more and initial investment between January 1, 2006, and December 31, 2008; MOIC stands for multiple of invested capital

Source: CEPRES PE.Analyzer

# What are the largest challenges for GP's in PE?

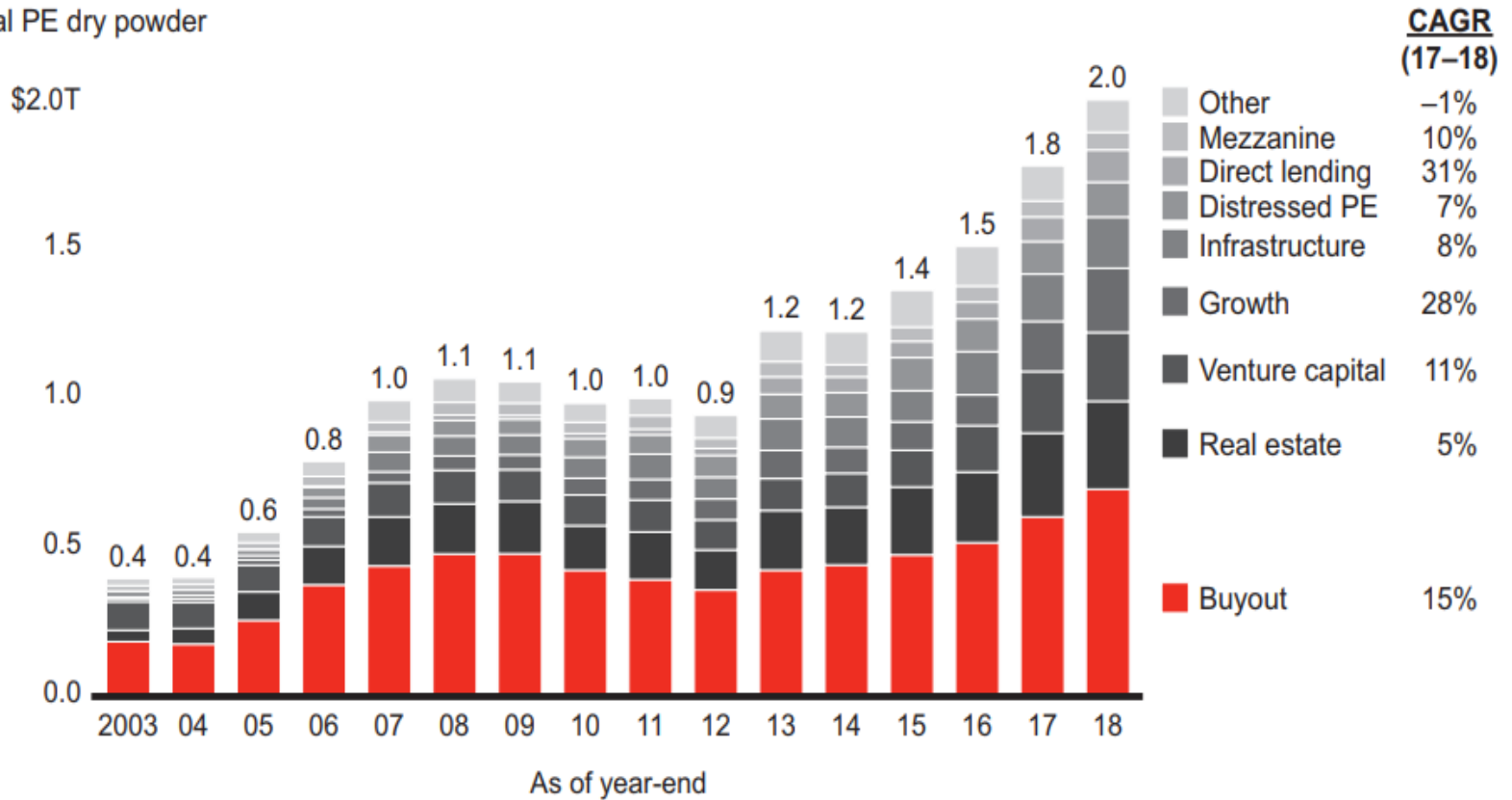


Source: Crystal Ball Report 2018, PitchBook Data, Inc.



# Dry powder continues to pile up.

Global PE dry powder

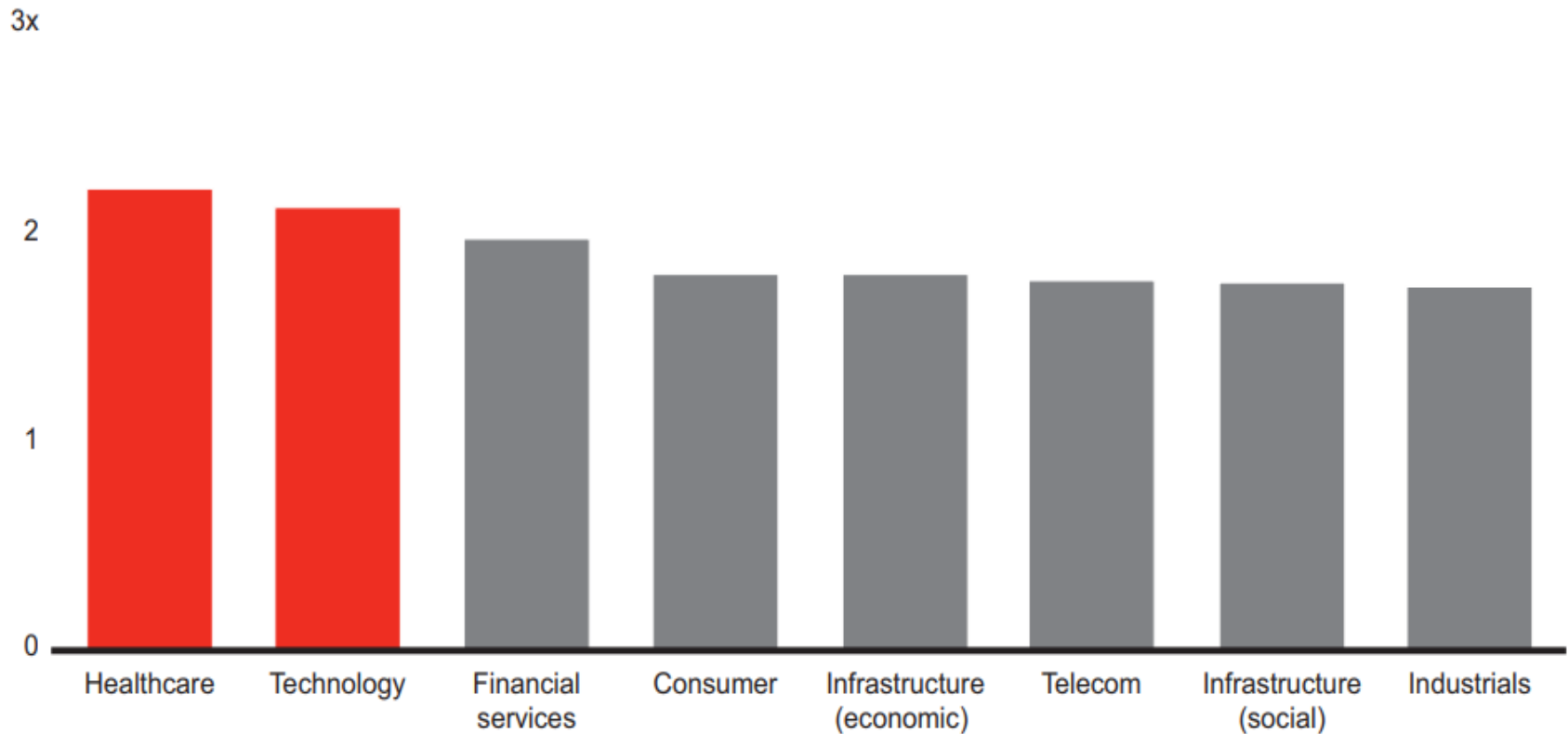


Buyout (\$B) 184 176 256 374 438 478 479 424 392 357 424 441 475 516 602 695

Note: Discrepancies in bar heights displaying the same value are due to rounding  
 Source: Preqin

# Healthcare and Tech Funds are gaining attention

Gross pooled MOIC, by sector, for global buyouts invested 2009–15



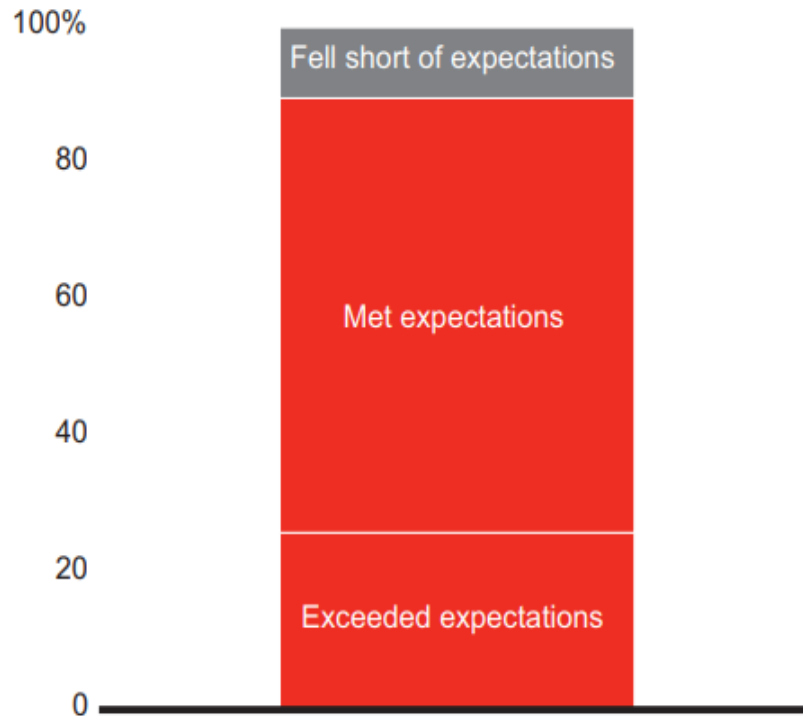
Notes: Includes realized and unrealized buyout deals with invested equity capital of \$50 million or more and initial investment between January 1, 2009, and December 31, 2015; MOIC stands for multiple of invested capital

Source: CEPRES PE.Analyzer

# PE continues to meet investors' expectations

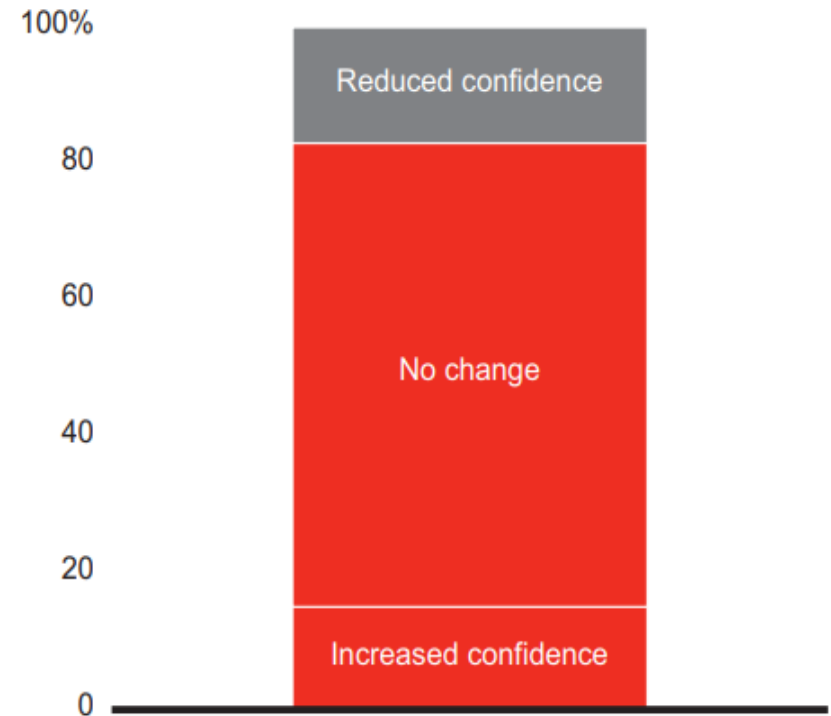
**“Have your PE portfolio investments performed up to your expectations in the past year?”**

Percentage of LP survey respondents



**“Has your confidence in private equity to meet portfolio objectives changed in the past year?”**

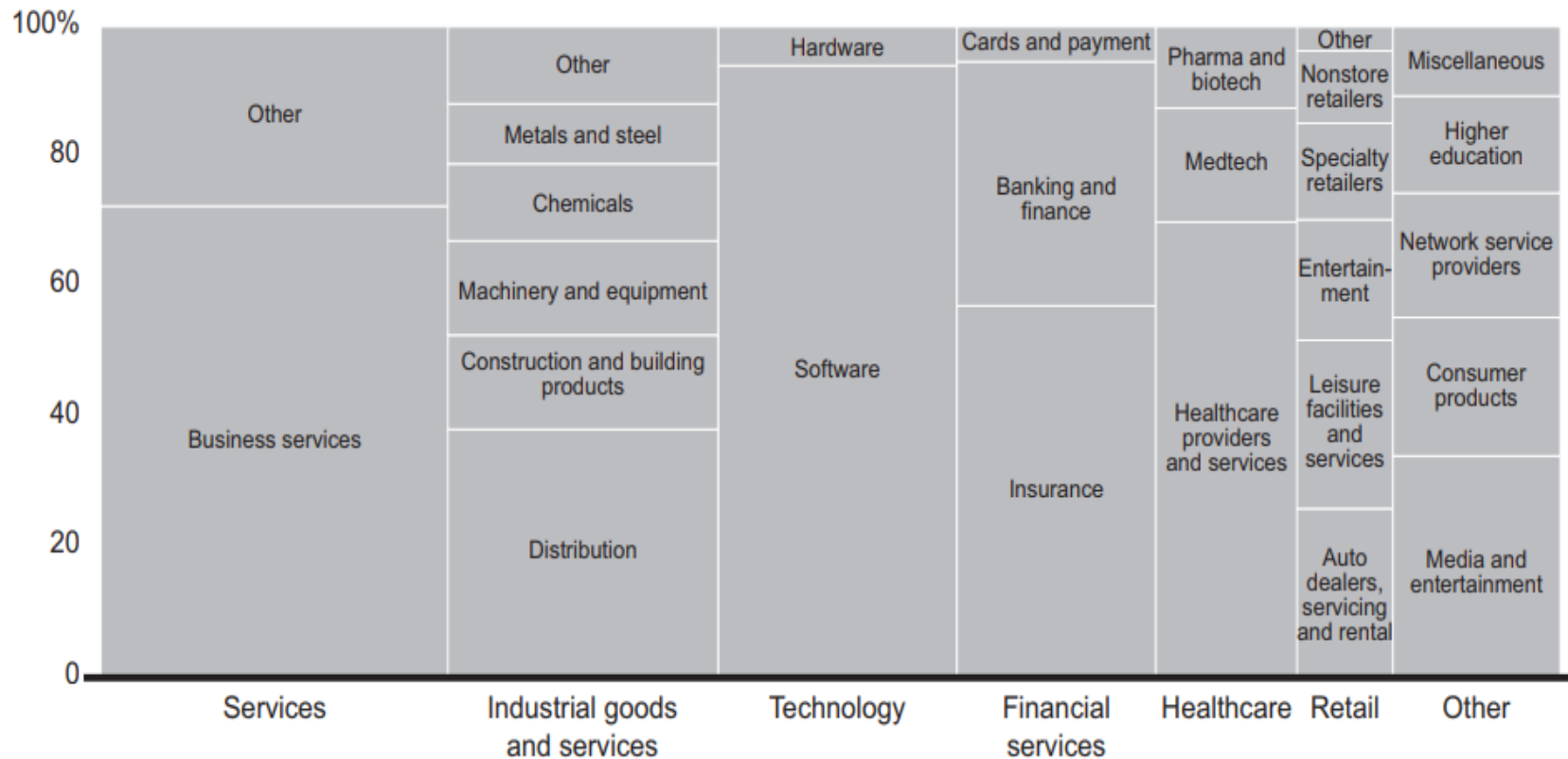
Percentage of LP survey respondents



Source: Preqin survey, 2018

# Buy and Builds have become more common

Distribution of US and European platform companies, by sector and subsector (2007–16)



Notes: Geography based on headquarters location of platform company; represents the year in which the deal to buy the platform company closed; platform companies defined as companies acquired in a buyout transaction that subsequently acquired at least four more businesses under the same PE ownership  
Sources: Dealogic; Bain analysis

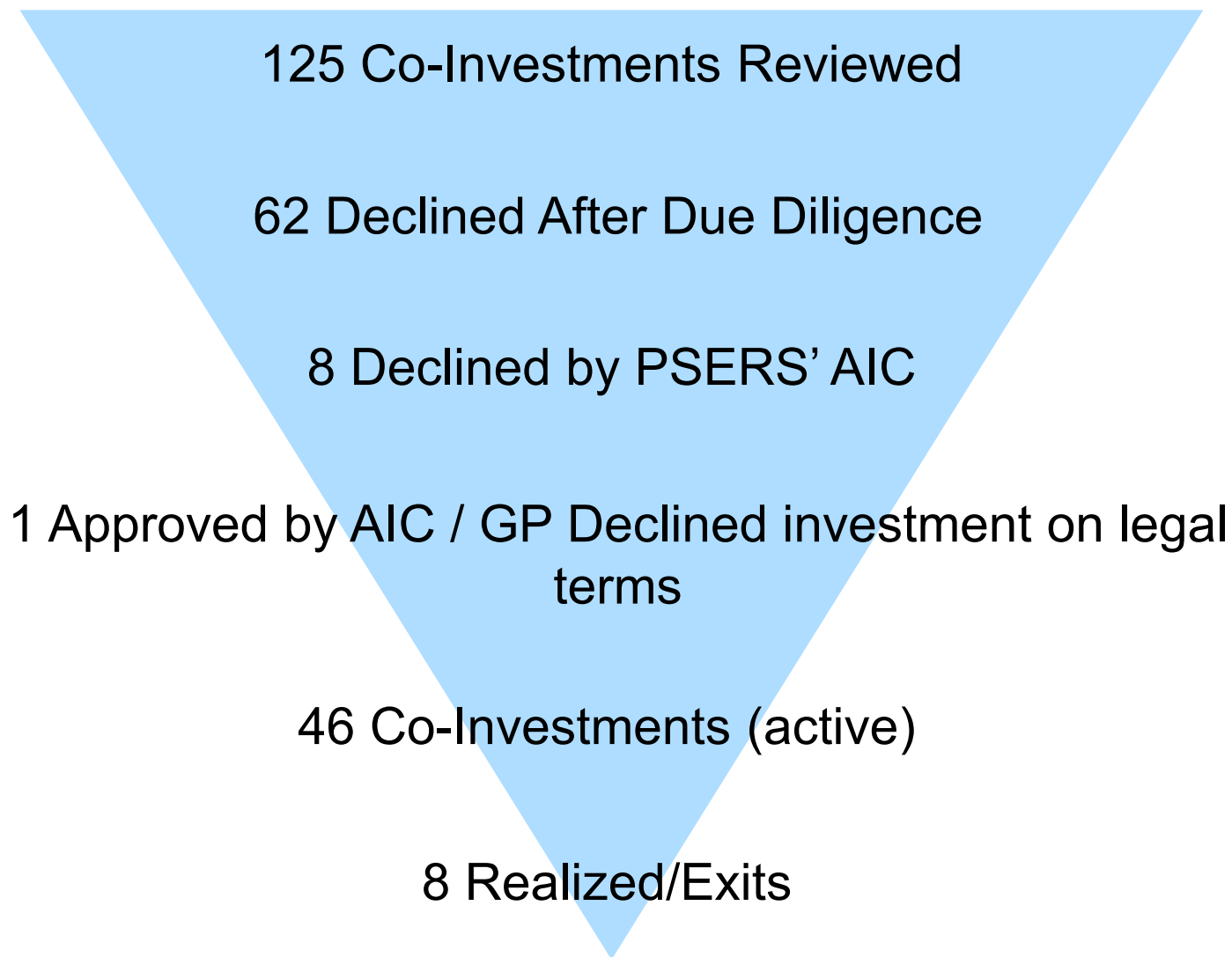
# Table of Contents

---

- Org Chart, Executive Summary, Performance Overview - Charlie
- Performance Summary – Darren
- Portfolio and Industry Summary – Patrick and Mike
- **Co-Investment Review - Tony**
- Management Fees, Carried Interest, & Other Expenses - Charlie
- Appendix

# Internal Co-Investments Deal Flow Funnel

Since Inception (Feb 2012 – To Date)



# Private Equity Internal Co-Investments

Realized and Unrealized Performance as of December 31, 2018

Investment	Vintage	Commitment	Cumulative Contributions	Cumulative Distributions	Valuation	IRR	MoC	DPI
<b>Fund 1</b>								
PEIP #12	2014	\$ 15,000,000	\$ 12,086,263	\$ 44,163,159	\$ 8,026	46.5%	3.65x	3.65x
PEIP #13	2014	13,000,000	13,035,722	94,207,284	-	90.6%	7.23x	7.23x
PEIP #2	2012	13,714,735	13,878,761	33,036,817	-	44.4%	2.38x	2.38x
PEIP #3	2012	8,701,022	10,000,061	25,540,380	-	22.5%	2.55x	2.55x
PEIP #4	2012	10,000,000	7,500,000	12,669,791	137,399	11.6%	1.71x	1.69x
PEIP #6	2013	11,252,164	10,161,660	18,637,634	-	16.1%	1.83x	1.83x
<b>Total Realized</b>		<b>71,667,921</b>	<b>66,662,467</b>	<b>228,255,065</b>	<b>145,425</b>	<b>39.9%</b>	<b>3.43x</b>	<b>3.43x</b>
Total Partially Realized and Unrealized		298,642,122	268,015,931	86,235,350	344,285,471	16.8%	1.61x	.32x
<b>Total - Fund 1 (2012)</b>		<b>370,310,043</b>	<b>334,678,398</b>	<b>314,490,415</b>	<b>344,430,896</b>	<b>25.3%</b>	<b>1.97x</b>	<b>.94x</b>
<b>Total - Fund 2 (2017)</b>		<b>345,320,944</b>	<b>297,364,246</b>	<b>6,274,108</b>	<b>322,252,610</b>	<b>14.3%</b>	<b>1.1x</b>	<b>.02x</b>
<b>Total - Private Equity Internal</b>		<b>\$ 712,659,340</b>	<b>\$ 632,042,643</b>	<b>\$ 320,868,298</b>	<b>\$ 666,579,619</b>	<b>24.2%</b>	<b>1.56x</b>	<b>.51x</b>

# Private Equity Internal Co-Investments

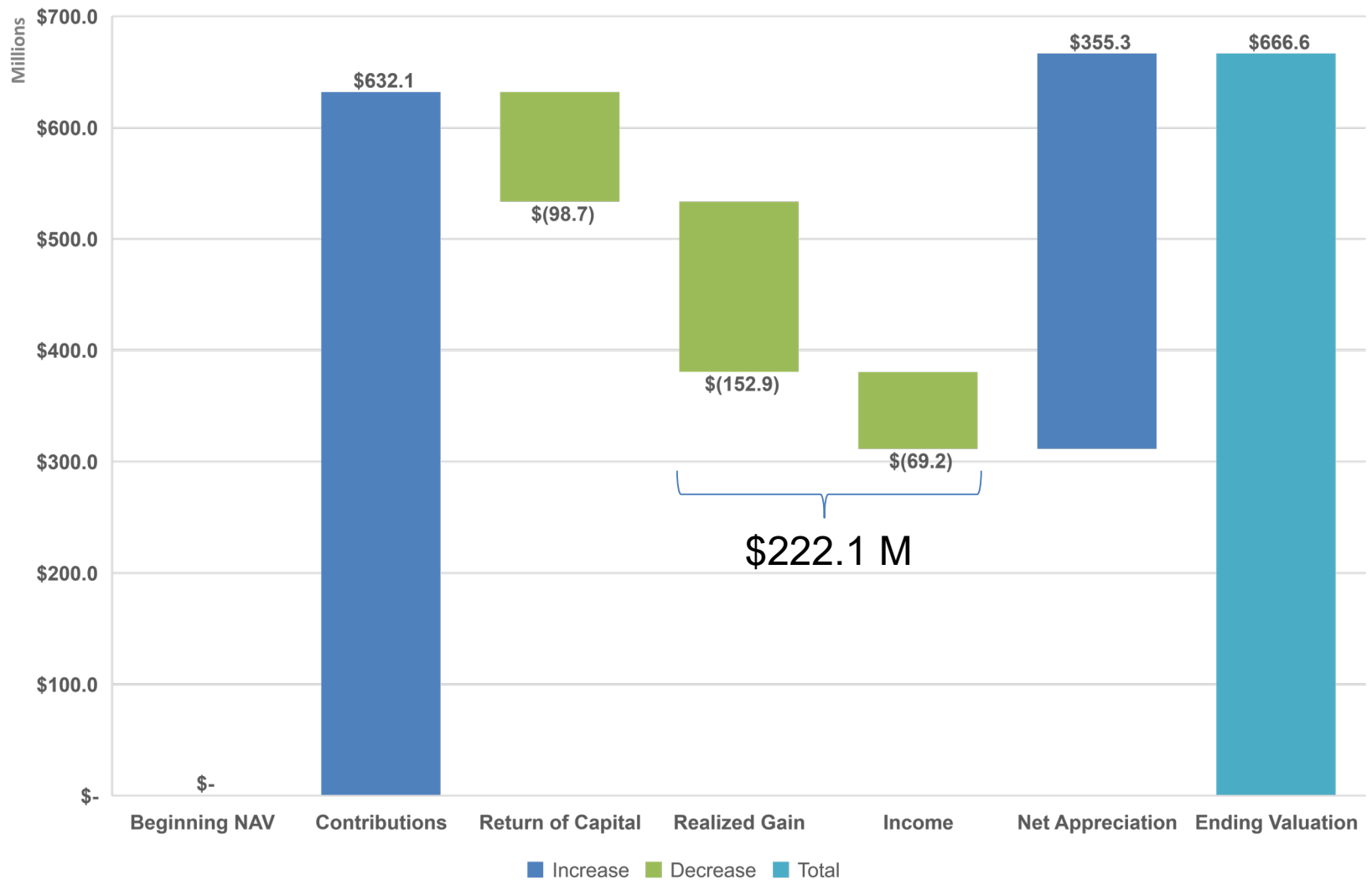
Performance by “Fund” as of December 31, 2018

(\$mm)	Private Equity					Pennsylvania Co-Invest	Total Program
	Fund I (2012)	Fund II (2017)	Total	Wilson Currency Hedge	Grand Total		
<b>Performance (net of fees):</b>							
Inception IRR	25.3%	14.3%	24.8%	n/a	24.8%	18.4%	24.3%
Benchmark *	10.5%	-5.5%	9.0%	n/a	9.0%	8.0%	8.9%
Direct Alpha	14.8%	19.8%	15.8%	n/a	15.8%	10.5%	15.5%
1-Quarter (TWR)	3.9%	2.6%	3.8%	n/a	3.8%	-9.4%	2.3%
1-Year (IRR)	8.6%	18.8%	14.4%	n/a	14.4%	-3.1%	12.3%
3-Year (IRR)	18.8%	n/a	18.6%	n/a	18.6%	18.3%	18.6%
5-Year (IRR)	22.0%	n/a	21.8%	n/a	21.8%	18.2%	21.5%
Inception Multiple	1.97x	1.10x	1.58x	n/a	1.58x	1.44x	1.57x
<b>Commitment Summary:</b>							
Authorized			\$ 1,000.0	n/a	\$ 1,000.0	\$ 250.0	\$ 1,250.0
Outstanding Cost	\$ 238.0	\$ 295.3	\$ 533.2	n/a	\$ 533.2	\$ 48.0	\$ 581.2
Unfunded Commitments	\$ 32.7	\$ 47.9	\$ 80.6	n/a	\$ 80.6	\$ 2.5	\$ 83.1
Available			\$ 386.2	n/a	\$ 386.2	\$ 199.5	\$ 585.7
<b>Flows &amp; Valuations:</b>							
Contributions	\$ 334.7	\$ 297.3	\$ 632.0	\$ (.1)	\$ 631.9	\$ 54.2	\$ 686.1
Distributions	\$ 314.5	\$ 6.3	\$ 320.8	\$ 9.2	\$ 330.0	\$ 8.5	\$ 338.5
Valuations	\$ 344.4	\$ 322.2	\$ 666.6	\$ .0	\$ 666.6	\$ 69.8	\$ 736.4



# Since Inception (Feb 2012) NAV Bridge

as of December 31, 2018



# Table of Contents

---

- Org Chart, Executive Summary, Performance Overview - Charlie
- Performance Summary – Darren
- Portfolio and Industry Summary – Patrick and Mike
- Co-Investment Review - Tony
- **Management Fees, Carried Interest, & Other Expenses - Charlie**
- Appendix

## Private Markets, Private Credit, & Private Real Estate Management Fees, Carried Interest, & Other Expenses

(Dollars in Millions)

	A	+	B	=	C	+	D	=	E	F	G	F - G = H	G/F
2018 Calendar Year	Management Fees		Offsets		Net Management Fees		Other Fund Expense <sup>2</sup>		Total Direct Exp. of Managing Partnership	Total Dollars Earned Incl. Carried Interest	Carried Interest <sup>1</sup>	Net Dollars Earned to PSERS	Carry as % of Gross
Private Markets	\$ 139		\$ (25)		\$ 114		\$ 46		\$ 160	\$ 911	\$ 214	\$ 697	23.49%
Private Credit	68		(3)		65		24		89	337	68	269	20.18%
Private Real Estate	48		(4)		44		26		70	598	128	470	21.40%
<b>Total</b>	<b>\$ 255</b>		<b>\$ (32)</b>		<b>\$ 223</b>		<b>\$ 96</b>		<b>\$ 319</b>	<b>\$ 1,846</b>	<b>\$ 410</b>	<b>\$ 1,436</b>	<b>22.21%</b>

1980 - 2018 Inception to Date As of 12/31/18	Management Fees		Offsets		Net Management Fees		Other Fund Expense <sup>2</sup>		Total Direct Exp. of Managing Partnership	Total Dollars Earned Incl. Carried Interest	Carried Interest <sup>1</sup>	Net Dollars Earned to PSERS	Carry as % of Gross
Private Markets	\$ 2,499		\$ (239)		\$ 2,260		\$ 512		\$ 2,772	\$ 17,522	\$ 3,437	\$ 14,085	19.68%
Private Credit	Not Collected		Not Collected		432		150		582	2,891	433	2,458	14.98%
Private Real Estate	Not Collected		Not Collected		1,129		286		1,345	10,725	1,712	9,013	15.96%
<b>Total</b>					<b>\$ 3,821</b>		<b>\$ 948</b>		<b>\$ 4,769</b>	<b>\$ 31,138</b>	<b>\$ 5,582</b>	<b>\$ 25,556</b>	<b>17.96%</b>

See Footnotes on next page.

# Private Markets, Private Credit, Private RE Management Fees, Carried Interest & Other Expenses

## Presentation Methodology

- PSERS used a best efforts approach to gathering the data necessary for this presentation.
- PSERS canvassed our active funds for Carried Interest, Mgt Fee Offsets and Other Fund Expenses detail by fund. These amounts have not been tracked separately for financial statement presentation.
- PSERS added performance fees to Carried Interest estimates for Private Debt funds structured as “evergreen funds”. These fees are separately accounted for and disclosed within the CAFR. We included these fees in the analysis for comparative purposes.
- PSERS also did not have any Carried Interest, Other Fund Expenses or Mgt Fee detail by fund for liquidated funds included in Inception to Date as of December 31, 2018 amounts presented. The Mgt Fees for Private Market liquidated funds were not available due to document retention policies and/or the fact that funds were no longer in existence. Therefore, good faith estimates were used to calculate Private Markets, Private Credit, and Private Real Estate funds as detailed below:
  - Liquidated Private Market, Private Credit and Private Real Estate fund’s carried interest was estimated by applying 25% to the combined Net Cash / Net Asset Value gain for those funds with an IRR of 8% or higher since inception.
  - Liquidated Private Real Estate fund’s Mgt Fees were provided by Courtland Advisors via their internal records.
  - Liquidated Private Market and Private Credit funds’ Mgt Fees were estimated in 2018 by applying the Mgt Fee rate on record to the Average Quarterly Commitment over PSERS first 16 quarters PSERS invested in those funds, these amounts were then rolled forward into 2018 inception to date. For the remaining quarters PSERS invested in these funds, the Mgt Fee rate on record was applied to the Average Quarterly Adjusted Net Asset Value divided by each fund’s Multiple of Cost, to approximate average invested capital.

Note: It took more than 200 staff hours from PSERS and Hamilton Lane to provide this analysis.

# Private Markets, Private Credit, & Private Real Estate Management Fees, Carried Interest, & Other Expenses

Footnotes to schedule

<sup>1</sup> Carried interest includes carried interest paid and accrued, offset by clawbacks. Carried interest for all active funds and for all periods presented were verified for reasonableness by applying a carry of 20% to cash / Net Asset Value gains for those funds with an Internal Rate of Return in excess of 6% and inquiring about outliers for additional documentation and substantiation.

<sup>2</sup> Other fund level expenses are partnership expenses per the Limited Partnership Agreement and are reimbursed to General Partner for services rendered and in some cases offset against Mgt Fees.

# Key Takeaways - Private Markets

- PM Program returned 9.1% in 2018 versus the PME which declined 7.8%
- PM Program has returned 11.4% since inception versus the PME return of 8.8%
- Staff has been able to select top quartile funds at a greater propensity:
  - 38% of the 2011 to 2016 Funds were in the top quartile versus 2003-2008 Funds where 20% were in the top quartile
- Private Equity:
  - We will opportunistically add new GPs that have a proven ability to add value to their portfolio companies along with a consistent investment strategy, with the expectation of generating top quartile performance
- Co-Investment:
  - Portfolio has generated strong returns, exceeding expectations
  - Deal flow has been very good
    - 14 deals closed in 2018 - \$250M of commitments (no mgmt. fee and carry)
- Venture Capital:
  - Will look to add some new emerging venture capital funds

# Table of Contents

---

- Org Chart, Executive Summary, Performance Overview - Charlie
- Performance Summary – Darren
- Portfolio and Industry Summary – Patrick and Mike
- Co-Investment Review - Tony
- Fee and Carry info - Charlie
- **Appendix**

# Performance Summary by Investment

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
<b>Private Equity Portfolio</b>									
ABS Capital Partners II, L.P.	1996	Private Equity	\$40,000,000	\$39,291,734	\$45,875,748	(\$10,033)	1.2x	6.72%	1.2x
Actis Emerging Markets 3, L.P.	2007	Private Equity	200,000,000	224,263,721	201,167,784	21,949,000	1.0x	(0.12%)	0.9x
Actis Global 4, L.P.	2012	Private Equity	100,000,000	90,995,350	26,536,094	80,057,000	1.2x	5.56%	0.3x
Allegheny New Mountain Partners, L.P.	2004	Private Equity	100,000,000	85,315,511	172,133,406	1,561,496	2.0x	14.18%	2.0x
Apax Digital L.P.	2017	Private Equity	100,000,000	9,782,015	-	8,334,153	0.9x	(29.08%)	-
Apax Europe VII-A, L.P.	2007	Private Equity	228,898,426	291,179,212	327,255,199	40,188,620	1.3x	4.51%	1.1x
Bain Capital Asia Fund II, L.P.	2012	Private Equity	100,000,000	99,985,567	111,624,907	83,557,421	2.0x	22.40%	1.1x
Bain Capital Asia Fund III, L.P.	2016	Private Equity	130,000,000	74,425,000	33,653,515	59,923,897	1.3x	28.42%	0.5x
Bain Capital Asia Fund IV, L.P.	2018	Private Equity	150,000,000	-	-	-	N/A	N/A	N/A
Bain Capital Fund XI, L.P.	2014	Private Equity	100,000,000	96,468,680	63,193,537	95,813,753	1.6x	26.81%	0.7x
Bain Capital Fund XII, L.P.	2017	Private Equity	125,000,000	29,062,500	-	25,244,124	0.9x	(34.00%)	-
Baring Asia Private Equity Fund III, L.P.	2005	Private Equity	122,500,000	145,214,197	333,702,589	4,344,505	2.3x	52.19%	2.3x
Baring Asia Private Equity Fund IV, L.P.	2007	Private Equity	300,000,000	334,388,475	511,658,682	30,240,160	1.6x	8.96%	1.5x
Baring Asia Private Equity Fund V, L.P.	2011	Private Equity	200,000,000	267,247,408	161,228,457	205,038,935	1.4x	9.57%	0.6x
Baring Asia Private Equity Fund VI, L.P.	2015	Private Equity	100,000,000	91,442,901	19,121,059	93,256,857	1.2x	13.61%	0.2x
Bastion Capital Fund, LP	1994	Private Equity	12,500,000	12,246,895	24,148,319	-	2.0x	18.93%	2.0x
BDC III, L.P.	2016	Private Equity	95,517,066	41,438,955	5,024,193	59,358,227	1.6x	79.68%	0.1x
BG Media International Investors	1997	Private Equity	25,000,000	24,729,264	21,119,037	-	0.9x	(2.40%)	0.9x
Blue Point Capital Partners I, L.P.	2001	Private Equity	103,750,000	91,140,153	143,028,571	210,670	1.6x	12.08%	1.6x
Blue Point Capital Partners II, L.P.	2007	Private Equity	100,000,000	92,914,961	252,738,487	10,980,863	2.8x	20.91%	2.7x
Blue Point Capital Partners III, L.P.	2014	Private Equity	60,000,000	56,847,381	31,122,866	46,118,267	1.4x	17.36%	0.5x
Blue Point Capital Partners IV, L.P.	2018	Private Equity	70,000,000	11,428,387	-	10,799,427	0.9x	(7.24%)	-
Bridgepoint Capital II (Secondary)	1998	Private Equity	84,714,906	81,290,641	166,312,361	172,905	2.0x	18.65%	2.0x
Bridgepoint Europe I	1998	Private Equity	79,622,624	75,126,567	135,823,089	47,767	1.8x	12.42%	1.8x
Bridgepoint Europe II, L.P.	2001	Private Equity	343,347,640	313,199,355	610,216,555	3,594,379	2.0x	29.40%	1.9x
Bridgepoint Europe III, L.P.	2005	Private Equity	228,898,426	260,820,005	264,873,337	65,528,940	1.3x	3.13%	1.0x
Bridgepoint Europe IV, L.P.	2008	Private Equity	343,347,640	374,063,409	398,915,611	159,530,705	1.5x	9.35%	1.1x
Bridgepoint Europe V, L.P.	2015	Private Equity	171,673,820	155,365,589	21,267,913	167,933,329	1.2x	15.14%	0.1x
Bridgepoint Europe VI, L.P.	2018	Private Equity	114,449,213	-	-	(997,059)	N/A	N/A	N/A



# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
Bruckmann, Rosser, Sherrill & Co. L.P.	1995	Private Equity	25,000,000	24,465,163	44,580,173	-	1.8x	10.37%	1.8x
Capital International Private Equity Fund V, L.P.	2007	Private Equity	200,000,000	206,038,488	182,602,895	5,138,372	0.9x	(2.66%)	0.9x
Capital International Private Equity Fund VI, L.P.	2011	Private Equity	100,000,000	103,621,146	17,613,777	85,215,163	1.0x	(0.21%)	0.2x
Catterton Growth Partners II, L.P.	2013	Private Equity	75,000,000	74,553,262	-	92,816,928	1.2x	5.79%	-
Catterton Growth Partners, L.P.	2008	Private Equity	75,000,000	92,996,496	119,839,200	29,613,270	1.6x	9.56%	1.3x
Catterton Partners V, L.P.	2004	Private Equity	100,000,000	101,386,111	140,451,682	1,182,882	1.4x	5.47%	1.4x
Catterton Partners VI, L.P.	2006	Private Equity	130,000,000	147,723,222	216,307,184	62,910,682	1.9x	11.97%	1.5x
Catterton Partners VII, L.P.	2012	Private Equity	100,000,000	109,677,185	41,863,961	138,124,094	1.6x	15.92%	0.4x
CIGNA	1988	Private Equity	4,566,946	4,566,946	6,645,349	-	1.5x	9.21%	1.5x
Cinven Fifth Fund, L.P.	2012	Private Equity	114,449,213	125,806,451	149,196,380	61,020,488	1.7x	20.79%	1.2x
Cinven Fourth Fund	2007	Private Equity	171,673,820	206,694,831	300,717,820	150,907	1.5x	7.46%	1.5x
Cinven Sixth Fund	2016	Private Equity	103,004,292	38,321,112	-	38,712,311	1.0x	0.98%	-
Clarity Partners L.P.	2000	Private Equity	203,590,000	204,760,392	150,711,218	-	0.7x	(6.93%)	0.7x
Clarity PSERS II, L.P.	2008	Private Equity	17,386,250	12,225,121	2,451,273	-	0.2x	(28.86%)	0.2x
Coller International Partners VI, L.P.	2011	Private Equity	100,000,000	71,690,668	81,324,762	36,159,344	1.6x	15.99%	1.1x
Coller International Partners VII, L.P.	2015	Private Equity	100,000,000	58,728,858	2,120,734	67,955,424	1.2x	19.70%	0.0x
Credit Suisse First Boston Equity Partners, LP	1998	Private Equity	137,172,500	114,737,213	32,970,843	-	0.3x	(16.26%)	0.3x
Credit Suisse First Boston Intl. Equity Partners	1997	Private Equity	100,000,000	76,663,758	95,813,877	-	1.2x	5.22%	1.2x
Crestview Capital Partners	2005	Private Equity	150,000,000	154,361,773	226,159,577	21,911,556	1.6x	7.46%	1.5x
Crestview Partners II, L.P.	2009	Private Equity	200,000,000	231,998,000	303,092,540	76,541,016	1.6x	12.92%	1.3x
Crestview Partners III, L.P.	2015	Private Equity	150,000,000	90,269,825	16,254,762	99,331,148	1.3x	14.00%	0.2x
CVC Capital Partners Asia Pacific III, L.P.	2008	Private Equity	300,000,000	296,570,497	438,803,087	41,690,631	1.6x	13.40%	1.5x
CVC European Equity Partners V, L.P.	2008	Private Equity	343,347,640	434,205,058	698,054,836	134,292,883	1.9x	16.51%	1.6x
DCPF VI Oil and Gas Coinvestment Fund LP	2013	Private Equity	25,000,000	21,218,942	12,421,734	21,828,314	1.6x	19.11%	0.6x
Denham Commodity Partners Fund VI, L.P.	2011	Private Equity	75,000,000	80,114,932	34,075,652	61,284,303	1.2x	7.25%	0.4x
Deutsche European Partners IV	1999	Private Equity	200,000,000	180,960,550	224,577,100	-	1.2x	6.41%	1.2x

# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
DLJ Merchant Banking Partners III, L.P.	2000	Private Equity	300,000,000	310,668,837	671,148,994	-	2.2x	20.27%	2.2x
Dubin Clark Fund II, L.P.	2000	Private Equity	24,083,333	23,706,041	27,060,085	-	1.1x	1.99%	1.1x
Edgewater Growth Capital Partners, L.P.	2001	Private Equity	59,196,500	59,196,500	77,379,658	-	1.3x	6.58%	1.3x
Edgewater Private Equity Fund III	1998	Private Equity	39,000,000	39,000,000	23,129,095	-	0.6x	(7.85%)	0.6x
Equistone Partners Europe Fund V, L.P.	2015	Private Equity	74,391,989	68,202,968	9,134,899	67,485,491	1.1x	5.64%	0.1x
Equistone Partners Europe Fund VI, L.P.	2018	Private Equity	85,836,910	7,254,423	-	7,219,341	1.0x	(2.12%)	-
Evergreen Pacific Partners II, L.P.	2008	Private Equity	80,954,545	71,098,524	155,395,879	1,160,251	2.2x	22.04%	2.2x
Evergreen Pacific Partners, L.P.	2005	Private Equity	50,000,000	45,104,137	5,292,828	941,629	0.1x	(88.93%)	0.1x
First Reserve Fund XI, L.P.	2006	Private Equity	200,000,000	213,209,232	140,355,363	-	0.7x	(9.68%)	0.7x
First Reserve Fund XII, L.P.	2008	Private Equity	250,000,000	275,544,748	136,510,493	49,385,631	0.7x	(8.97%)	0.5x
Furman Selz Investors II, L.P.	1998	Private Equity	56,250,000	55,816,077	96,375,368	-	1.7x	11.53%	1.7x
Furman Selz Investors III, L.P.	2000	Private Equity	100,000,000	95,025,051	206,864,610	-	2.2x	22.58%	2.2x
GoldPoint Partners Co-Investment V, L.P.	2012	Private Equity	50,000,000	56,136,123	35,331,931	50,965,227	1.5x	18.75%	0.6x
Graham Partners	1999	Private Equity	56,671,214	61,946,457	82,648,447	-	1.3x	5.47%	1.3x
Green Equity Investors II, L.P.	1994	Private Equity	25,000,000	24,151,005	50,916,127	-	2.1x	14.40%	2.1x
Greenwich Street Capital Partners II, L.P.	1998	Private Equity	200,000,000	216,105,302	214,588,348	-	1.0x	(0.13%)	1.0x
GS Mezzanine Partners, LP	1996	Private Equity	30,000,000	26,883,828	39,260,072	-	1.5x	8.82%	1.5x
Halifax Capital Partners	1999	Private Equity	50,000,000	39,967,488	63,972,891	-	1.6x	11.77%	1.6x
Headland Private Equity Fund 6 Ltd.	2008	Private Equity	200,000,000	187,330,868	215,392,572	-	1.1x	5.08%	1.1x
Heritage Fund I, L.P.	1994	Private Equity	25,000,000	24,999,999	24,755,484	-	1.0x	(0.46%)	1.0x
HgCapital 7, L.P.	2013	Private Equity	95,517,066	104,202,839	43,080,522	103,065,604	1.4x	12.08%	0.4x
HgCapital 8, L.P.	2017	Private Equity	120,988,283	3,776,787	-	1,309,171	0.3x	(99.31%)	-
HGGC Fund II, L.P.	2014	Private Equity	100,000,000	89,415,163	23,078,424	101,863,994	1.4x	15.27%	0.3x
HGGC Fund III, L.P.	2017	Private Equity	125,000,000	74,256,023	-	85,051,968	1.1x	20.70%	-
Incline Equity Partners III, L.P.	2011	Private Equity	65,000,000	68,034,295	61,605,293	71,227,377	2.0x	31.45%	0.9x
Incline Equity Partners IV, L.P.	2017	Private Equity	90,000,000	25,196,700	105,343	26,769,602	1.1x	18.04%	0.0x
Irving Place Capital III SPV, L.P.	2006	Private Equity	150,000,000	157,455,468	173,476,820	78,799,468	1.6x	7.64%	1.1x
Irving Place Capital MB-PSERS II, L.P.	2000	Private Equity	300,000,000	285,417,494	462,986,839	13,063,333	1.7x	12.64%	1.6x
Jefferies Capital Partners IV, L.P.	2005	Private Equity	100,000,000	95,270,050	108,935,198	-	1.1x	2.85%	1.1x
K4 Private Investors, L.P.	2018	Private Equity	100,000,000	8,952,520	-	6,783,302	0.8x	(24.23%)	-

# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
KKR 2006 Fund, L.P.	2006	Private Equity	300,000,000	299,054,703	408,221,889	-	1.4x	6.52%	1.4x
KRG Capital Fund II (PA) L.P.	2001	Private Equity	100,000,000	79,636,623	119,983,431	-	1.5x	22.08%	1.5x
KRG Capital Fund III, (PA) L.P.	2005	Private Equity	88,000,000	88,076,832	77,248,244	-	0.9x	(2.67%)	0.9x
KRG Capital Fund IV, L.P.	2007	Private Equity	300,000,000	287,028,332	337,445,210	-	1.2x	6.26%	1.2x
KRG Capital Partners I, L.P.	1999	Private Equity	50,000,000	43,261,578	91,634,458	-	2.1x	17.75%	2.1x
L Catterton Growth Partners III, L.P.	2016	Private Equity	100,000,000	71,433,630	9,756,095	94,504,587	1.5x	29.44%	0.1x
L Catterton VIII, L.P.	2016	Private Equity	100,000,000	38,249,369	-	39,347,389	1.0x	3.34%	-
Landmark Equity Partners III, LP	1993	Private Equity	27,085,010	27,085,010	76,454,209	-	2.8x	33.81%	2.8x
Landmark Equity Partners IV, LP	1994	Private Equity	10,533,687	10,254,032	15,424,473	-	1.5x	16.66%	1.5x
Landmark Equity Partners XIII, L.P.	2006	Private Equity	100,000,000	96,089,730	102,102,369	22,826,411	1.3x	5.26%	1.1x
Landmark Equity Partners XIV, L.P.	2008	Private Equity	150,000,000	145,423,618	160,527,305	31,762,213	1.3x	9.67%	1.1x
Landmark Mezzanine Partners	1995	Private Equity	75,000,000	59,315,512	107,971,301	-	1.8x	28.73%	1.8x
Lehman Brothers Merchant Banking Partners II, L.P.	1997	Private Equity	158,552,133	168,556,341	220,371,513	-	1.3x	5.72%	1.3x
Lexington Capital Partners I, L.P.	1996	Private Equity	50,000,000	49,613,120	62,993,730	-	1.3x	13.16%	1.3x
Lindsay Goldberg & Bessemer, L.P.	2002	Private Equity	300,000,000	313,313,056	733,251,794	-	2.3x	34.18%	2.3x
Milestone Partners II, L.P.	2004	Private Equity	29,890,000	27,844,247	44,374,647	-	1.6x	17.23%	1.6x
Milestone Partners III, L.P.	2008	Private Equity	60,000,000	61,078,376	55,613,526	6,865,951	1.0x	0.42%	0.9x
Milestone Partners IV, L.P.	2011	Private Equity	70,000,000	73,180,567	40,571,570	72,472,814	1.5x	11.81%	0.6x
Morgan Stanley DW Capital Partners IV, L.P.	1998	Private Equity	300,000,000	236,774,394	478,042,786	-	2.0x	16.87%	2.0x
Navis Asia Fund V, L.P.	2007	Private Equity	100,000,000	121,024,807	181,335,725	-	1.5x	8.83%	1.5x
New Mountain Partners III, L.P.	2007	Private Equity	300,000,000	305,309,625	406,920,130	197,792,259	2.0x	13.28%	1.3x
New Mountain Partners IV, L.P.	2013	Private Equity	100,000,000	88,434,230	38,707,532	96,789,501	1.5x	20.19%	0.4x
New Mountain Partners V, L.P.	2017	Private Equity	200,000,000	56,910,667	1,321,780	57,004,510	1.0x	3.49%	0.0x
New Mountain Partners, L.P.	2000	Private Equity	192,509,033	161,121,249	243,188,690	-	1.5x	13.69%	1.5x
New York Life Capital Partners I, L.P.	1999	Private Equity	200,000,000	205,037,393	226,909,340	138,921	1.1x	1.74%	1.1x
New York Life Capital Partners II, L.P.	2001	Private Equity	200,000,000	194,782,469	552,868,863	651,749	2.8x	32.47%	2.8x
New York Life Capital Partners III-A, L.P.	2005	Private Equity	200,000,000	218,879,927	209,854,408	2,390,189	1.0x	(0.45%)	1.0x
New York Life Capital Partners IV-A, L.P.	2008	Private Equity	100,000,000	109,488,034	187,839,505	17,372,795	1.9x	13.72%	1.7x

# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
NGP Natural Resources X, L.P.	2012	Private Equity	100,000,000	100,138,654	70,249,912	41,174,394	1.1x	3.54%	0.7x
NGP Natural Resources XI, L.P.	2014	Private Equity	100,000,000	90,291,277	17,085,793	97,247,810	1.3x	14.84%	0.2x
Nordic Capital VII Beta, L.P.	2008	Private Equity	171,673,820	187,621,305	230,587,380	-	1.2x	5.34%	1.2x
North Haven Private Equity Asia IV, L.P.	2013	Private Equity	100,000,000	106,622,641	28,041,589	101,453,317	1.2x	7.90%	0.3x
Odyssey Investment Partners Fund V, L.P.	2014	Private Equity	100,000,000	73,184,270	13	66,802,568	0.9x	(4.96%)	0.0x
Orchid Asia Fund VI, L.P.	2014	Private Equity	75,000,000	73,475,285	14,459,329	66,307,454	1.1x	7.61%	0.2x
Orchid Asia V, L.P.	2011	Private Equity	40,000,000	35,590,824	51,114,216	11,405,499	1.8x	27.26%	1.4x
Orchid Asia VII, L.P.	2017	Private Equity	75,000,000	6,834,362	-	5,772,488	0.8x	(15.54%)	-
PAI Europe III	2001	Private Equity	343,347,640	335,956,000	1,112,343,391	-	3.3x	38.15%	3.3x
PAI Europe IV	2005	Private Equity	114,449,213	131,323,788	191,669,313	6,504,747	1.5x	9.42%	1.5x
PAI Europe V	2008	Private Equity	114,449,213	127,525,805	187,094,107	33,097,005	1.7x	9.24%	1.5x
PAI Europe VI	2015	Private Equity	114,449,213	93,956,936	26,508,591	88,956,760	1.2x	11.89%	0.3x
PAI Europe VII	2018	Private Equity	143,061,517	-	-	-	N/A	N/A	N/A
Palladium Equity Partners II-A, L.P.	2000	Private Equity	57,750,000	67,771,944	142,953,682	-	2.1x	8.46%	2.1x
Palladium Equity Partners IV, L.P.	2012	Private Equity	75,000,000	62,407,930	33,209,040	56,409,776	1.4x	14.65%	0.5x
Partners Group Secondary 2008 S.C.A., SICAR	2007	Private Equity	171,673,820	178,460,588	240,057,116	26,146,590	1.5x	8.80%	1.3x
Partners Group Secondary 2011 (USD), L.P. Inc.	2011	Private Equity	100,000,000	63,330,430	70,207,250	40,848,040	1.8x	17.49%	1.1x
Partners Group Secondary 2015 (USD) A, L.P.	2015	Private Equity	100,000,000	34,755,738	3,557,620	39,754,003	1.2x	18.01%	0.1x
Pemira IV, L.P.	2006	Private Equity	143,061,517	168,696,669	252,795,301	20,942,979	1.6x	8.72%	1.5x
Platinum Equity Capital Partners II, L.P.	2007	Private Equity	300,000,000	283,051,567	432,991,423	20,655,320	1.6x	12.66%	1.5x
Platinum Equity Capital Partners III, L.P.	2012	Private Equity	200,000,000	166,026,208	233,024,018	73,629,020	1.8x	28.17%	1.4x
Platinum Equity Capital Partners IV, L.P.	2016	Private Equity	300,000,000	192,237,501	49,953,070	201,828,252	1.3x	36.07%	0.3x
Platinum Equity Capital Partners, L.P.	2004	Private Equity	125,000,000	98,371,482	250,769,692	7,231,985	2.6x	59.93%	2.5x
Platinum Equity Small Cap Fund, L.P.	2018	Private Equity	160,000,000	7,803,878	-	5,603,746	0.7x	(30.63%)	-
PNC Equity Partners II, L.P.	2007	Private Equity	68,065,386	59,200,573	125,124,414	504,315	2.1x	14.81%	2.1x
PNC Equity Partners, L.P.	2001	Private Equity	43,154,458	39,619,636	77,640,378	-	2.0x	21.11%	2.0x
Portfolio Advisors Secondary Fund III, L.P.	2017	Private Equity	125,000,000	53,376,093	11,939,090	54,990,451	1.3x	64.59%	0.2x
Providence Equity Partners VI, L.P.	2007	Private Equity	300,000,000	316,291,227	403,436,046	-	1.3x	5.69%	1.3x
Quadrangle Capital Partners II, L.P.	2005	Private Equity	250,000,000	227,201,835	296,569,830	-	1.3x	5.70%	1.3x

# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
Quadrangle Capital Partners, L.P.	2001	Private Equity	270,422,415	225,438,094	386,739,733	-	1.7x	11.07%	1.7x
StepStone International Investors III L.P.	2007	Private Equity	114,449,213	136,709,467	106,283,246	9,781,695	0.8x	(3.22%)	0.8x
Sterling Capital Partners, L.P.	2002	Private Equity	75,000,000	84,393,474	163,071,264	6,733,892	2.0x	17.88%	1.9x
Strategic Feeder, L.P.	2001	Private Equity	200,000,000	194,687,388	308,973,117	-	1.6x	16.81%	1.6x
Strategic Partners Fund II, L.P.	2003	Private Equity	300,000,000	265,035,869	473,133,827	-	1.8x	34.15%	1.8x
Strategic Partners Fund III-B, L.P.	2005	Private Equity	200,000,000	218,593,477	278,426,894	15,433,338	1.3x	6.19%	1.3x
Strategic Partners Fund IV, L.P.	2008	Private Equity	100,000,000	95,847,618	141,322,094	11,801,388	1.6x	13.13%	1.5x
Strategic Partners Fund V, L.P.	2011	Private Equity	150,000,000	121,799,311	164,132,368	36,319,279	1.7x	19.86%	1.3x
Strategic Partners Fund VI, L.P.	2014	Private Equity	150,000,000	102,105,819	88,852,103	59,234,723	1.5x	18.88%	0.9x
Strategic Partners Fund VII, L.P.	2016	Private Equity	250,000,000	152,900,791	20,741,155	186,605,662	1.4x	41.60%	0.1x
Sunrise Capital Partners, L.P.	1998	Private Equity	57,388,755	57,104,502	20,834,805	-	0.4x	(15.59%)	0.4x
The Energy & Minerals Group Fund III, L.P.	2014	Private Equity	100,000,000	96,067,293	6,915,349	75,331,180	0.9x	(4.28%)	0.1x
TPG Partners II, L.P.	1997	Private Equity	50,000,000	53,854,393	91,361,723	-	1.7x	9.93%	1.7x
TPG Partners V, L.P.	2006	Private Equity	250,000,000	261,876,873	307,855,529	-	1.2x	3.11%	1.2x
TPG Partners VI, L.P.	2008	Private Equity	360,000,000	364,618,439	486,773,394	-	1.3x	10.75%	1.3x
TPG Partners, L.P.	1993	Private Equity	24,194,356	24,465,437	89,300,776	-	3.7x	36.55%	3.7x
Trilantic Capital Partners IV L.P.	2007	Private Equity	76,752,676	79,454,209	118,509,293	9,520,577	1.6x	14.07%	1.5x
Trilantic Capital Partners V (North America), L.P.	2013	Private Equity	100,000,000	106,130,781	87,255,799	67,699,443	1.5x	16.99%	0.8x
Trilantic Capital Partners VI (North America), L.P.	2018	Private Equity	150,000,000	31,184,826	29,447	28,665,559	0.9x	(9.50%)	0.0x
U.S. Equity Partners II, L.P.	2002	Private Equity	300,000,000	218,963,263	427,144,173	-	2.0x	14.95%	2.0x
U.S. Equity Partners, L.P.	1996	Private Equity	75,000,000	76,336,235	69,738,856	-	0.9x	(1.56%)	0.9x
Webster Capital IV, L.P.	2018	Private Equity	75,000,000	21,750,000	664	22,754,144	1.0x	8.27%	0.0x
Wicks Communications and Media Partners, L.P.	1999	Private Equity	87,500,000	88,993,376	115,304,727	-	1.3x	8.57%	1.3x
Willis Stein & Partners, L.P.	1996	Private Equity	25,000,000	25,004,635	53,581,016	-	2.1x	20.65%	2.1x
<b>Private Equity Portfolio Total</b>			<b>\$22,044,713,334</b>	<b>\$19,668,052,268</b>	<b>\$24,519,770,793</b>	<b>\$5,249,401,177</b>	<b>1.5x</b>	<b>11.75%</b>	<b>1.2x</b>

# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
<b>PSERS Private Equity Internal Portfolio</b>									
ERT	2016	PSERS Private Equity Internal	10,764,461	10,764,461	-	22,447,252	2.1x	31.63%	-
Evans Network	2017	PSERS Private Equity Internal	10,029,145	10,029,145	-	15,898,519	1.6x	27.38%	-
Lasko	2016	PSERS Private Equity Internal	10,744,628	8,212,746	2,250,542	6,832,250	1.1x	5.88%	0.3x
PEIP #1	2012	PSERS Private Equity Internal	14,999,081	6,207,513	23,799,877	1,546,672	4.1x	49.02%	3.8x
PEIP #10	2013	PSERS Private Equity Internal	14,982,607	6,880,656	7,676,244	3,977,693	1.7x	13.92%	1.1x
PEIP #12	2014	PSERS Private Equity Internal	15,000,000	12,086,263	44,163,159	8,026	3.7x	46.51%	3.7x
PEIP #13	2014	PSERS Private Equity Internal	13,000,000	13,035,722	94,207,284	-	7.2x	90.60%	7.2x
PEIP #14	2014	PSERS Private Equity Internal	13,000,000	10,000,000	497,386	16,378,585	1.7x	12.46%	0.0x
PEIP #15	2014	PSERS Private Equity Internal	6,000,000	6,000,000	-	6,000,000	1.0x	0.00%	-
PEIP #16	2014	PSERS Private Equity Internal	15,649,951	7,587,710	7,905,168	6,795,955	1.9x	21.38%	1.0x
PEIP #17	2014	PSERS Private Equity Internal	10,000,000	10,000,000	-	19,288,400	1.9x	16.70%	-
PEIP #18	2014	PSERS Private Equity Internal	15,000,000	13,956,426	3,127,108	12,729,521	1.1x	4.65%	0.2x
PEIP #19	2015	PSERS Private Equity Internal	15,000,000	15,175,000	-	4,341	0.0x	(88.63%)	-
PEIP #2	2012	PSERS Private Equity Internal	11,767,533	13,878,761	33,036,817	-	2.4x	44.43%	2.4x
PEIP #20	2015	PSERS Private Equity Internal	12,000,000	12,362,967	6,932,222	11,147,156	1.5x	11.62%	0.6x
PEIP #21	2015	PSERS Private Equity Internal	15,000,000	15,012,260	-	12,011,982	0.8x	(6.65%)	-
PEIP #22	2015	PSERS Private Equity Internal	14,617,943	14,758,927	4,208,263	18,012,510	1.5x	16.09%	0.3x

# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
PEIP #23	2016	PSERS Private Equity Internal	11,000,000	11,000,000	-	17,453,291	1.6x	17.42%	-
PEIP #24	2016	PSERS Private Equity Internal	5,000,000	5,000,000	-	7,500,000	1.5x	17.10%	-
PEIP #25	2016	PSERS Private Equity Internal	7,000,000	5,000,000	-	6,398,859	1.3x	9.09%	-
PEIP #26	2016	PSERS Private Equity Internal	7,000,000	5,005,029	-	4,393,399	0.9x	(4.57%)	-
PEIP #27	2016	PSERS Private Equity Internal	15,311,145	16,654,100	-	33,669,224	2.0x	36.44%	-
PEIP #28	2016	PSERS Private Equity Internal	17,000,000	15,916,188	-	8,551,219	0.5x	(22.71%)	-
PEIP #29	2016	PSERS Private Equity Internal	14,878,398	14,850,812	-	30,310,756	2.0x	30.36%	-
PEIP #3	2012	PSERS Private Equity Internal	8,193,790	10,000,061	25,548,076	(7,623)	2.6x	22.48%	2.6x
PEIP #30	2016	PSERS Private Equity Internal	15,000,000	15,057,858	3,434,403	18,069,856	1.4x	14.98%	0.2x
PEIP #31	2016	PSERS Private Equity Internal	15,450,644	13,358,923	-	16,930,874	1.3x	11.09%	-
PEIP #32	2016	PSERS Private Equity Internal	17,760,000	14,549,622	5,768,020	23,356,735	2.0x	43.47%	0.4x
PEIP #33	2016	PSERS Private Equity Internal	9,900,000	9,900,000	-	12,905,035	1.3x	13.08%	-
PEIP #34	2017	PSERS Private Equity Internal	10,000,000	10,055,734	-	4,141,537	0.4x	(36.18%)	-
PEIP #35	2017	PSERS Private Equity Internal	12,000,000	10,008,006	734	15,488,004	1.5x	26.66%	0.0x
PEIP #36	2017	PSERS Private Equity Internal	17,167,382	13,735,375	-	24,380,300	1.8x	42.45%	-
PEIP #37	2017	PSERS Private Equity Internal	15,000,000	15,000,000	-	17,591,711	1.2x	9.67%	-
PEIP #38	2017	PSERS Private Equity Internal	5,000,000	5,000,000	500,000	6,560,997	1.4x	23.21%	0.1x

# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
PEIP #39	2017	PSERS Private Equity Internal	14,009,170	14,472,033	-	14,869,023	1.0x	1.71%	-
PEIP #4	2012	PSERS Private Equity Internal	10,000,000	7,500,000	12,707,868	99,322	1.7x	11.61%	1.7x
PEIP #40	2017	PSERS Private Equity Internal	13,762,747	14,381,070	-	20,173,843	1.4x	30.90%	-
PEIP #41	2018	PSERS Private Equity Internal	16,000,000	12,509,768	1,659	18,733,115	1.5x	49.80%	0.0x
PEIP #42	2018	PSERS Private Equity Internal	15,000,000	9,521,333	26,713	10,408,523	1.1x	11.45%	0.0x
PEIP #43	2018	PSERS Private Equity Internal	25,000,000	18,210,573	3,729,282	21,220,566	1.4x	39.12%	0.2x
PEIP #44	2018	PSERS Private Equity Internal	20,000,000	20,000,000	2,042,432	17,905,714	1.0x	(0.28%)	0.1x
PEIP #45	2018	PSERS Private Equity Internal	10,400,000	10,400,000	-	10,705,746	1.0x	3.66%	-
PEIP #46	2018	PSERS Private Equity Internal	13,779,685	14,242,163	-	14,036,289	1.0x	(1.45%)	-
PEIP #47	2018	PSERS Private Equity Internal	25,000,000	25,000,000	-	31,794,501	1.3x	27.18%	-
PEIP #48	2018	PSERS Private Equity Internal	25,000,000	25,000,000	-	14,679,429	0.6x	(41.28%)	-
PEIP #49	2018	PSERS Private Equity Internal	16,000,000	12,500,000	-	12,497,395	1.0x	(0.02%)	-
PEIP #51	2018	PSERS Private Equity Internal	17,167,382	17,170,571	-	17,178,000	1.0x	0.04%	-
PEIP #52	2018	PSERS Private Equity Internal	10,013,736	10,085,521	-	10,009,587	1.0x	(0.75%)	-
PEIP #53	2018	PSERS Private Equity Internal	25,000,000	25,084,154	-	24,890,039	1.0x	(0.78%)	-
PEIP #54	2019	PSERS Private Equity Internal	25,000,000	-	-	-	N/A	N/A	N/A
PEIP #55	2018	PSERS Private Equity Internal	15,000,000	15,000,000	-	15,000,000	1.0x	0.00%	-



# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
PEIP #6	2013	PSERS Private Equity Internal	10,712,039	10,161,660	18,695,635	(58,002)	1.8x	16.06%	1.8x
PEIP #7	2013	PSERS Private Equity Internal	12,007,603	12,281,374	8,507,605	12,985,115	1.8x	13.44%	0.7x
PEIP #8	2013	PSERS Private Equity Internal	10,729,614	11,506,868	14,385,359	43,868,293	5.1x	38.03%	1.3x
PS-PEIP #1	2013	PSERS Private Equity Internal	2,500,000	2,500,000	-	2,715,345	1.1x	1.43%	-
RedZone Robotics	2018	PSERS Private Equity Internal	14,011,640	14,011,640	-	9,364,893	0.7x	(33.18%)	-
Woodstream	2013	PSERS Private Equity Internal	8,726,532	8,726,532	6,231,453	12,499,060	2.1x	29.81%	0.7x
<b>PSERS Private Equity Internal Portfolio Total</b>			<b>\$775,059,593</b>	<b>\$686,305,526</b>	<b>\$329,383,310</b>	<b>\$736,348,833</b>	<b>1.6x</b>	<b>23.82%</b>	<b>0.5x</b>
<b>Special Situations Portfolio</b>									
Apollo Investment Fund IX, L.P.	2017	Special Situations	225,000,000	-	-	(2,790,252)	N/A	N/A	N/A
Apollo Investment Fund VIII, L.P.	2013	Special Situations	220,000,000	197,953,234	57,208,330	186,462,007	1.2x	10.01%	0.3x
Avenue Asia Special Situations Fund II, L.P.	2001	Special Situations	220,000,000	220,000,000	413,276,527	-	1.9x	21.47%	1.9x
Avenue Asia Special Situations Fund III, L.P.	2003	Special Situations	100,000,000	76,892,230	114,952,589	-	1.5x	8.41%	1.5x
Avenue Asia Special Situations Fund IV, L.P.	2006	Special Situations	300,000,000	225,070,059	246,579,577	-	1.1x	1.98%	1.1x
Avenue Europe Special Situations Fund, L.P.	2008	Special Situations	228,898,426	260,544,517	362,645,255	-	1.4x	12.18%	1.4x
Avenue Special Situations Fund II, L.P.	2000	Special Situations	125,000,000	126,838,089	199,775,750	-	1.6x	19.22%	1.6x
Avenue Special Situations Fund III, L.P.	2002	Special Situations	205,156,000	152,853,651	259,715,762	-	1.7x	18.53%	1.7x
Avenue Special Situations Fund IV, L.P.	2006	Special Situations	115,000,000	144,782,669	190,119,308	-	1.3x	8.40%	1.3x
Avenue Special Situations Fund V, L.P.	2007	Special Situations	300,000,000	301,785,852	399,729,589	-	1.3x	11.07%	1.3x
Avenue Special Situations Fund VI, L.P.	2010	Special Situations	75,000,000	76,892,726	76,363,160	5,323,257	1.1x	1.42%	1.0x
Cerberus Institutional Partners L.P. (Series Two)	2001	Special Situations	200,000,000	173,047,901	539,836,820	-	3.1x	27.08%	3.1x

# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
Cerberus Institutional Partners V, L.P.	2012	Special Situations	200,000,000	212,359,277	196,276,464	150,573,216	1.6x	12.74%	0.9x
Cerberus Institutional Partners VI, L.P.	2015	Special Situations	200,000,000	193,028,933	10,872,857	178,583,743	1.0x	(2.08%)	0.1x
Cerberus Institutional Partners, L.P. - Series 3	2003	Special Situations	100,000,000	81,055,777	160,448,796	2,184,729	2.0x	12.89%	2.0x
Cerberus Institutional Partners, L.P. (Series 4)	2006	Special Situations	400,000,000	369,661,873	592,875,550	74,834,711	1.8x	9.20%	1.6x
Clearlake Capital Partners IV, L.P.	2015	Special Situations	57,500,000	65,534,433	37,008,344	59,869,927	1.5x	32.02%	0.6x
Clearlake Capital Partners V, L.P.	2018	Special Situations	100,000,000	39,951,772	382,044	49,950,041	1.3x	61.04%	0.0x
Gleacher Mezzanine Fund I, L.P.	2001	Special Situations	75,000,000	63,450,304	95,943,900	-	1.5x	20.30%	1.5x
Gleacher Mezzanine Fund II, L.P.	2007	Special Situations	100,000,000	91,977,798	121,870,338	837,056	1.3x	10.62%	1.3x
Gold Hill Venture Lending 03, L.P.	2004	Special Situations	50,000,000	50,000,000	81,731,620	415,339	1.6x	10.80%	1.6x
GSC Partners CDO Investors III, L.P.	2001	Special Situations	80,000,000	80,000,000	146,903,688	-	1.8x	18.58%	1.8x
GSC Partners CDO Investors IV, L.P.	2003	Special Situations	80,000,000	80,000,000	114,506,209	-	1.4x	7.17%	1.4x
GSC Recovery II, L.P.	2000	Special Situations	280,000,000	279,170,771	430,042,246	364,060	1.5x	10.14%	1.5x
GSC Recovery III (Parallel Fund), L.P.	2005	Special Situations	200,000,000	201,932,340	264,913,449	2,404,467	1.3x	6.68%	1.3x
NYLIM Mezzanine Partners (Parallel Fund) L.P.	2003	Special Situations	75,000,000	69,151,449	93,056,893	-	1.3x	9.88%	1.3x
NYLIM Mezzanine Partners II (Parallel Fund) LP	2006	Special Situations	150,000,000	166,209,906	211,122,379	229,371	1.3x	7.00%	1.3x
OCM Opportunities Fund VII, L.P.	2007	Special Situations	75,000,000	75,000,000	99,782,034	3,623,130	1.4x	7.42%	1.3x
OCM Opportunities Fund VII-B, L.P.	2008	Special Situations	225,000,000	202,500,000	344,287,352	6,426,398	1.7x	16.56%	1.7x
Searchlight Capital Partners II, L.P.	2015	Special Situations	74,000,000	43,744,759	9,401,784	50,675,305	1.4x	22.69%	0.2x
Venor Special Situations Fund II, L.P.	2015	Special Situations	100,000,000	100,000,000	33,457,863	83,940,411	1.2x	6.65%	0.3x
Versa Capital Fund I, L.P.	2005	Special Situations	75,000,000	88,556,288	62,726,434	43,515,009	1.2x	3.69%	0.7x
Versa Capital Fund II, L.P.	2008	Special Situations	150,000,000	166,539,127	79,290,385	89,871,289	1.0x	0.36%	0.5x
Versa Capital Fund III, L.P.	2015	Special Situations	150,000,000	106,500,000	3,000,000	76,816,003	0.7x	(14.48%)	0.0x
Windjammer Senior Equity Fund III, L.P.	2006	Special Situations	50,000,000	45,230,610	106,463,823	180,379	2.4x	19.56%	2.4x
Windjammer Senior Equity Fund IV, L.P.	2012	Special Situations	100,000,000	83,239,707	16,094,975	102,073,528	1.4x	10.91%	0.2x
<b>Special Situations Portfolio Total</b>			<b>\$5,460,554,426</b>	<b>\$4,911,456,053</b>	<b>\$6,172,662,094</b>	<b>\$1,166,363,124</b>	<b>1.5x</b>	<b>12.97%</b>	<b>1.3x</b>
<b>Venture Capital Portfolio</b>									
Adams Capital Management, L.P.	1997	Venture Capital	12,500,000	12,500,000	22,671,838	170,020	1.8x	44.80%	1.8x

# Performance Summary by Investment (continued)

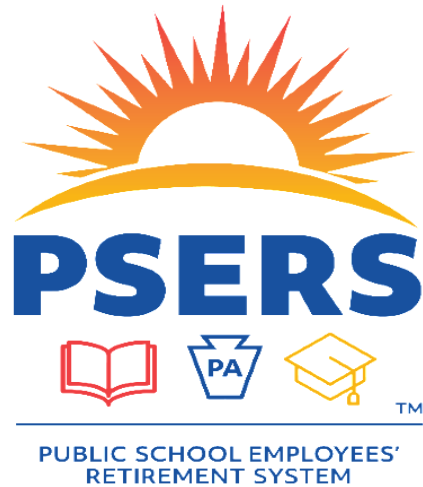
PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
Aisling Capital II, L.P.	2006	Venture Capital	50,000,000	58,983,213	57,850,047	2,220,575	1.0x	0.32%	1.0x
Aisling Capital III, L.P.	2008	Venture Capital	50,000,000	56,426,677	96,002,705	25,965,401	2.2x	25.00%	1.7x
Aisling Capital IV, L.P.	2016	Venture Capital	100,000,000	90,153,036	34,636,816	65,343,103	1.1x	9.81%	0.4x
APA/Fostin Venture Fund I, L.P.	1987	Venture Capital	20,000,000	20,000,000	77,132,193	-	3.9x	19.88%	3.9x
CEO Venture Fund I, L.P.	1987	Venture Capital	1,000,000	1,000,000	1,101,749	-	1.1x	1.43%	1.1x
CEO Venture Fund II, L.P.	1989	Venture Capital	15,000,000	15,000,000	10,651,730	-	0.7x	(4.17%)	0.7x
Co-Investment 2000 Fund, L.P.	2000	Venture Capital	135,000,000	135,000,000	212,362,128	(47,425)	1.6x	7.60%	1.6x
Co-Investment Fund II, L.P.	2006	Venture Capital	135,000,000	134,811,285	50,229,127	81,590,706	1.0x	(0.30%)	0.4x
Commonwealth Venture Partners I	1986	Venture Capital	20,000,000	20,000,000	20,584,156	-	1.0x	0.30%	1.0x
Commonwealth Venture Partners II	1992	Venture Capital	10,000,000	10,000,000	15,214,766	-	1.5x	15.10%	1.5x
Cross Atlantic Technology Fund II, L.P.	2001	Venture Capital	21,119,734	21,119,734	21,562,069	101,113	1.0x	0.42%	1.0x
Cross Atlantic Technology Fund, L.P.	1999	Venture Capital	30,141,666	30,357,584	35,781,536	89,172	1.2x	2.33%	1.2x
Edison II-PA Venture Fund	1991	Venture Capital	10,000,000	10,000,000	25,972,603	-	2.6x	22.19%	2.6x
Edison Venture Fund III, L.P.	1994	Venture Capital	14,807,690	14,807,690	28,785,013	-	1.9x	18.19%	1.9x
Franklin Capital Associates III, L.P.	1995	Venture Capital	15,000,000	15,000,000	14,558,465	-	1.0x	(0.33%)	1.0x
Genesis Seed Fund	1987	Venture Capital	2,000,000	2,000,000	815,687	-	0.4x	(12.43%)	0.4x
Grotech Capital Partners IV, L.P.	1993	Venture Capital	25,000,000	25,000,000	44,210,693	-	1.8x	15.67%	1.8x
Insight Venture Partners X, L.P.	2018	Venture Capital	100,000,000	41,000,000	34,245	41,643,383	1.0x	3.22%	0.0x
Jefferson Partners Fund IV, L.P.	2003	Venture Capital	21,404,286	24,583,511	219,088	-	0.0x	(54.80%)	0.0x
KBL Partnership, L.P.	1999	Venture Capital	13,743,333	13,711,864	6,919,745	1,723,384	0.6x	(6.38%)	0.5x
Keystone Minority Capital Fund	1994	Venture Capital	114,865	114,865	15,365	-	0.1x	(15.91%)	0.1x
Keystone Venture Fund IV, L.P.	1993	Venture Capital	7,766,667	7,766,666	5,904,516	-	0.8x	(8.41%)	0.8x
Landmark Equity Partners II, L.P.	1992	Venture Capital	25,000,000	25,000,000	39,042,318	-	1.6x	24.34%	1.6x
Landmark Equity Partners V, L.P.	1995	Venture Capital	49,060,283	48,481,948	59,574,190	-	1.2x	8.28%	1.2x
Lehman Brothers Communications Partners, L.P.	1999	Venture Capital	12,500,000	11,442,260	5,210,205	-	0.5x	(13.81%)	0.5x
LLR Equity Partners II, L.P.	2004	Venture Capital	75,000,000	75,003,401	135,331,303	583,929	1.8x	12.41%	1.8x
LLR Equity Partners III, L.P.	2008	Venture Capital	187,500,000	168,296,850	267,464,817	77,089,012	2.0x	16.85%	1.6x
LLR Equity Partners IV, L.P.	2013	Venture Capital	200,000,000	184,000,000	148,162,208	191,278,050	1.8x	27.69%	0.8x
LLR Equity Partners V, L.P.	2017	Venture Capital	200,000,000	56,000,000	8,113,934	48,352,735	1.0x	1.72%	0.1x

# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
LLR Equity Partners, L.P.	1999	Venture Capital	62,500,000	61,344,870	131,600,274	-	2.1x	21.74%	2.1x
Loyalhanna Venture Fund	1987	Venture Capital	15,000,000	15,000,000	21,446,203	-	1.4x	3.58%	1.4x
NEPA Venture Fund I	1985	Venture Capital	1,000,000	1,000,000	6,080,528	-	6.1x	17.08%	6.1x
NEPA Venture Fund II	1992	Venture Capital	5,000,000	5,000,000	23,252,576	624,294	4.8x	38.02%	4.7x
Novitas Capital II, L.P.	2000	Venture Capital	75,000,000	74,775,000	16,507,112	-	0.2x	(19.47%)	0.2x
Novitas Capital, L.P.	1998	Venture Capital	30,000,000	29,952,000	35,182,565	480,397	1.2x	9.22%	1.2x
P/A Fund	1993	Venture Capital	30,000,000	30,000,000	66,835,233	-	2.2x	18.83%	2.2x
Perseus-Soros BioPharmaceutical Fund, L.P.	2001	Venture Capital	112,206,666	124,112,299	202,856,847	830,000	1.6x	20.30%	1.6x
Psilos Group Partners III, L.P.	2007	Venture Capital	62,500,000	64,471,078	32,146,734	48,885,265	1.3x	3.56%	0.5x
Quaker BioVentures II, L.P.	2007	Venture Capital	100,000,000	98,153,932	85,705,793	18,688,140	1.1x	1.49%	0.9x
Quaker Bio-Ventures, L.P.	2003	Venture Capital	69,350,000	69,458,692	27,445,322	1,815,973	0.4x	(12.39%)	0.4x
SCP Private Equity Partners I, L.P.	1996	Venture Capital	62,500,000	63,285,918	43,172,864	49,044	0.7x	(6.41%)	0.7x
SCP Private Equity Partners II, L.P.	2000	Venture Capital	125,000,000	129,745,343	41,010,860	15,198,463	0.4x	(8.50%)	0.3x
Spectrum Equity Investors, L.P.	1994	Venture Capital	25,000,000	25,000,000	52,261,392	-	2.1x	23.59%	2.1x
StarVest	1999	Venture Capital	67,500,000	65,659,367	113,831,193	106,520	1.7x	7.38%	1.7x
StarVest Partners II (Parallel), L.P.	2007	Venture Capital	50,000,000	49,586,990	10,263,263	32,110,283	0.9x	(2.43%)	0.2x
Sterling Venture Partners I, L.P.	2000	Venture Capital	33,986,000	36,115,022	39,387,959	85,069	1.1x	1.66%	1.1x
Strategic Partners Fund III VC, L.P.	2005	Venture Capital	50,000,000	56,470,934	66,892,404	7,452,978	1.3x	5.91%	1.2x
Strategic Partners Fund IV VC, L.P.	2008	Venture Capital	50,000,000	58,628,714	68,704,237	13,646,203	1.4x	7.92%	1.2x
Summit Partners Growth Equity Fund IX, L.P.	2017	Venture Capital	100,000,000	64,006,174	9,979,800	64,730,976	1.2x	29.68%	0.2x
Summit Partners Growth Equity Fund VIII, L.P.	2012	Venture Capital	100,000,000	110,125,462	142,455,446	78,859,922	2.0x	26.03%	1.3x
Summit Partners Venture Capital Fund III, L.P.	2012	Venture Capital	25,000,000	26,092,500	24,570,134	24,748,245	1.9x	17.43%	0.9x
Summit Partners Venture Capital Fund IV, L.P.	2015	Venture Capital	50,000,000	26,836,575	17,558,881	27,154,403	1.7x	46.12%	0.7x
TDH III, L.P.	1993	Venture Capital	7,350,750	7,350,750	4,874,316	-	0.7x	(5.23%)	0.7x
Technology Leaders, L.P.	1992	Venture Capital	10,000,000	10,000,000	22,111,898	-	2.2x	23.24%	2.2x
Tenaya Capital IV-P, L.P.	2003	Venture Capital	75,000,000	72,679,657	91,130,220	34,322,143	1.7x	7.99%	1.3x

# Performance Summary by Investment (continued)

PSERS Private Markets Portfolio Performance Summary by Investment as of December 31, 2018									
Partnership	Vintage Year	Strategy	Capital Committed	Contributions	Distributions	NAV	MoC	Since Inception IRR	DPI
Tenaya Capital VI, L.P.	2012	Venture Capital	50,000,000	45,590,495	-	51,872,751	1.1x	2.84%	-
Tenaya Capital VII, L.P.	2015	Venture Capital	100,000,000	67,840,100	16,563,827	62,950,383	1.2x	10.54%	0.2x
Tenaya Capital V-P, L.P.	2007	Venture Capital	75,000,000	70,433,806	111,994,852	45,480,065	2.2x	18.57%	1.6x
TL Ventures III, L.P.	1997	Venture Capital	50,000,000	50,000,000	69,245,707	-	1.4x	24.67%	1.4x
<b>Venture Capital Portfolio Total</b>			<b>\$3,227,551,940</b>	<b>\$2,936,276,263</b>	<b>\$3,041,183,696</b>	<b>\$1,066,194,675</b>	<b>1.4x</b>	<b>7.73%</b>	<b>1.0x</b>
<b>Total Portfolio</b>			<b>\$31,507,856,555</b>	<b>28,202,090,111</b>	<b>\$34,062,999,893</b>	<b>\$8,219,416,631</b>	<b>1.5x</b>	<b>11.36%</b>	<b>1.2x</b>



# Private Markets Asset Class Review Year-End 2018

**Charles Spiller, CPM**

**Darren Foreman, CAIA, MBA**

**Patrick Knapp, CFA**

**Mike Tyler, MBA**

**Tony Meadows, CAIA, CPA, CITP**

**October 10, 2019**

**NEXT**