

# Investment Expenses Report FY 2019

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**December 5, 2019**

# Summary

- Total Investment Expenses declined from \$468 million in FY2018 to \$450 million in FY2019
  - Base Fees for External Managers declined from \$388 million to \$385 million
  - Performance Fees for External Managers declined from \$59 million to \$40 million
  - Investment Office Expenses increased from \$19 million to \$24 million
- Total Investment Expenses declined from 0.87% of Net Total Fund NAV in FY2018 to 0.82% in FY2019
  - Base Fees for External Managers declined from 0.72% to 0.70%
- Annual savings from Internal Management increased from \$42 to \$48 million and Internally Managed NAV increased from \$23.8 to \$25.1 billion
- Progress continues on implementation of the Fee Reduction Plan presented to the Board in August 2018

# Framework

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- Total Investment Expenses = External Manager Expenses + Investment Office Expenses
- Evaluate the outperformance (Alpha) we earned over the Board-approved policy benchmarks against the investment expenses we paid

# Definition of Total Investment Expenses

## **External Management Expenses**

- Traditional Investments
  - Base Fees
  - Profit Share
- Non-Traditional Investments
  - Base Fees
  - Profit Share in Absolute Return

## **+ Investment Office Expenses**

- Compensation and Benefits
- Technology Services
- Miscellaneous Service Providers
- Consultants (Aon Hewitt, Hamilton Lane, Aksia)
- Custodian

## **= Total Investment Expenses**

## Definition of Total Investment Expenses

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- Carried Interest from Private Markets, Private Credit, and Private Real Estate is NOT included in this definition
- PSERS reports Carried Interest separately and on a Calendar Year basis
  - It was reported at October Board meeting

## Private Markets, Private Credit, & Private Real Estate Management Fees, Carried Interest, & Other Expenses: CY2018

	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>

Dollar amounts in millions

<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.

# Definition of Total Investment Expenses

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- Peers use their own definitions
  - No uniform reporting convention exists
  - No uniform analysis framework exists
  - No guidance has been issued by GASB, GIPS, GFOA, etc.
  - Public Pension Funds can and do report and disclose expenses differently
- Therefore, peer-to-peer comparisons of Total Investment Expenses are not “apples to apples”
  - They can be highly misleading if they are claimed to be “apples to apples”

# Total Investment Expenses: FY2019

Year Ended June 30, 2019, amounts in \$ millions					
Summary of Investment Expenses					
	Base	Profit Share	Other Expenses	Total	
<b>External Management</b>					
Domestic Equity	\$ 2	\$ 2	\$ -	\$ 4	
International Equity	\$ 20	\$ 20	\$ -	\$ 40	
Fixed Income	\$ 100	\$ 1	\$ -	\$ 101	
Real Estate	\$ 48	\$ -	\$ -	\$ 48	
Private Markets	\$ 96	\$ -	\$ -	\$ 96	
Absolute Return	\$ 87	\$ 17	\$ -	\$ 104	
Commodities	\$ 5	\$ -	\$ -	\$ 5	
Infrastructure	\$ 2	\$ -	\$ -	\$ 2	
Master Limited Partnership	\$ 8	\$ -	\$ -	\$ 8	
Risk Parity	\$ 16	\$ 1	\$ -	\$ 17	
<b>Total External Management</b>	<b>\$ 385</b>	<b>\$ 40</b>	<b>\$ -</b>	<b>\$ 425</b>	
<b>Total Investment Office Expenses</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 24</b>	<b>\$ 24</b>	
<b>Total Investment Expenses</b>	<b>\$ 385</b>	<b>\$ 40</b>	<b>\$ 24</b>	<b>\$ 450</b>	

Totals may not sum due to rounding

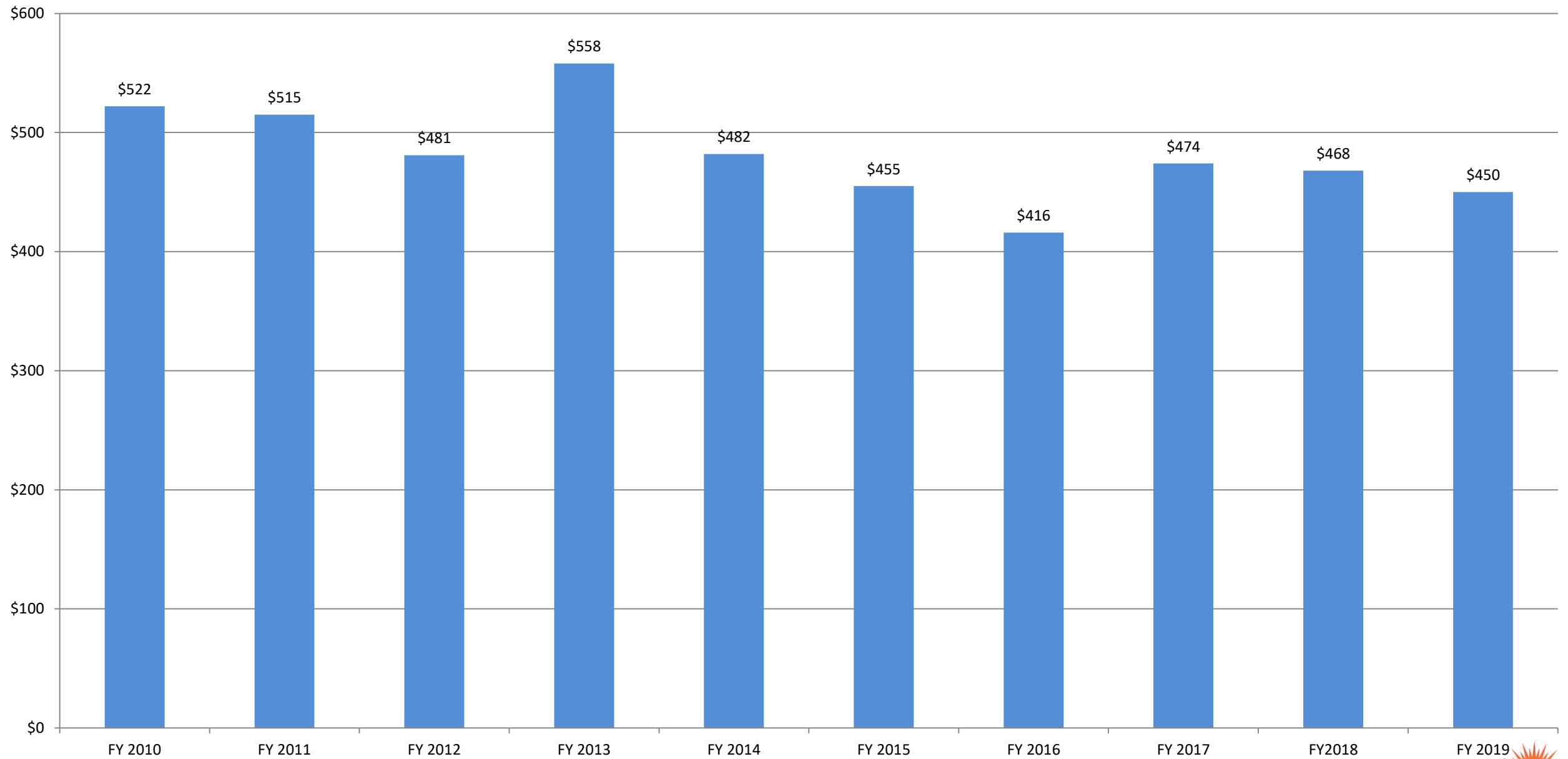


# Total Investment Expenses: FY2014 - FY2019

INVESTMENT EXPENSES BY ASSET CLASS						
	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
<b>External Management</b>						
Domestic Equity	\$ 3	\$ 3	\$ 3	\$ 3	\$ 2	\$ 4
International Equity	\$ 18	\$ 24	\$ 24	\$ 25	\$ 28	\$ 40
Fixed Income	\$ 82	\$ 84	\$ 82	\$ 109	\$ 111	\$ 101
Real Estate	\$ 74	\$ 69	\$ 52	\$ 51	\$ 50	\$ 48
Private Markets	\$ 117	\$ 102	\$ 99	\$ 103	\$ 98	\$ 96
Absolute Return	\$ 141	\$ 117	\$ 102	\$ 123	\$ 115	\$ 104
Commodities	\$ 11	\$ 8	\$ 6	\$ 10	\$ 10	\$ 5
Master Limited Partnerships	\$ 11	\$ 12	\$ 8	\$ 9	\$ 9	\$ 8
Infrastructure	N/A	N/A	N/A	N/A	\$ 2	\$ 2
Risk Parity	\$ 6	\$ 13	\$ 18	\$ 23	\$ 22	\$ 17
<b>External Management Total</b>	<b>\$ 463</b>	<b>\$ 432</b>	<b>\$ 396</b>	<b>\$ 455</b>	<b>\$ 447</b>	<b>\$ 425</b>
<b>Total Investment Office Expenses</b>	<b>\$ 19</b>	<b>\$ 23</b>	<b>\$ 20</b>	<b>\$ 19</b>	<b>\$ 21</b>	<b>\$ 24</b>
<b>Total Investment Expenses</b>	<b>\$ 482</b>	<b>\$ 455</b>	<b>\$ 416</b>	<b>\$ 474</b>	<b>\$ 468</b>	<b>\$ 450</b>

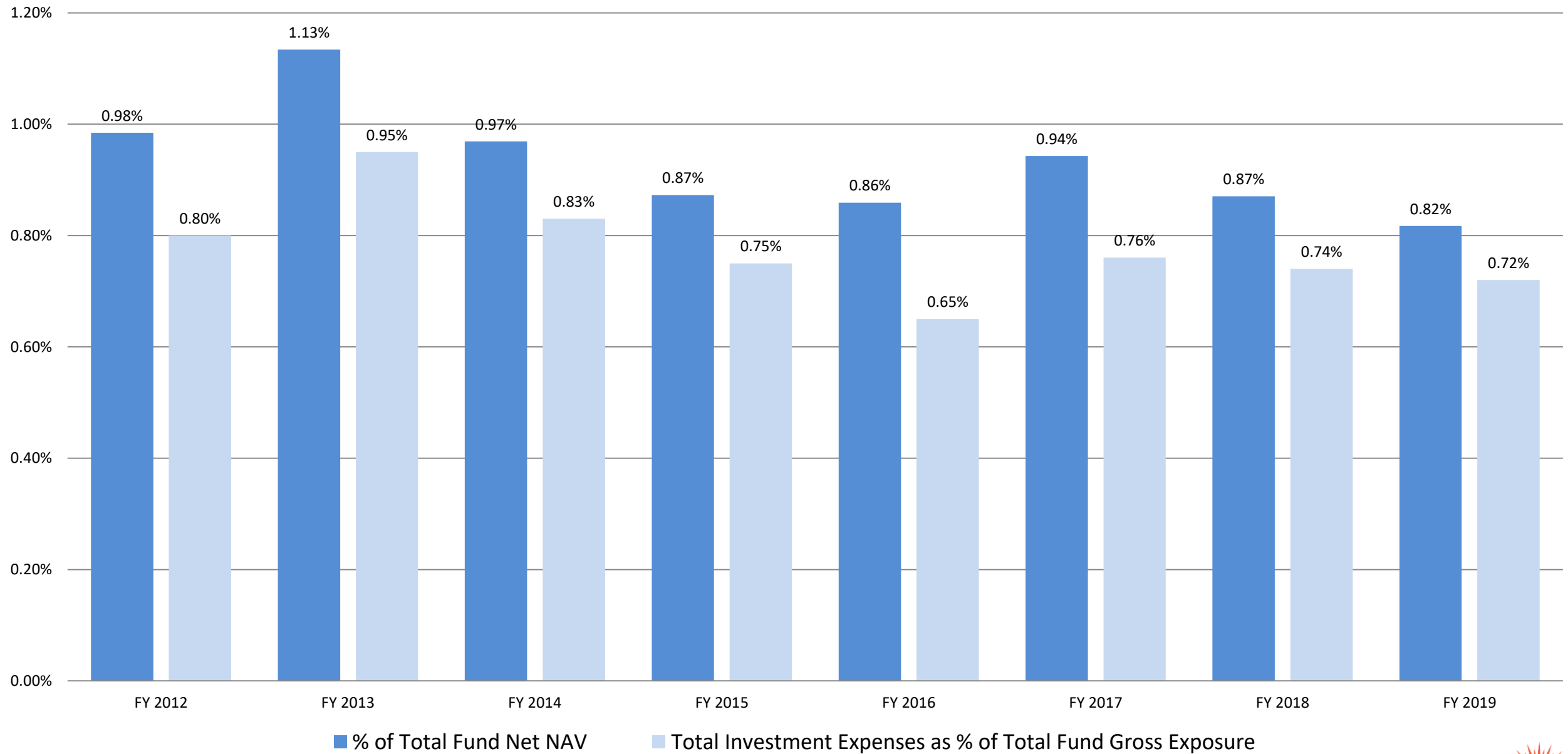
Amounts in millions of dollars, totals may not sum due to rounding

# Total Investment Expenses



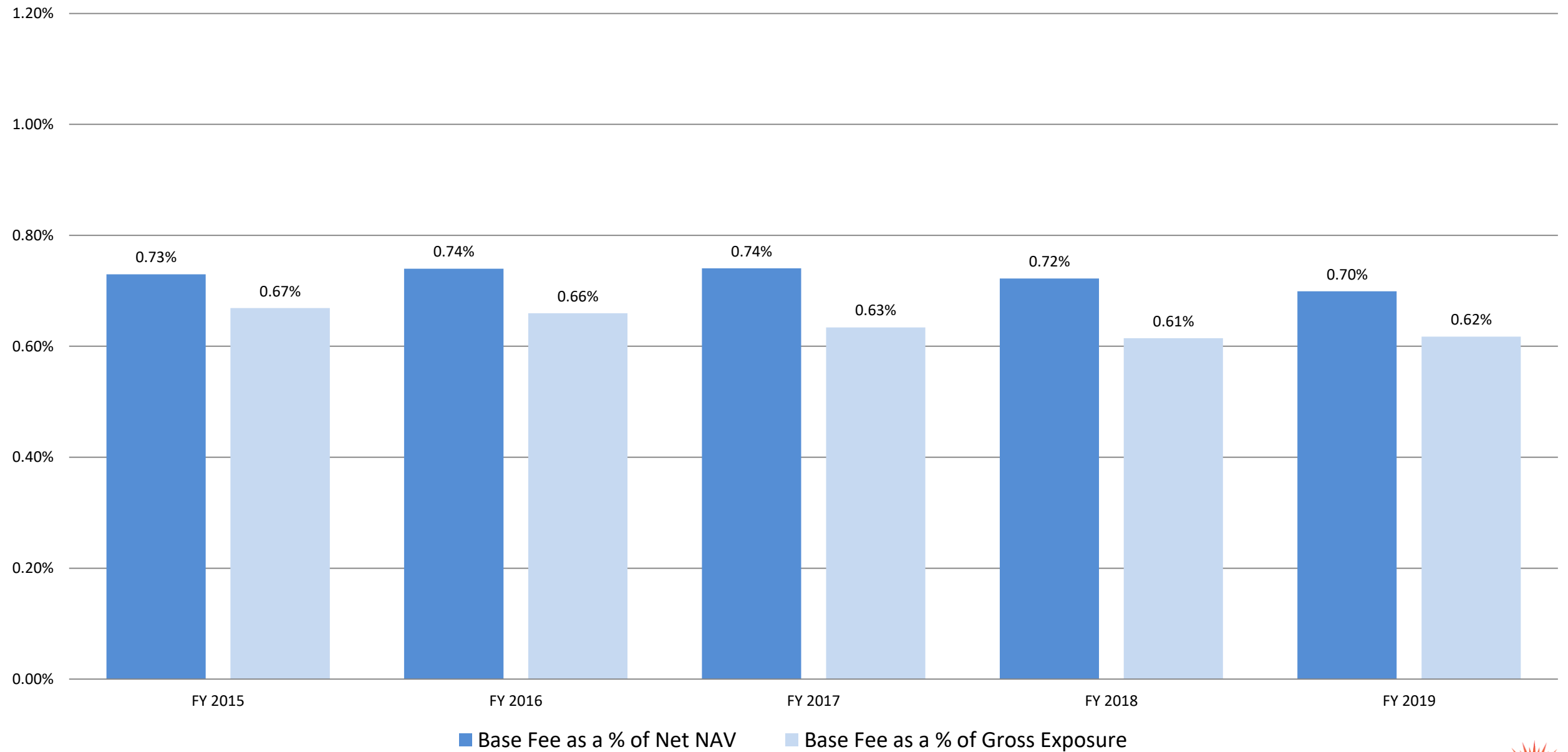
Dollar amounts in millions

# Total Investment Expenses



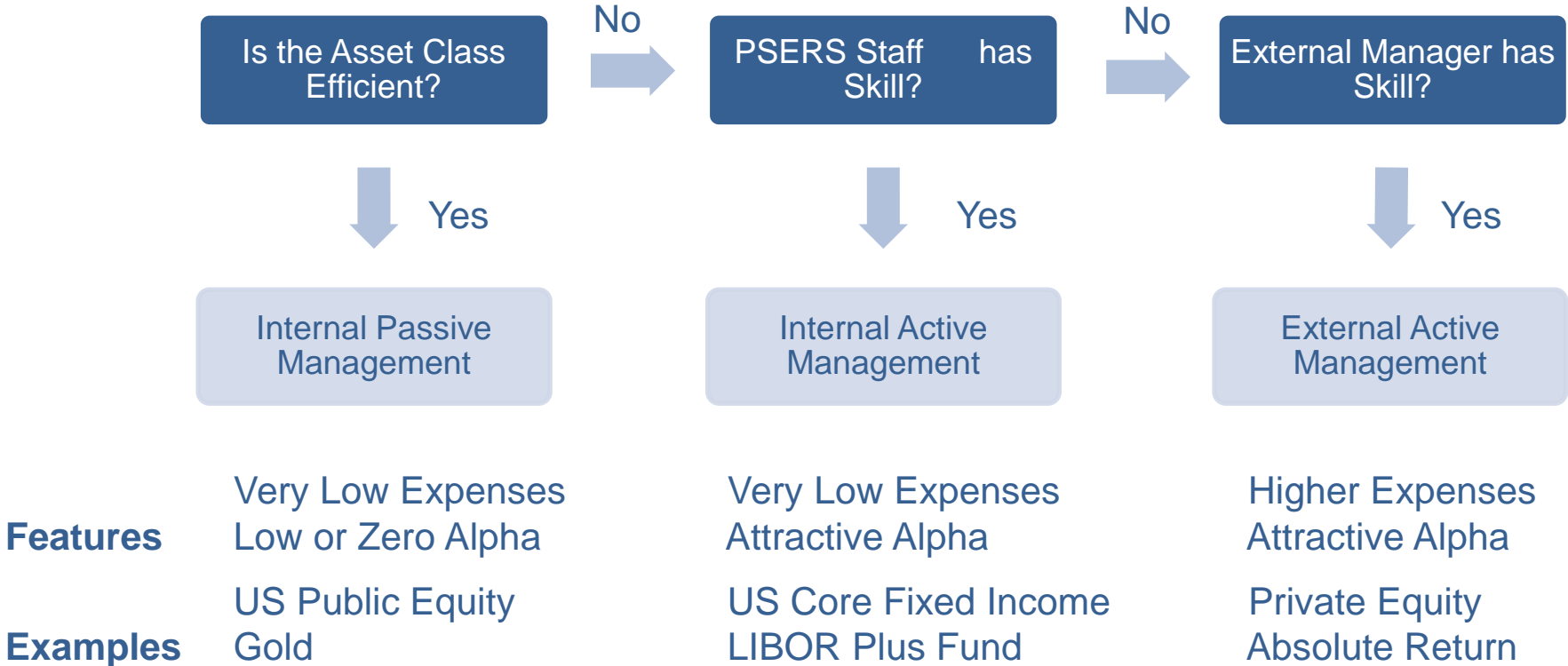
Calculated based upon quarterly NAV and gross exposure (NAV plus leverage)

# Base Fee Expenses



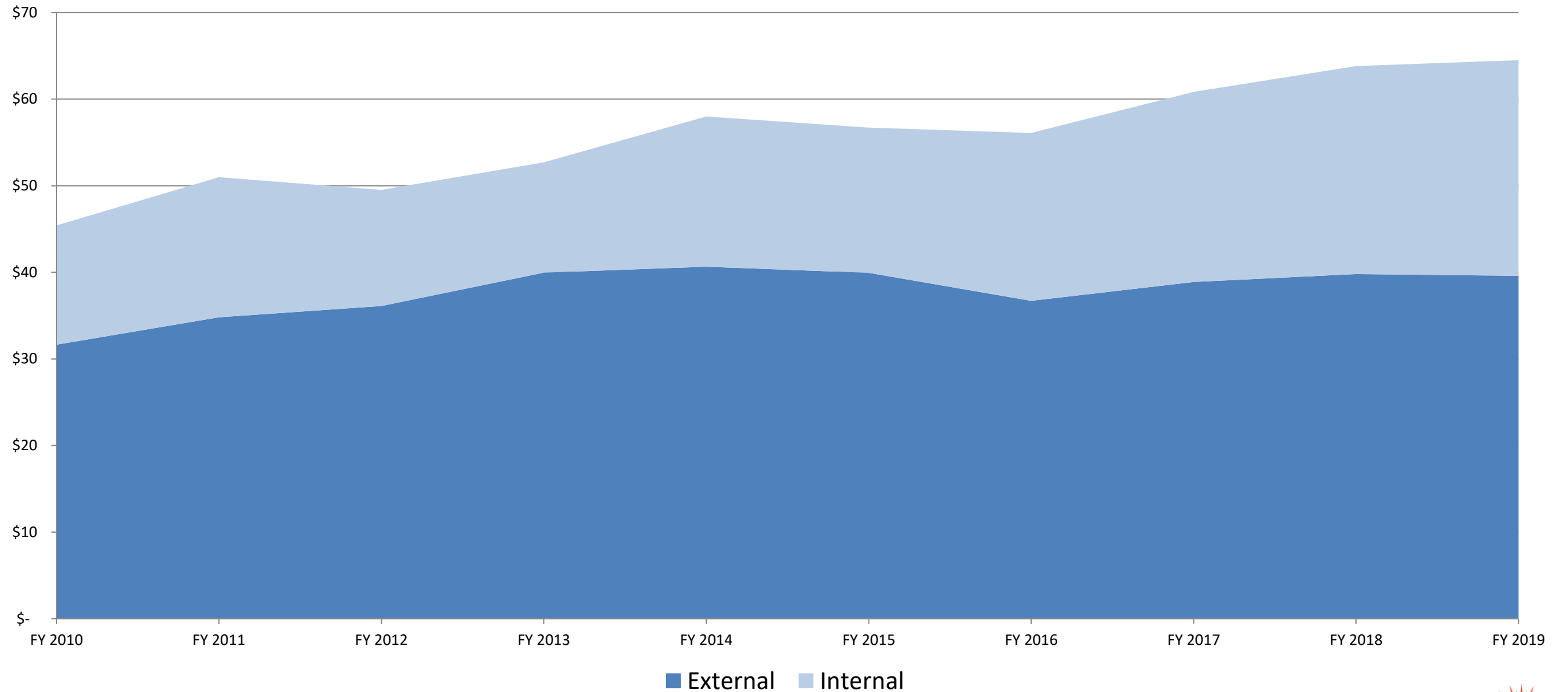
Calculated based upon quarterly NAV and gross exposure (NAV plus leverage)

# External vs Internal Management



# External vs Internal Management

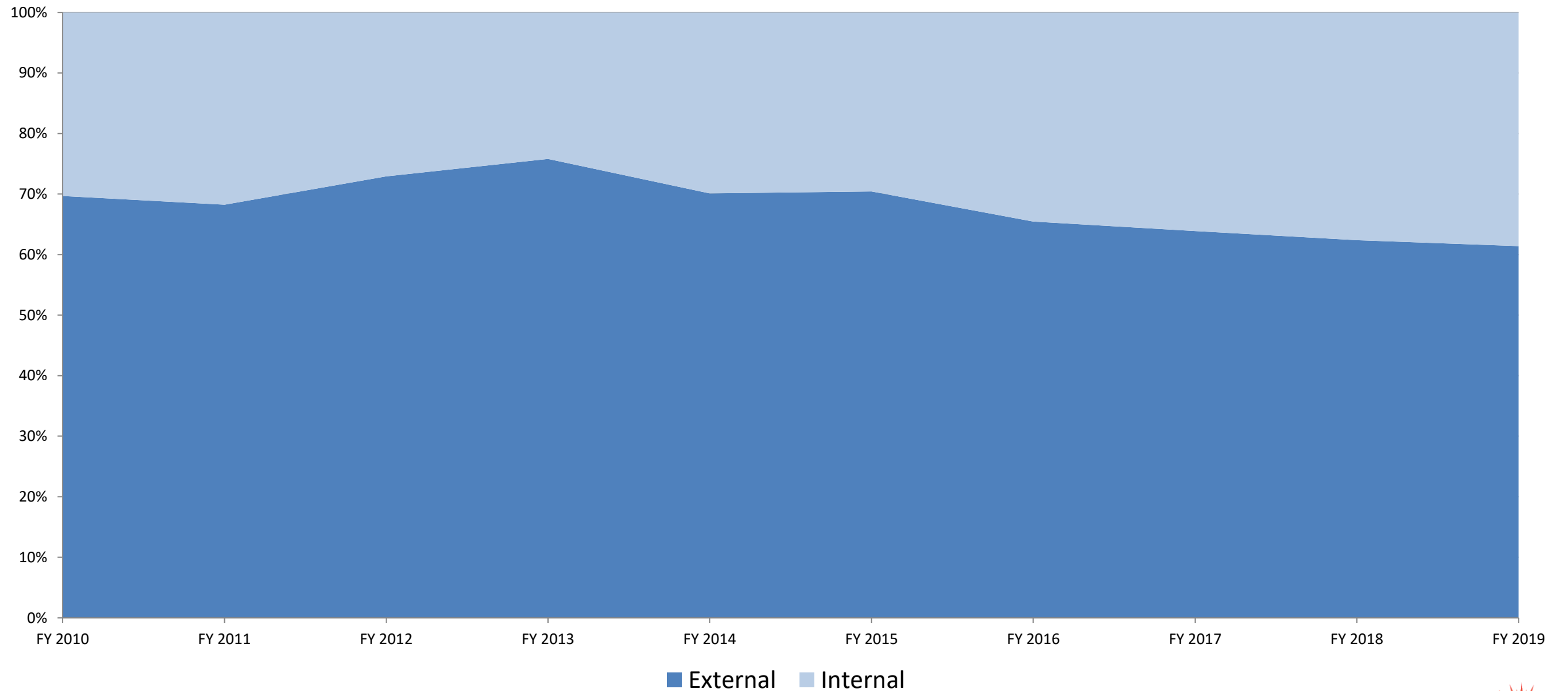
## External AUM v Internal AUM (Gross Exposure)



Amounts in billions of dollars  
Calculated based upon monthly average gross exposure (NAV plus leverage)

# External vs Internal Management

External AUM v Internal AUM as a % of the Total Fund (Gross Exposure)



# Savings Generated by Internal Management

Account	Asset Class	Estimated Annual Fee%	Market Value FY 18*	Estimated Cost to Manage Externally	Market Value FY 19*	Estimated Cost to Manage Externally
PSERS - S&P 500 Index	U.S. Equities	0.01%	\$3,124,356	\$312	\$2,036,956	\$204
PSERS - S&P 400 Index	U.S. Equities	0.03%	545,220	164	317,259	95
PSERS - S&P 600 Index	U.S. Equities	0.04%	567,573	227	291,498	117
Misc. PSERS Equity Accounts	U.S. Equities	0.00%	45,554	0	1,084	0
	<b>U.S. Equities Total</b>		<b>4,282,703</b>	<b>703</b>	<b>2,646,797</b>	<b>415</b>
PSERS ACWI ex. U.S. Index	Non U.S. Equities	0.08%	3,152,720	2,522	2,497,669	1,998
	<b>Non U.S. Equities Total</b>		<b>3,152,720</b>	<b>2,522</b>	<b>2,497,669</b>	<b>1,998</b>
Private Markets Co-Investments	Private Markets	1.00%	493,983	4,940	687,284	6,873
PA Investment Fund - Private Equity	Private Markets	1.00%	3,778	38	2,715	27
	<b>Private Markets Total</b>		<b>497,761</b>	<b>4,978</b>	<b>689,999</b>	<b>6,900</b>
Special Situations Internal	Fixed Income	1.00%	41,646	416	111,717	1,117
PSERS Active Aggregate	Fixed Income	0.21%	1,243,914	2,612	1,344,716	2,824
PSERS TIPS Portfolio	Fixed Income	0.13%	1,943,835	2,527	3,463,763	4,503
PSERS Long Treasuries	Fixed Income	0.18%	1,778,897	3,202	3,492,479	6,286
	<b>Fixed Income Total</b>		<b>5,008,292</b>	<b>8,758</b>	<b>8,412,675</b>	<b>14,730</b>
PSERS Infrastructure Index	Infrastructure	0.50%	1,034,990	5,175	1,172,970	5,865
Infrastructure Internal	Infrastructure	0.50%	0	0	38,437	192
	<b>Infrastructure Total</b>		<b>1,034,990</b>	<b>5,175</b>	<b>1,211,407</b>	<b>6,057</b>
PSERS Commodity Beta	Commodities	0.15%	1,748,381	2,623	1,608,042	2,412
PSERS Gold Fund	Commodities	0.15%	1,700,000	2,550	1,867,652	2,801
Private Commodities Internal	Commodities	0.15%	0	0	8,132	12
	<b>Commodities Total</b>		<b>3,448,381</b>	<b>5,173</b>	<b>3,483,826</b>	<b>5,226</b>
PSERS S&P MLP Index	MLP	0.50%	476,238	2,381	370,149	1,851
	<b>MLP Total</b>		<b>476,238</b>	<b>2,381</b>	<b>370,149</b>	<b>1,851</b>
PSERS REIT Index	Real Estate	0.08%	454,734	364	494,050	395
Real Estate Co-Investments	Real Estate	0.49%	116,518	565	107,841	523
	<b>Real Estate Total</b>		<b>571,252</b>	<b>929</b>	<b>601,891</b>	<b>918</b>
PSERS Risk Parity	Risk Parity	0.30%	2,811,232	8,434	2,508,599	7,526
	<b>Risk Parity Total</b>		<b>2,811,232</b>	<b>8,434</b>	<b>2,508,599</b>	<b>7,526</b>
PSERS Cash Management	Cash Management	0.10%	2,489,293	2,489	2,694,996	2,695
	<b>Cash Management Total</b>		<b>2,489,293</b>	<b>2,489</b>	<b>2,694,996</b>	<b>2,695</b>
	<b>Grand Total</b>		<b>23,772,862</b>	<b>41,541</b>	<b>25,118,008</b>	<b>48,317</b>

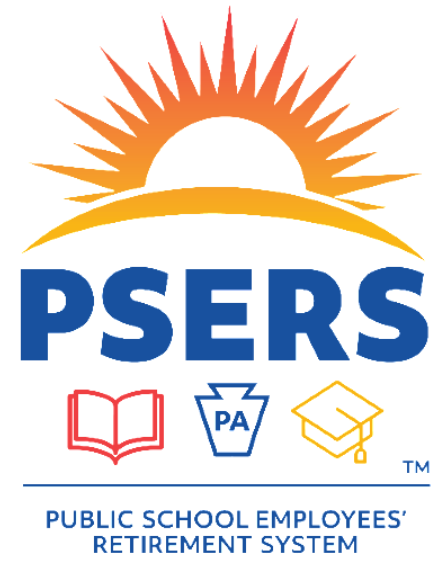
Dollar amounts in thousands

\*Market values include cash and derivatives exposure



# Investment Office Expenses

<u>FY 2019</u>	
<u>Investment Office Expenses</u>	
BNY Mellon (Custody)	\$2,518,148
GASB 68 Pension Expense	\$1,383,104
Investment Consultants	
Aksia, LLC	\$525,000
Glass Lewis & Co. LLC	\$178,681
Hamilton Lane Advisors LLC	\$1,718,205
Hewitt EnnisKnupp Inc	\$762,500
STP Investment Services LLC (ABOR)	\$657,898
Misc Consultants	\$503,124
Misc. Legal Fees	\$5,194
Overhead	\$953,325
Specialized Service Providers	
BlackRock Solutions (Risk)	\$470,950
Bloomberg	\$709,121
Misc Service Providers	\$1,643,185
Staff Compensation (salary and benefits)	\$12,441,902
<b>Total Investment Office Expenses</b>	<b>\$24,470,336</b>



# Progress Report on Fee Reduction Plan (Response to PSERB Resolution 2017-41 Re: Management Fees)

# Progress Report on Fee Reduction Plan

- Essential Plan Elements

1. Renegotiate management fee arrangements to create a better alignment of interest between PSERS and each investment manager
2. Expand internal management, which in most cases will require an expansion of investment office professionals

- Goal: by end of FY2021, reduce base fees by \$38.7 million per year to \$334 million, which is by 10.4% from FY2017 levels of \$372 million

- This would be offset by \$3.15 million per year cost increase from 9 additional investment office staff

- Complete fee reduction plan can be found at

<https://www.psers.pa.gov/About/Board/Resolutions/Documents/2018/res41.pdf>

# Progress Report on Fee Reduction Plan

Asset Class	Achieved Annual Savings	Targeted Annual Savings
Public Equity	N/A	N/A
Private Equity	\$4.3	\$6.7 (\$5.65 net of additional staff)
Fixed Income US Core Plus	\$0.23	\$0.197
Fixed Income Non-US Developed Markets	\$0.275	\$0.775 (\$0.425 net of additional staff)
Fixed Income Multi-Sector	\$1.19	N/A
Fixed Income TIPS	\$2.25	\$11.85 (\$11.5 net of additional staff)
Fixed Income Emerging Markets Debt	-	N/A
Fixed Income High Yield/Opportunistic (Private Credit)	N/A	N/A
Fixed Income Other	N/A	N/A
Real Estate	\$5.70	\$11.4 (\$11.05 net of additional staff)
Master Limited Partnerships	-	\$1.5
Infrastructure	(\$2.0)	(\$8.8)
Commodities	(\$2.6)	(\$1.5) ((\$2.025) net of additional staff)
Risk Parity	\$0.92	\$1.0 (\$0.65 net of additional staff)
Absolute Return	\$3.775	\$15.61
<b>Total</b>	<b>\$14.04</b>	<b>\$38.732</b>

# Progress Report on Fee Reduction Plan

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- In Traditional Investments, progress has been hampered by loss of two key staff
  - Essential Plan Element #1 has been hurt by departure of Senior Portfolio Manager, External Managers in February 2019, and difficulty in attracting a suitable replacement with our current compensation structure
  - Essential Plan Element #2 has been hurt by departure of Senior Portfolio Manager, Commodities in August 2019, due to (i) inability to surmount certain legal hurdles particular to PSERS as a Commonwealth entity and (ii) sensitivity to periodic underperformance of internally managed portfolios as shown by Investment Committee discussions

# Progress Report on Fee Reduction Plan

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- In Non-Traditional Investments, progress has been on schedule
  - Co-Investments in Private Markets continue to increase at a steady pace
  - Hiring of additional staff is going well
    - This will allow an increase in Co-Investment activity not only in Private Markets, but also in Private Credit, Private Real Estate, Private Infrastructure, and Absolute Return

## Independent Review

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- We are in discussions with a number of vendors for one to perform a third party review of our external investment expenses as well as carried interest
  - Colmore
  - Novarca
  - XTP
- This was not part of the original Fee Reduction Plan but might be an additional means of obtaining savings

## Progress Report - Public Equity

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- Public Equity was not envisioned as a source of savings in the Fee Reduction Plan



# Progress Report - Private Equity

- Private Equity was envisioned as a source of \$6.7 million in annual fee savings, or \$5.65 million net of additional staff required
  - Increase Co-Investments from 6.2% to 12% of the Private Equity program
  - Hire 3 additional investment professionals including one in operations at cost of \$1.05 million
- Status
  - Co-Investments have increased to 9.4% of the Private Equity program as of June 30, 2019
  - Annual management fee savings are on pace to be \$12.5 million, \$4.3 million increase from June 30, 2017
  - In addition, total carried interest savings since inception have been \$42.4 million of which \$3.9 million relates to Fiscal Year 2019
  - Have not hired any additional investment professionals

# Progress Report - Fixed Income US Core Plus

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- Fixed Income US Core Plus was envisioned as a source of \$0.197 million in annual savings
  - Terminate an external manager and bring the assets in house
- Status
  - External manager was terminated in September 2019 and \$111 million of assets brought in house, for annual fee savings of \$0.23 million

# Progress Report - Fixed Income Non-US Developed Markets

- Fixed Income Non-US Developed Markets was envisioned as a source of \$0.775 million in annual fee savings, or \$0.425 million net of additional staff required
  - Terminate an external manager and bring the assets in house
  - Hire 1 additional investment professional at cost of \$0.35 million
- Status
  - External manager was liquidated in September 2018 and \$180 million of assets put in cash, as we have 0% target weight in the asset class. This generated \$0.275 million in annual fee savings
  - Have not hired additional investment professional. Will do so when allocation to the asset class is restored.

# Progress Report - Fixed Income Multi-Sector

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- Fixed Income Multi-Sector was not envisioned as a source of annual fee savings
- Status
  - External manager mandate was liquidated in November 2019 and \$260 million of assets brought in house, for annual fee savings of \$1.19 million

# Progress Report - Fixed Income TIPS

- Fixed Income TIPS was envisioned as a source of \$11.85 million in annual fee savings, or \$11.5 million net of additional staff required
  - For US TIPS, terminate an external manager and bring the assets in house, saving \$2.25 million
  - For US TIPS, hire 1 additional investment professional at cost of \$0.35 million
  - For Non-US TIPS, move external manager from fixed fee to a base fee plus profit share, saving \$9.6 million in base fees
- Status
  - For US TIPS, external manager was terminated in February 2019 and \$1.5 billion of exposure (\$260 million of assets) brought in house, saving \$2.25 million
  - For US TIPS, have not hired additional investment professional
  - For Non-US TIPS, have not yet negotiated new fee arrangement as this mandate is part of a broader relationship that we want to negotiate all together

# Progress Report - Fixed Income Emerging Markets Debt

- Fixed Income Emerging Markets Debt was not envisioned as a source of annual fee savings
  - Move existing external manager from fixed fee to a base fee plus profit share, saving \$0.835 million in base fees
  - Hire a second external manager at equivalent cost to the savings contemplated
- Status
  - Have not yet negotiated new fee arrangement with existing manager
  - Have not hired a second external manager

## Progress Report - Fixed Income High Yield/Opportunistic

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- Fixed Income High Yield/Opportunistic was not envisioned as a source of annual fee savings
  - More commonly known as Private Credit

## Progress Report - Fixed Income Other

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- Fixed Income Other was not envisioned as a source of annual fee savings



## Progress Report - Real Estate

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- Real Estate was envisioned as a source of \$11.4 million in annual fee savings, or \$11.05 million net of additional staff required
  - Step 1
    - Reduce Private Real Estate target allocation from 9.8% of the Total Fund to 8.0%, for annual savings of \$10.3 million
  - Step 2
    - Increase Private Real Estate Co-Investments from 2.3% to 8.0% of the Private Real Estate allocation, for annual savings of \$1.1 million
    - Hire 1 additional investment professional to help with the Co-Investments program at cost of \$0.35 million

# Progress Report - Real Estate Continued

## ■ Status

### ■ Step 1

- Private Real Estate was been reduced from 9.8% to 8.4% towards the target of 8.0%
- Annual management fee savings are \$5.04 million

### ■ Step 2

- Co-Investments have increase to 2.4% of the Private Real Estate program as of June 30, 2019
- Annual management fee savings are on pace to be \$0.674 million, a minimal increase from June 30, 2017
- In addition, total carried interest savings since inception have been \$8.5 million of which \$2.8 million relates to Fiscal Year 2019

### ■ Additional Cost Savings Achieved

- During Fiscal Year 2019 a tail end Fund position was converted to a SMA (Separately Managed Account). The management fee was reduced from 0.75% to 0.50% (partial year savings of \$640,324) and the carried interest from 20% to 10%

# Progress Report - MLPs

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- MLPs was envisioned as a source of \$1.5 million in annual fee savings
  - Move two existing external managers from fixed fee to base fee plus profit share
  - The third external manager is already on a base fee plus profit share arrangement
- Status
  - Currently negotiating with all 3 existing managers to move to a base fee plus profit share
    - In the case of the manager already on such an arrangement, renegotiate that arrangement

# Progress Report - Infrastructure

- Infrastructure was envisioned to cost an additional \$8.8 million per year in fees
  - Move actual allocation from 2% of the Total Fund to the 4% target
  - Move actual allocation from current 95% Public/5% Private to 50% Public/50% Private
    - Public is internal and passive
    - Private is external and active
  - Increase Co-Investments from 0% of the Private program to 10%
- Status
  - Current actual allocation to infrastructure is 76% Public/24% Private
    - Fees increased \$2.2 million from Fiscal Year 2017
  - A large infrastructure co-investment was consummated, at no fee/no carry
    - Annual management fee savings of approximately \$0.217 million
  - Side-car co-investment vehicle alongside an existing fund investment is currently being negotiated
    - Preliminary terms: no fee/no carry for initial six years each co-investment is held

# Progress Report - Commodities

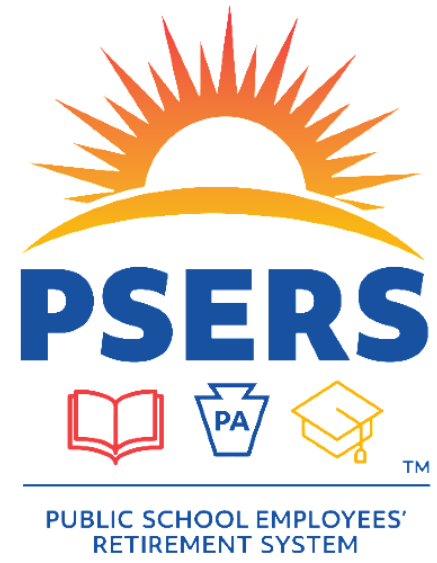
- Commodities was envisioned to cost an additional \$1.5 million per year in fees, or \$2.025 million net of additional staff required
  - Negotiate fee arrangements with the 3 existing managers, for annual savings of \$2.8 million
  - Increase allocation to Private Commodities, for annual additional costs of \$5.4 million
  - Bring assets in house to the Senior Portfolio Manager, Commodities, for annual savings of \$1.1 million
  - Hire 1-1/2 additional staff for the internal Commodities portfolio for cost of \$0.525 million
- Status
  - Negotiated fee arrangements with the 3 existing managers, for annual savings of \$2.8 million
  - Increased allocation to Private Commodities increasing annual costs by \$5.4 million
  - Have not brought assets in house, due to departure of Senior PM, Commodities. No intention to replace him.
  - Have not hired 1-1/2 additional staff for the internal Commodities portfolio. These slots reassigned to other areas.

# Progress Report - Risk Parity

- Risk Parity was envisioned as a source of \$1.0 million in annual fee savings, or \$0.65 million net of additional staff required
  - Bring \$250 million in house from external managers
  - Hire 1 additional staff
- Status
  - Have not yet brought \$250 million in house from external managers
  - Have hired 1 additional staff starting in December
  - Renegotiated base fee reduction of 20 bps with one manager, saving \$0.92 million per year

# Progress Report - Absolute Return

- Absolute Return was envisioned as a source of \$15.61 million in annual fee savings
  - With one manager, renegotiate the existing base fee plus profit share, saving \$3.25 million per year in base fees
  - With another manager, move from fixed fee to base fee plus profit share, saving \$12.36 million per year in base fees
- Status
  - With one manager, have renegotiated the existing base fee plus profit share, saving \$3.25 million per year in base fees
  - With another manager, have renegotiated the existing base fee plus profit share, saving \$0.425 million per year in base fees
  - With the other manager, have not moved from fixed fee to base fee plus profit share, as this mandate is part of a broader relationship that we want to negotiate all together



# Appendix: Net Alpha by Manager



# Net Alpha\*\* Generated by External Managers

Manager	FY 2019			3 Year			5 Year		
	FY 2019 Return	Benchmark	1 Yr \$ Alpha	3 Year Return	Benchmark	3 Yr \$ Alpha	5 Year Return	Benchmark	5 Yr \$ Alpha
Aeolus Property Catastrophe Keystone PF Fund, LP	-5.98%	2.37%	\$ (28)	-5.58%	1.56%	\$ (47)	2.32%	1.03%	\$ 25
AKAZ Offshore Fund Ltd*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Apollo Aviation/SASOF III LP	34.92%	2.37%	\$ 23	24.23%	1.56%	\$ 42	N/A	N/A	N/A
Apollo Aviation/SASOF IV LP	12.06%	2.37%	\$ 4	N/A	N/A	N/A	N/A	N/A	N/A
Bridgewater Pure Alpha Fund II, Ltd.	4.78%	2.57%	\$ 21	9.86%	1.78%	\$ 204	3.95%	1.21%	\$ 145
Brigade Leveraged Capital Structures Offshore Fund, Ltd.	4.43%	2.37%	\$ 13	8.23%	1.56%	\$ 101	4.09%	1.03%	\$ 75
Capula Global Relative Value Fund Limited	6.76%	2.37%	\$ 19	6.40%	1.56%	\$ 60	7.10%	1.03%	\$ 106
Capula Tail Risk Fund Limited	-2.15%	2.37%	\$ (14)	-3.65%	1.56%	\$ (51)	-1.88%	1.03%	\$ (47)
Caspian Keystone Focused Fund, Ltd.	17.11%	9.54%	\$ 0	10.51%	8.67%	\$ (1)	N/A	N/A	N/A
Caspian Select Credit International, Ltd.	3.17%	2.37%	\$ 2	6.63%	1.56%	\$ 34	1.35%	1.03%	\$ 4
DaVinci Reinsurance Ltd.	6.18%	0.87%	\$ 1	-0.78%	1.56%	\$ (1)	N/A	N/A	N/A
Garda Fixed Income Relative Value Opportunity Fund Ltd.	5.82%	2.37%	\$ 14	6.23%	1.56%	\$ 54	4.78%	1.03%	\$ 68
HS Group Sponsor Fund II, Ltd.	-3.41%	2.57%	\$ (1)	N/A	N/A	N/A	N/A	N/A	N/A
RenaissanceRe Medici Fund Ltd.	0.87%	2.37%	\$ (1)	3.07%	1.56%	\$ 1	N/A	N/A	N/A
Nephila/Nimbus Weather Fund	-0.32%	7.41%	\$ (6)	N/A	N/A	N/A	N/A	N/A	N/A
Nephila/Palmetto Fund Ltd.	-2.98%	2.37%	\$ (11)	-2.32%	1.56%	\$ (21)	0.87%	1.03%	\$ 8
Oceanwood Investments SPC Co-Invest*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Oceanwood Opportunities Fund	0.88%	2.37%	\$ (4)	9.23%	1.56%	\$ 46	N/A	N/A	N/A
OWS Credit Opportunity Offshore Fund III, Ltd.	6.30%	2.57%	\$ 10	13.00%	N/A	N/A	N/A	N/A	N/A
Perry Partners LP	7.68%	2.37%	\$ 1	2.83%	1.56%	\$ 3	-3.14%	1.03%	\$ (44)
PIMCO Global Credit Opportunity Offshore Fund, Ltd.	3.31%	2.37%	\$ 3	5.60%	1.56%	\$ 34	5.74%	1.03%	\$ 63
PIMCO Absolute Return Strategy V Offshore Fund, Ltd.	1.15%	2.37%	\$ (3)	1.23%	1.56%	\$ (2)	3.87%	1.03%	\$ 38
Two Sigma Risk Premia Enhanced Fund, LP	2.00%	2.57%	\$ (1)	N/A	N/A	N/A	N/A	N/A	N/A
Upsilon Diversified Fund Ltd.	-7.45%	2.37%	\$ (9)	N/A	N/A	N/A	N/A	N/A	N/A
Venor Capital Offshore, Ltd.	-0.35%	2.28%	\$ (5)	N/A	N/A	N/A	N/A	N/A	N/A
<b>Absolute Return Total</b>			<b>\$ 28</b>			<b>\$ 455</b>			<b>\$ 441</b>

Dollar amounts in millions

\*New manager in FY2019 alpha not included

\*\*Net Alpha refers to performance over the benchmark net of fees

# Net Alpha\*\* Generated by External Managers

Manager	FY 2019			3 Year			5 Year		
	FY 2019 Return	Benchmark	1 Yr \$ Alpha	3 Year Return	Benchmark	3 Yr \$ Alpha	5 Year Return	Benchmark	5 Yr \$ Alpha
Gresham	-7.89%	-6.75%	\$ (4)	0.24%	-2.18%	\$ 24	-7.98%	-9.15%	\$ 22
PIMCO Commodity Alpha Fund	6.95%	0.00%	\$ 14	12.54%	0.00%	\$ 82	N/A	N/A	N/A
Wellington Management Company	-5.14%	-5.76%	\$ 3	2.87%	3.40%	\$ (9)	-5.72%	-5.32%	\$ (11)
<b>Commodities Total</b>			<b>\$ 13</b>			<b>\$ 98</b>			<b>\$ 11</b>
Radcliffe Ultra Short Duration	4.19%	2.57%	\$ 4	3.30%	1.78%	\$ 12	2.95%	1.21%	\$ 22
Capula LIBOR Tail Risk	-2.15%	2.57%	\$ (2)	N/A	N/A	N/A	N/A	N/A	N/A
Penn Mutual Asset Management	3.43%	2.57%	\$ 1	N/A	N/A	N/A	N/A	N/A	N/A
Franklin Templeton Emerging Fixed Income	10.00%	8.71%	\$ 4	8.95%	3.96%	\$ 47	4.35%	0.51%	\$ 72
Alliance Bernstein Global Fixed	1.42%	7.99%	\$ (12)	1.76%	3.57%	\$ (9)	-0.38%	0.62%	\$ (8)
Apollo European Principal Fund II	-8.78%	7.48%	\$ (14)	3.62%	7.52%	\$ (4)	6.17%	4.70%	\$ 19
Apollo European Principal Fund III*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Avenue Energy Opportunities Fund	-5.43%	7.48%	\$ (33)	8.17%	7.52%	\$ (0)	N/A	N/A	N/A
Avenue Energy Opportunities Fund II	-5.88%	7.48%	\$ (9)	N/A	N/A	N/A	N/A	N/A	N/A
Avenue Europe SS III	5.10%	7.48%	\$ (5)	10.42%	7.52%	\$ 10	N/A	N/A	N/A
Bain Capital Credit Managed Account (PSERS), L.P.	2.08%	7.48%	\$ (21)	8.90%	7.52%	\$ 5	5.31%	4.70%	\$ (23)
Bain Capital Credit Opp. Fund IV	-17.48%	7.48%	\$ (19)	16.14%	7.52%	\$ 23	8.11%	4.70%	\$ 15
Bain Capital Distressed and Special Situations 2013	-0.82%	7.48%	\$ (22)	10.01%	7.52%	\$ 27	5.28%	4.70%	\$ 7
Bain Capital Distressed and Special Situations 2016 (A), L.P.	5.79%	7.48%	\$ (4)	14.13%	7.52%	\$ 17	N/A	N/A	N/A
Bain Capital Middle Market Credit 2010, L.P.	13.19%	7.48%	\$ 2	4.84%	7.52%	\$ (3)	3.12%	4.70%	\$ 4
Bain Capital Middle Market Credit 2014, L.P.	5.89%	7.48%	\$ (2)	8.63%	7.52%	\$ (2)	6.16%	4.70%	\$ (4)
Brigade Distressed Value	1.44%	7.48%	\$ (10)	10.29%	7.52%	\$ 14	5.39%	4.70%	\$ 9
Brigade Structured Credit Offshore Fund	7.82%	7.48%	\$ 1	11.21%	7.52%	\$ 24	N/A	N/A	N/A
Carlyle Energy Mezz. Opp. Fund	-15.51%	7.48%	\$ (21)	-12.49%	7.52%	\$ (53)	-15.92%	4.70%	\$ (103)
Carlyle Energy Mezz. Opp. Fund II	-0.15%	7.48%	\$ (7)	-7.22%	7.52%	\$ (13)	N/A	N/A	N/A
Cerberus Levered Loan Fund I	6.91%	7.48%	\$ (0)	6.72%	7.52%	\$ (2)	4.72%	4.70%	\$ 1
Cerberus Levered Loan Fund II	3.16%	7.48%	\$ (5)	3.07%	7.52%	\$ (18)	4.87%	4.70%	\$ 4

Dollar amounts in millions

\*New manager in FY2019 alpha not included

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# Net Alpha\*\* Generated by External Managers

Manager	FY 2019			3 Year			5 Year		
	FY 2019 Return	Benchmark	1 Yr \$ Alpha	3 Year Return	Benchmark	3 Yr \$ Alpha	5 Year Return	Benchmark	5 Yr \$ Alpha
Cerberus PSERS Levered Loan Opportunities Fund	10.23%	7.48%	\$ 6	16.66%	7.52%	\$ 38	N/A	N/A	N/A
Galton Onshore Mortgage Recovery Fund III, LP	10.35%	7.48%	\$ 2	10.04%	7.52%	\$ 8	4.96%	4.70%	\$ 8
Galton Onshore Mortgage Recovery Fund IV, L.P.	-8.83%	7.48%	\$ (7)	N/A	N/A	N/A	N/A	N/A	N/A
Hayfin SOF II USD Co-Invest	5.46%	7.48%	\$ (0)	N/A	N/A	N/A	N/A	N/A	N/A
Hayfin SOF II USD LP	7.33%	7.48%	\$ (0)	N/A	N/A	N/A	N/A	N/A	N/A
Hayfin Special Opportunities Credit LP	17.62%	7.48%	\$ 10	13.63%	7.52%	\$ 22	6.64%	4.70%	\$ 18
ICG Europe Fund V	17.80%	7.48%	\$ 15	15.88%	7.52%	\$ 38	8.62%	4.70%	\$ 36
ICG Europe Fund VI	8.34%	7.48%	\$ 1	26.48%	7.52%	\$ 18	N/A	N/A	N/A
ICG Europe Fund VII*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Latitude Management Real Estate Capital IV	6.92%	7.48%	\$ (0)	N/A	N/A	N/A	N/A	N/A	N/A
LBC Credit Partners III	-3.51%	7.48%	\$ (10)	1.43%	7.52%	\$ (23)	6.75%	4.70%	\$ 9
LBC-P Credit Fund LP	7.91%	7.48%	\$ 1	N/A	N/A	N/A	N/A	N/A	N/A
Mariner International Infrastructure	11.07%	7.48%	\$ 3	8.33%	7.52%	\$ 3	6.33%	4.70%	\$ 9
Mariner/Galton RMBS	10.52%	7.48%	\$ 6	6.95%	7.52%	\$ 24	6.34%	4.70%	\$ 31
Oaktree Loan Fund 2X, LP	3.07%	7.48%	\$ (1)	1.11%	7.52%	\$ (2)	-5.50%	4.70%	\$ (7)
Park Square Credit Opportunities	8.50%	7.48%	\$ 2	6.57%	N/A	N/A	N/A	N/A	N/A
PIMCO BRAVO Fund III Onshore Feeder, L.P.	8.24%	7.48%	\$ 1	N/A	N/A	N/A	N/A	N/A	N/A
PIMCO Commercial Real Estate Debt Fund, L.P.*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Summit Partners Credit Fund II LP	6.53%	7.48%	\$ (1)	9.70%	7.52%	\$ 7	N/A	N/A	N/A
TCI Real Estate Partners Fund III, L.P.*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
The Varde Scratch and Dent Fund Feed I-A	8.91%	7.48%	\$ 1	N/A	N/A	N/A	N/A	N/A	N/A
The Varde Scratch and Dent Fund, LP	7.53%	7.48%	\$ 0	7.13%	7.52%	\$ (2)	N/A	N/A	N/A
TOP NPL (A)	-4.43%	7.48%	\$ (1)	-3.10%	7.52%	\$ (6)	6.87%	4.70%	\$ 29
TPG Opportunities Partners II, LP	1.84%	7.48%	\$ (2)	8.59%	7.52%	\$ 0	12.23%	4.70%	\$ 30
TPG Opportunities Partners III, LP	3.04%	7.48%	\$ -	11.46%	7.52%	\$ 13	8.25%	4.70%	\$ 16
TPG TAO	7.83%	7.48%	\$ 1	9.24%	7.52%	\$ 14	N/A	N/A	N/A

Dollar amounts in millions

\*New manager in FY2019 alpha not included

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# Net Alpha\*\* Generated by External Managers

Manager	FY 2019			3 Year			5 Year		
	FY 2019 Return	Benchmark	1 Yr \$ Alpha	3 Year Return	Benchmark	3 Yr \$ Alpha	5 Year Return	Benchmark	5 Yr \$ Alpha
TSSP Opportunities Partners IV, LP*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bridgewater TIPS (unlevered)	5.92%	5.83%	\$ 4	4.66%	3.73%	\$ 108	N/A	N/A	N/A
BlackRock Global Alpha	7.36%	7.87%	\$ (5)	4.76%	2.31%	\$ 64	4.40%	2.95%	\$ 63
PIMCO Multi-Sector Strategy	9.66%	10.34%	\$ (3)	4.05%	3.31%	\$ 9	3.33%	3.37%	\$ (13)
Pugh Capital Management	7.79%	7.87%	\$ (0)	2.31%	2.31%	\$ (0)	2.93%	2.95%	\$ (0)
SEI Investment Management	3.27%	5.06%	\$ (2)	7.37%	2.37%	\$ 15	4.29%	2.08%	\$ 12
<b>Fixed Income Total</b>			<b>\$ (155)</b>			<b>\$ 422</b>			<b>\$ 257</b>
Insight Everest - Int'l Eq (notional)	3.18%	3.31%	\$ (5)	2.28%	2.38%	\$ (12)	4.62%	4.69%	\$ (16)
Insight Nevada - Infra (notional)	3.09%	3.21%	\$ (1)	N/A	N/A	N/A	N/A	N/A	N/A
Insight Oxygen - HY (notional)	5.64%	5.44%	\$ 1	1.46%	1.14%	\$ 4	N/A	N/A	N/A
Insight Sierra - REIT (notional)	2.65%	2.77%	\$ (0)	2.06%	2.18%	\$ (1)	N/A	N/A	N/A
Insight Wilson - PE (notional) Unlagged	11.93%	11.89%	\$ -	N/A	N/A	N/A	N/A	N/A	N/A
Wasatch EM Small Cap	2.85%	-2.19%	\$ 16	7.71%	6.40%	\$ 12	2.43%	0.69%	\$ 26
Acadian Asset Mgmt	-7.07%	-5.94%	\$ (3)	10.72%	7.76%	\$ 19	4.68%	2.77%	\$ 21
Baillie Gifford	3.55%	1.29%	\$ 26	12.96%	9.39%	\$ 106	5.87%	2.16%	\$ 159
BlackRock EMAA	-1.56%	1.21%	\$ (13)	11.80%	10.66%	\$ 13	N/A	N/A	N/A
BlackRock Global Composite	-3.66%	1.40%	\$ (12)	9.09%	9.43%	\$ 15	2.78%	2.19%	\$ 35
Cederberg China Equity Fund*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Effissimo Capital Partners Feeder Fund 2 LP*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Marathon Asset Mgmt	1.93%	1.29%	\$ 7	9.68%	9.39%	\$ 9	3.47%	2.16%	\$ 49
Oberweis Asset Mgmt	-8.91%	-5.94%	\$ (7)	7.76%	7.76%	\$ 1	5.64%	2.77%	\$ 23
QS Investors	-7.60%	-5.94%	\$ (2)	7.37%	7.76%	\$ (1)	3.33%	2.77%	\$ 2
Steadview Capital Partners LP*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
The Children's Investment Fund, LP	17.02%	6.33%	\$ 12	N/A	N/A	N/A	N/A	N/A	N/A
Wasatch Int'l Small Cap	-3.33%	-5.94%	\$ 8	8.60%	7.76%	\$ 9	6.04%	2.77%	\$ 39
<b>International Equity Total</b>			<b>\$ 29</b>			<b>\$ 175</b>			<b>\$ 337</b>

Dollar amounts in millions

\*New manager in FY2019 alpha not included

\*\*Net Alpha refers to performance over the benchmark net of fees

# Net Alpha\*\* Generated by External Managers

Manager	FY 2019			3 Year			5 Year		
	FY 2019 Return	Benchmark	1 Yr \$ Alpha	3 Year Return	Benchmark	3 Yr \$ Alpha	5 Year Return	Benchmark	5 Yr \$ Alpha
Atlantic Trust	2.27%	3.23%	\$ (5)	2.26%	1.54%	\$ 12	-4.26%	-6.65%	\$ 65
PSERS Harvest Funds MLP	1.26%	3.23%	\$ (15)	1.54%	1.54%	\$ (0)	-4.47%	-6.65%	\$ 79
Salient	1.78%	3.23%	\$ (9)	2.59%	1.54%	\$ 18	-6.38%	-6.65%	\$ 15
<b>MLP Total</b>			<b>\$ (29)</b>			<b>\$ 29</b>			<b>\$ 159</b>
Security Capital Preferred Growth	9.33%	10.47%	\$ (2)	4.62%	4.30%	\$ 1	7.08%	8.16%	\$ (11)
<b>REIT Total</b>			<b>\$ (2)</b>			<b>\$ 1</b>			<b>\$ (11)</b>
BlackRock Market Advantage II (vol adjusted)	14.12%	9.41%	\$ 29	11.06%	7.10%	\$ 90	N/A	N/A	N/A
Bridgewater All Weather (vol adjusted)	7.69%	9.41%	\$ (15)	7.51%	7.10%	\$ 24	4.20%	5.08%	\$ (98)
Bridgewater Optimal (vol adjusted)	2.98%	9.41%	\$ (41)	5.30%	7.10%	\$ (46)	N/A	N/A	N/A
DE Shaw Orienteer HV (vol adjusted)	16.55%	9.41%	\$ 59	9.22%	7.10%	\$ 69	N/A	N/A	N/A
<b>Risk Parity Total</b>			<b>\$ 33</b>			<b>\$ 137</b>			<b>\$ (98)</b>
Radcliffe Specialty Finance Debt	6.98%	3.18%	\$ 13	5.05%	2.39%	\$ 27	N/A	N/A	N/A
<b>U.S. Equity Total</b>			<b>\$ 13</b>			<b>\$ 27</b>			<b>\$ -</b>

Dollar amounts in millions

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# Net Alpha\*\* Generated by External Managers

Investment	ITD Direct Alpha	KS PME
GCM Grosvenor Customized Infrastructure Strategies II, LP	4.62	1.06
International Infrastructure Finance Company II, L.P.	-0.38	1
Strategic Partners Real Assets II, L.P.	13.09	1.05
Actis Emerging Markets 3, L.P.	-11.46	0.61
Actis Global 4, L.P.	1.35	1.04
Apax Digital, L.P.	-4.77	0.98
Apax Europe VII, L.P.	-4.98	0.78
Bain Capital Asia Fund II, L.P.	11.42	1.44
Bain Capital Asia Fund III, L.P.	18.16	1.13
Bain Capital Fund XI, L.P.	16.32	1.39
Bain Capital Fund XII, L.P.	-17.5	0.93
Baring Asia Private Equity Fund IV, L.P.	-0.33	0.98
Baring Asia Private Equity Fund V, L.P.	-0.46	0.98
Baring Asia Private Equity Fund VI, L.P.	4.71	1.09
Blue Point Capital Partners (B), L.P.	-2.44	0.91
Blue Point Capital Partners II (B), L.P.	11.53	1.62
Blue Point Capital Partners III (B), L.P.	7.77	1.14
Blue Point Capital Partners IV, L.P.	-3.78	0.97
Bridgepoint Capital II (Secondary)	10.99	1.48
Bridgepoint Development Capital III, L.P.	57.63	1.48
Bridgepoint Europe I	4.2	1.21
Bridgepoint Europe II	14.6	1.24
Bridgepoint Europe III A, L.P.	-3.86	0.76
Bridgepoint Europe IV, L.P.	-2.58	0.89
Bridgepoint Europe V, L.P.	2.73	1.05
Capital International Private Equity Fund V L.P.	-10.86	0.74
Capital International Private Equity Fund VI, L.P.	-7.84	0.75
Catterton Growth Partners II, L.P.	-1.85	0.93
Catterton Growth Partners III, L.P., L	18.56	1.33
Catterton Growth Partners, L.P.	-2.17	0.9

Dollar amounts in millions

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# Net Alpha\*\* Generated by External Managers

Investment	ITD Direct Alpha	KS PME
Catterton Partners VI, L.P.	2.91	1.16
Catterton Partners VII, L.P.	2.61	1.09
Catterton VIII, L.P., L	6.47	1.06
Cinven Fund (Fifth), L.P.	9.74	1.29
Cinven Fund (Fourth), L.P.	0.08	1
Cinven Fund (Sixth), L.P.	-2.06	0.98
Coller International Partners VI, L.P.	3.81	1.14
Coller International Partners VII, L.P.	8.04	1.1
Crestview Partners II, L.P.	1.51	1.06
Crestview Partners III, L.P.	8.41	1.18
Crestview Partners, L.P.	1.96	1.12
CVC Capital Partners Asia Pacific III, L.P.	1.51	1.05
CVC European Equity Partners V (A), L.P.	4.16	1.17
DCPF VI Oil and Gas Co-Investment Fund, L.P.	6.75	1.19
Denham Commodity Partners Fund VI, L.P.	-3.15	0.92
Energy & Minerals Group Fund III, L.P., The	-10.99	0.66
Equistone Partners Europe Fund V E, L.P.	-5.99	0.86
Equistone Partners Europe Fund VI E, SCSp	-20.27	0.9
Evergreen Pacific Partners II, L.P.	9.96	1.37
First Reserve Fund XII, L.P.	-20.29	0.41
GoldPoint Partners Co-Investment V, L.P.	10.45	1.26
HgCapital 7 A, L.P.	1.67	1.05
HgCapital 8 D, L.P.	-80.83	0.83
HGGC Fund II, L.P.	7.7	1.2
HGGC Fund III, L.P.	20.25	1.2
Incline Equity Partners III (PSERS), L.P.	19.11	1.51
Incline Equity Partners IV, L.P.	3.72	1.02
Irving Place Capital MB-PSERS II, L.P.	3.85	1.17
Irving Place Capital Partners III SPV, L.P.	-1.89	0.89
K4 Private Investors, L.P.	-18.39	0.88

Dollar amounts in millions

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# Net Alpha\*\* Generated by External Managers

Investment	ITD Direct Alpha	KS PME
Landmark Equity Partners XIII, L.P.	-1.19	0.95
Landmark Equity Partners XIV, L.P.	-2.62	0.93
Milestone Partners III, L.P.	-11.64	0.53
Milestone Partners IV, L.P.	1.61	1.07
New Mountain Partners III L.P.	1.2	1.06
New Mountain Partners IV, L.P.	10.45	1.28
New Mountain Partners V, L.P.	7.89	1.06
New Mountain Partners, L.P., Allegheny	8.97	1.52
New York Life Capital Partners I, L.P.	-0.95	0.96
New York Life Capital Partners II, L.P.	16.89	1.63
New York Life Capital Partners III-A, L.P.	-5.96	0.7
New York Life Capital Partners IV-A, L.P.	1.8	1.09
NGP Natural Resources X, L.P.	-4.85	0.86
NGP Natural Resources XI, L.P.	3.42	1.07
North Haven Private Equity Asia IV, L.P.	-0.6	0.99
Odyssey Investment Partners Fund V, L.P.	-6.05	0.89
Orchid Asia V, L.P.	13.46	1.34
Orchid Asia VI, L.P.	0.19	1
Orchid Asia VII, L.P.	-3.14	0.97
PAI Europe IV-B2, L.P.	3.96	1.14
PAI Europe V, L.P.	-1.36	0.92
PAI Europe VI, L.P.	4.02	1.07
Palladium Equity Partners IV, L.P.	5.1	1.12
Partners Group Secondary 2008, L.P.	-4.1	0.85
Partners Group Secondary 2011 (USD), L.P. Inc.	5.56	1.19
Partners Group Secondary 2015 (USD) A, L.P.	6.4	1.11
Permira IV, L.P.	-0.65	0.97
Platinum Equity Capital Partners IV, L.P.	29.68	1.28
Platinum Equity Capital Partners-A II, L.P.	2.66	1.05
Platinum Equity Capital Partners-A III, L.P.	12.37	1.19

Dollar amounts in millions

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# Net Alpha\*\* Generated by External Managers

Investment	ITD Direct Alpha	KS PME
Platinum Equity Capital Partners-A, L.P.	45.66	1.68
Platinum Equity Small Cap Fund, L.P.	-29.56	0.82
PNC Equity Partners II, L.P.	3.6	1.17
Portfolio Advisors Secondary Fund III, L.P.	40.46	1.19
StepStone International Investors III L.P.	-11.38	0.6
Sterling Capital Partners, L.P.	9.1	1.44
Strategic Partners Fund III-B, L.P.	-1.48	0.94
Strategic Partners Fund IV, L.P.	1.25	1.04
Strategic Partners Fund V, L.P.	5.71	1.16
Strategic Partners Fund VI, L.P.	7.48	1.16
Strategic Partners Fund VII, L.P.	22.02	1.24
Trilantic Capital Partners IV L.P.	2.97	1.09
Trilantic Capital Partners V (North America), L.P.	5.22	1.11
Trilantic Capital Partners VI (North America), L.P.	1.15	1.01
U.S. Equity Partners II	6.05	1.15
Webster Capital IV, L.P.	6.92	1.04
Denham Mining Fund, L.P.	14.63	1.13
NGP Natural Resources XII, L.P.	-11.51	0.9
AG Core Plus Realty Fund III, L.P.	10.07	1.29
AG Core Plus Realty Fund IV, L.P.	0.02	1
AG Europe Realty Fund II, L.P.	-7.44	0.95
Almanac Realty Securities V, L.P.	1.12	1.03
Almanac Realty Securities VI, L.P.	1.18	1.03
Almanac Realty Securities VII, L.P.	5.37	1.09
Almanac Realty Securities VIII, L.P.	-81.33	0.53
Apollo Real Estate Finance Corp	-11.35	0.55
Ares European Real Estate Fund III, L.P.	-10.12	0.65
Ares European Real Estate Fund IV, L.P.	7.38	1.13
Ares U.S. Real Estate Fund IX, L.P.	-7.69	0.96
Ares U.S. Real Estate Fund VII, L.P.	1.95	1.07

Dollar amounts in millions

\*New manager in FY2019 alpha not included

\*\*Net Alpha refers to performance over the benchmark net of fees

# Net Alpha\*\* Generated by External Managers

Investment	ITD Direct Alpha	KS PME
Ares U.S. Real Estate Fund VIII, L.P.	7.88	1.16
Avenue Real Estate Fund (Parallel) L.P.	-7.2	0.53
Bell Institutional Fund IV, LLC	7.38	1.25
Bell Institutional Fund V, L.P.	4.73	1.14
Bell Institutional Fund VI, L.P.	-7.81	0.92
BlackRock Asia Property Fund III, L.P.	-11.59	0.47
BlackRock Europe Property Fund III, L.P.	-8.88	0.65
Blackstone Real Estate Debt Strategies II, L.P.	-0.37	0.99
Blackstone Real Estate Debt Strategies III, L.P.	-0.78	0.99
Blackstone Real Estate Partners Europe III, L.P.	0.68	1.03
Blackstone Real Estate Partners Europe IV, L.P.	7.28	1.22
Blackstone Real Estate Partners V, L.P.	4.68	1.28
Blackstone Real Estate Partners VI, L.P.	5.01	1.26
Blackstone Real Estate Partners VII, L.P.	6.21	1.19
Blackstone Real Estate Partners VIII, L.P.	6.49	1.11
BPG/PSERS Co-Investment Fund	4.54	1.14
Brookfield Strategic Real Estate Partners II, L.P.	4.06	1.08
Brookfield Strategic Real Estate Partners, L.P.	11.14	1.44
Cabot Industrial Core Fund, L.P.	6.87	1.15
Cabot Industrial Value Fund IV, L.P.	25.93	1.59
Cabot Industrial Value Fund V, L.P.	-0.43	1
Carlyle Realty Partners III, L.P.	12.14	1.4
Carlyle Realty Partners IV, L.P.	-5.04	0.72
Carlyle Realty Partners V, L.P.	-1.59	0.94
Carlyle Realty Partners VI, L.P.	8.89	1.23
Carlyle Realty Partners VII, L.P.	6.96	1.15
Carlyle Realty Partners VIII, L.P.	-41.96	0.77
Centerline High Yield CMBS III - Loan/Stock	-20.87	0.54
DRA Growth and Income Fund IX, LLC	8.42	1.08
DRA Growth and Income Fund VI, L.P.	-0.09	1

Dollar amounts in millions

\*New manager in FY2019 alpha not included

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# Net Alpha\*\* Generated by External Managers

Investment	ITD Direct Alpha	KS PME
DRA Growth and Income Fund VII, L.P.	9.64	1.43
DRA Growth and Income Fund VIII, LLC	4.39	1.1
Exeter Core Industrial Club Fund II, L.P.	4.88	1.07
Exeter Industrial Value Fund II, L.P.	17.32	1.54
Exeter Industrial Value Fund III, L.P.	24.55	1.73
Exeter Industrial Value Fund IV, L.P.	-0.68	0.99
Fortress Investment Fund IV LP	-5.78	0.64
Fortress Investment Fund LLC	7.12	1.27
Fortress Investment Fund V (Fund A) L.P.	-4.85	0.67
LAI Strategic Realty Investors, L.P.	3.02	1.14
Latitude Management Real Estate Capital III, Inc.	0.61	1.02
Legg Mason Real Estate Capital II	-2.83	0.86
LEM Multifamily Senior Equity Fund IV, L.P.	9.49	1.14
LEM RE HY Debt & Pfd Equity Fund III, L.P.	14.59	1.49
LEM Real Estate Mezzanine Fund II, L.P.	-7.36	0.74
Paramount Group Real Estate Fund VII, L.P.	-3.97	0.94
Peabody Global Real Estate Partners	-3.02	0.91
Pramerica Real Estate Capital VI, L.P.	3.78	1.04
RCG Longview Debt Fund V, L.P.	2.8	1.07
RCG Longview Debt Fund VI, L.P.	3.58	1.02
RCG Longview Equity Fund, L.P.	-9.79	0.56
Senior Housing Partnership Fund IV, L.P.	5.33	1.24
Senior Housing Partnership Fund V, L.P.	4.49	1.1
Silverpeak Legacy/PSERS, L.P.	-2	0.96
Stockbridge Real Estate Fund II, LP	-16.66	0.17
Stockbridge Real Estate Fund III, LP	-9.78	0.47
Stockbridge Real Estate Fund, L.P.	5.43	1.19
Strategic Partners Fund III RE, L.P.	-15.55	0.35
Strategic Partners Fund IV RE, L.P.	-10.73	0.51
UBS (US) Trumbull Property Fund, L.P.	-0.09	0.99

Dollar amounts in millions

\*New manager in FY2019 alpha not included

\*\*Net Alpha refers to performance over the benchmark net of fees

# Net Alpha\*\* Generated by External Managers

Investment	ITD Direct Alpha	KS PME
812 Market Street	-62.46	0.47
Atlanta Marriott	-6.3	0.51
Big Valley Ranch	-6.1	0.91
Five North 5th Street	-5.34	0.49
Galleria at Ft Lauderdale, The	1.76	1.1
Golden Hills Ranch	-20.11	0.8
Keystone Milano LLC	-14.33	0.93
Keystone Miramar LLC	-6.27	0.97
Keystone Orlando LLC	-5.13	0.98
Keystone Parkland LLC	-5.13	0.98
Lorida Groves	1.56	1.03
Maricopa Citrus	14.35	2.32
PSERS YES Holdings, L.P.	22.29	1.56
Rivercenter Mall	-1.51	0.91
Townsend Grove	0.81	1.08
Apollo Investment Fund IX, L.P.	-16.31	0.84
Apollo Investment Fund VIII, L.P.	0.86	1.02
Avenue Special Situations Fund VI, L.P.	-10.16	0.63
Cerberus Institutional Partners V, L.P.	0.49	1.02
Cerberus Institutional Partners VI, L.P.	-3.62	0.96
Cerberus Institutional Partners, L.P. (Series 3)	5.81	1.32
Cerberus Institutional Partners, L.P. (Series 4)	-0.39	0.98
Clearlake Capital Partners IV, L.P.	21.59	1.36
Clearlake Capital Partners V, L.P.	63.47	1.34
Gleacher Mezzanine Fund II, L.P.	-1.07	0.97
Gold Hill Venture Lending 03-A, L.P.	6.02	1.3
GSC Recovery II, L.P.	-0.47	0.98
GSC Recovery III (Parallel Fund), L.P.	-1.04	0.97
NYLIM Mezzanine Partners II (Parallel Fund) LP	2.8	1.08
OCM Opportunities Fund VII L.P.	3.71	1.16

Dollar amounts in millions

\*New manager in FY2019 alpha not included

\*\*Net Alpha refers to performance over the benchmark net of fees

# Net Alpha\*\* Generated by External Managers

Investment	ITD Direct Alpha	KS PME
OCM Opportunities Fund VII-b L.P.	1.91	1.07
Searchlight Capital II, L.P.	6.12	1.11
Venor Special Situations Fund II, L.P.	-3.4	0.91
Versa Capital Fund I, L.P.	-3.77	0.86
Versa Capital Fund II, L.P.	-9.93	0.62
Versa Capital Fund III, L.P.	-19.88	0.65
Windjammer Senior Equity Fund III, L.P.	10.64	1.49
Adams Capital Management, L.P.	31.78	1.56
Aisling Capital II L.P.	-7.28	0.69
Aisling Capital III, L.P.	11.15	1.44
Aisling Capital IV, L.P.	7.21	1.08
Co-Investment 2000 Fund, L.P.	-1.37	0.92
Co-Investment Fund II, L.P.	-10.42	0.44
Cross Atlantic Technology Fund II	-7.52	0.64
Cross Atlantic Technology Fund, L.P.	-4.04	0.74
Insight Venture Partners X, L.P.	18.95	1.1
KBL Partnership, L.P.	-14.06	0.4
LLR Equity Partners II, L.P.	6.94	1.36
LLR Equity Partners III, L.P.	3.06	1.13
LLR Equity Partners IV, L.P.	13.04	1.38
LLR Equity Partners V, L.P.	3.58	1.02
Perseus-Soros BioPharmaceutical Fund	8.56	1.24
Psilos Group Partners III-C, L.P.	-4.62	0.76
Quaker Bio-Ventures, L.P.	-20	0.27
Quaker BioVentures II, L.P.	-9.22	0.67
SCP Private Equity Partners II, L.P.	-16.36	0.2
StarVest Partners , L.P.	0.63	1.04
StarVest Partners II (Parallel), L.P.	-11.73	0.51
Sterling Venture Partners, L.P.	-6.91	0.69
Strategic Partners Fund III VC, L.P.	0.97	1.04

Dollar amounts in millions

\*New manager in FY2019 alpha not included

\*\*Net Alpha refers to performance over the benchmark net of fees

# Net Alpha\*\* Generated by External Managers

Investment	ITD Direct Alpha	KS PME
Strategic Partners Fund IV VC, L.P.	-4.62	0.81
Summit Partners Growth Equity Fund IX, L.P.	16.39	1.1
Summit Partners Growth Equity Fund VIII, L.P.	13.76	1.49
Summit Partners Venture Capital Fund III, L.P.	6.86	1.32
Summit Partners Venture Capital Fund IV, L.P.	31.51	1.52
Tenaya Capital IV-P, L.P.	1.76	1.12
Tenaya Capital V-P, L.P.	6.28	1.3
Tenaya Capital VI, L.P.	-5.2	0.77
Tenaya Capital VII, L.P.	0.89	1.02

Dollar amounts in millions

\*New manager in FY2019 alpha not included

\*\*Net Alpha refers to performance over the benchmark net of fees

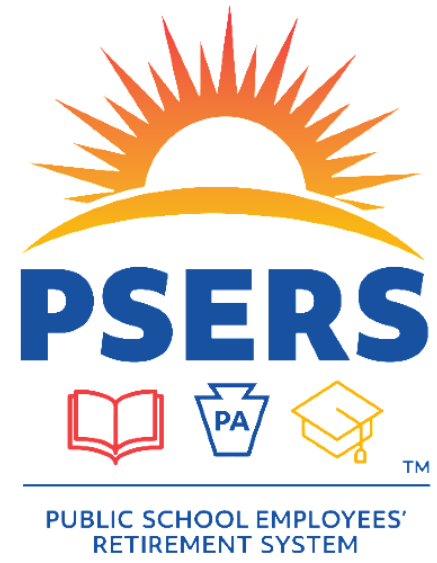
# Net Alpha Generated by Internal Managers

Manager	FY 2019								
	FY 2019 Return	Benchmark	1 Year \$ Alpha	3 Year Return	3 Year Benchmark	3 Year \$ Alpha	5 Year Return	5 Year Benchmark	5 Year \$ Alpha
Internally Managed Private Debt Co-Investment	5.48%	7.48%	\$ (0.9)	-2.22%	7.52%	\$ (4.8)	-14.01%	4.70%	\$ (20.6)
Internally Managed Private Equity	14.09%	9.67%	\$ 20.3	17.03%	13.26%	\$ 83.2	21.22%	10.88%	\$ 165.6
Internally Managed Private Infrastructure*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Internally Managed Private Real Estate	17.39%	5.69%	\$ 14.9	15.64%	9.01%	\$ 30.3	18.01%	10.35%	\$ 43.9
PSERS Active Core Plus Fixed Income	8.10%	7.87%	\$ 2.9	3.16%	2.31%	\$ 30.2	3.80%	2.95%	\$ 48.9
PSERS ACWI x US Index Fund	1.56%	1.29%	\$ 8.5	10.10%	9.39%	\$ 58.4	2.86%	2.16%	\$ 92.2
PSERS Funded U.S. Long Treasuries*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PSERS Infrastructure Private	10.60%	9.67%	\$ 1.1	N/A	N/A	N/A	N/A	N/A	N/A
PSERS MLP	1.13%	1.72%	\$ (4.2)	1.71%	1.70%	\$ (1.0)	N/A	N/A	N/A
PSERS Private Commodities*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PSERS Risk Parity Composite (vol adjusted)	6.53%	9.41%	\$ (80.7)	6.99%	7.10%	\$ (31.3)	5.02%	5.08%	\$ (45.2)
PSERS S&P 400 Index Composite	1.48%	1.36%	\$ 0.7	11.14%	10.90%	\$ 1.8	8.22%	8.02%	\$ 3.9
PSERS S&P 500 Index Composite	11.07%	10.42%	\$ 20.3	14.22%	14.19%	\$ (22.2)	10.88%	10.71%	\$ 28.6
PSERS S&P 600 Index Composite	-4.69%	-4.88%	\$ 1.1	12.36%	11.97%	\$ 3.3	8.89%	8.41%	\$ 10.5
PSERS Ultra Short Duration	2.50%	2.28%	\$ 11.6	1.60%	1.34%	\$ 39.4	1.06%	0.83%	\$ 54.0

Dollar amounts in millions

Does not include levered accounts

\*New manager in FY2019 alpha not included



# Investment Expenses Report FY 2019

**Thomas A. Bauer, CFA - Deputy Chief Investment Officer, Traditional Investments**  
**Charles J. Spiller – Deputy Chief Investment Officer, Non-Traditional Investments**  
**Jarid M. Snyder, CTP – Senior Investment Professional**

December 5, 2019

**NEXT**