



Texas Municipal Retirement System

## Investments Overview – Tracking and Analyzing Investments

**T.J. Carlson**, Chief Investment Officer

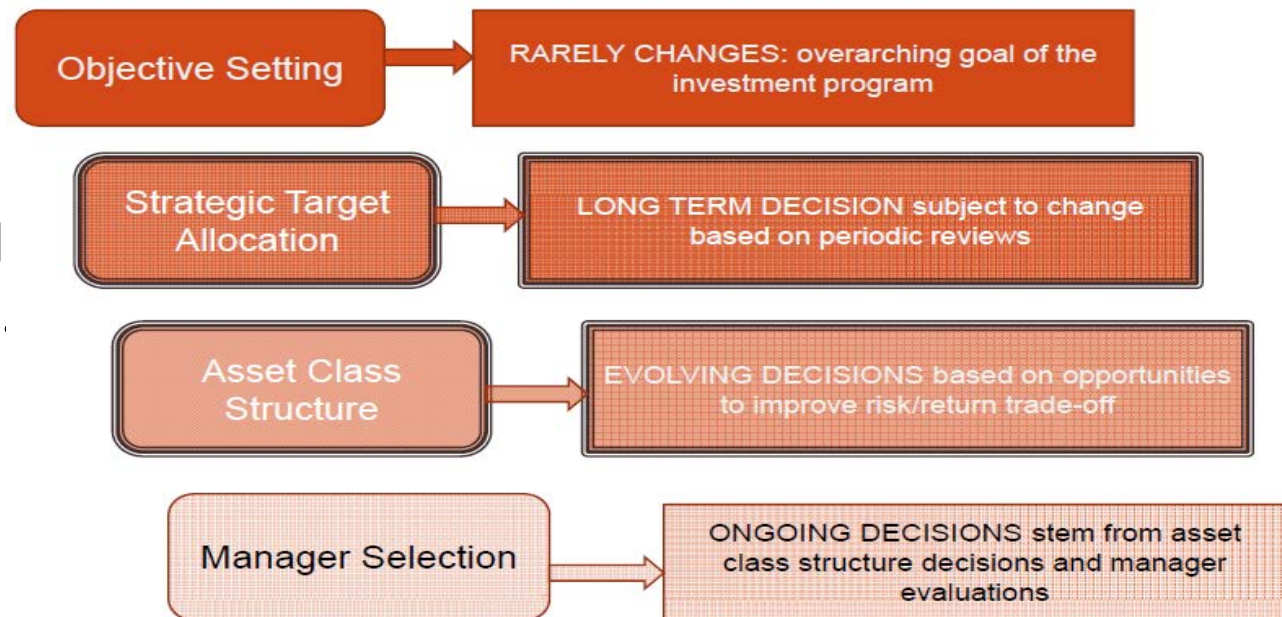
[www.tMrs.com/workshop.php](http://www.tMrs.com/workshop.php)

# Asset Allocation Process

## Investment Policy Statement: *Asset Allocation Reviews*

- Formal pension financial (asset-liability) study will be conducted at least every five years (2019)
- Formal asset allocation study will be conducted at least every three years to verify or amend the targets
- Strategic Target Allocation will be reviewed at least annually to ensure that the long-term return objective and risk tolerance

continues to be appropriate for the current environment and the Board's goals.



# Asset Allocation Process

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## Investment Policy Statement: *Investment Beliefs*

The investment beliefs of the Board are based on capital market theories that are generally accepted and followed by institutional investors, who by definition are long-term oriented investors. These beliefs hold that<sup>1</sup>:

1. Increasing risk is compensated
2. Risk can be diversified
3. Relative performance of asset classes is reasonably consistent
  - (Return, Volatility and Correlation assumptions are used to represent investment opportunities)
4. The primary determinant of return is asset allocation
  - (The choice of Strategic Target Allocation is the most important investment decision)
5. The risk of tactical shifts between asset classes is hard to diversify and must be used judiciously
6. Active management can improve returns and is inversely dependent on market efficiency
  - (Choices of sub-asset classes, Active Strategies, and Managers are expected to contribute to total performance)

Risk Tolerance<sup>2</sup>: Risk commensurate with a 6.75% target rate of return

1. Summarized from the TMRS Investment Policy Statement (IPS)

2. TMRS IPS Sec. IV. Investment Objective . . . The Board is responsible for approving an Actuarial Return Assumption and accepting that the commensurate risk posture of that portfolio is in line with the Board's Risk Tolerance.

# Asset Allocation Process

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## Investment Policy Statement: *Asset Allocation Policy*

- The Board has adopted the following framework for making asset allocation decisions.
  - The Board will adopt a Strategic Target Allocation that must deliver:
    1. A representation of the Board's long-term return objective with its implied Risk Tolerance;
    2. Sufficient confidence for the Board to “stay the course” given extreme market moves; and
    3. A benchmark against which to measure performance.

# Asset Allocation Inputs

## Primary Sources of Risk and Return

- Alternative asset classes provide diversification by adding new risk premia

Primary Sources of Risk and Return (Risk Premia)		Asset Class Examples						
		Gov't Bonds	Core Fixed Income	Equity	Real Assets <sup>1</sup>	Private Equity	Non – Core Fixed Income	Absolute Return Strategies
Traditional	Interest rates	x	x					x
	Credit		x				x	x
	Equity			x	x			x
	Real Assets				x	x		x
Alternative	Liquidity				x	x	x	x
	Direct Engagement				x	x	x	x
	Optionality						x	x
	Complexity						x	x

1. Includes Real Estate and Real Return investments

# Asset Allocation Inputs

## RVK Assumptions: Summary of Year-over-Year Changes

Asset Class	2017			2018			Change (2018 - 2017)		
	Nominal Return (Arith.)	Risk (St. Dev.)	Nominal Return (Geo.)	Nominal Return (Arith.)	Risk (St. Dev.)	Nominal Return (Geo.)	Nominal Return (Arith.)	Risk (St. Dev.)	Nominal Return (Geo.)
Large/Mid Cap US Equity	7.00%	17.75%	5.56%	6.75%	17.75%	5.30%	-0.25%	0.00%	-0.25%
Small Cap US Equity	7.50%	21.25%	5.46%	7.25%	21.25%	5.20%	-0.25%	0.00%	-0.25%
Broad US Equity	7.05%	17.80%	5.60%	6.80%	17.80%	5.35%	-0.25%	0.00%	-0.25%
Dev'd Large/Mid Cap Int'l Equity	8.25%	19.00%	6.62%	8.00%	19.00%	6.37%	-0.25%	0.00%	-0.25%
Dev'd Small Cap Int'l Equity	8.50%	23.00%	6.14%	8.25%	23.00%	5.89%	-0.25%	0.00%	-0.26%
Emerging Markets Equity	10.75%	29.00%	7.14%	10.25%	29.00%	6.62%	-0.50%	0.00%	-0.51%
Broad International Equity	8.85%	20.65%	6.94%	8.60%	20.80%	6.66%	-0.25%	0.15%	-0.28%
Global Equity	7.90%	18.30%	6.38%	7.65%	18.35%	6.12%	-0.25%	0.05%	-0.26%
Intermediate Duration Fixed Income	3.50%	6.00%	3.33%	3.50%	6.00%	3.33%	0.00%	0.00%	0.00%
Non-US Dev'd Sovereign Fixed Income UH	2.25%	10.50%	1.72%	2.25%	10.50%	1.72%	0.00%	0.00%	0.00%
TIPS	3.75%	6.25%	3.56%	3.75%	6.25%	3.56%	0.00%	0.00%	0.00%
Low Duration Fixed Income	2.50%	3.50%	2.44%	3.00%	3.50%	2.94%	0.50%	0.00%	0.50%
Long Duration Fixed Income	4.00%	11.50%	3.37%	3.50%	11.50%	2.87%	-0.50%	0.00%	-0.50%
High Yield	6.00%	15.00%	4.95%	5.50%	15.00%	4.45%	-0.50%	0.00%	-0.50%
Emerging Markets Debt Hard Currency	5.75%	12.50%	5.02%	5.25%	12.50%	4.52%	-0.50%	0.00%	-0.50%
Emerging Markets Debt Local Currency	6.75%	12.50%	6.03%	5.75%	12.50%	5.02%	-1.00%	0.00%	-1.01%
Core Real Estate	6.25%	12.50%	5.52%	6.25%	12.50%	5.52%	0.00%	0.00%	0.00%
Global REITs	6.25%	19.00%	4.59%	6.25%	19.00%	4.59%	0.00%	0.00%	0.00%
MLPs	8.50%	22.00%	6.34%	8.50%	22.00%	6.34%	0.00%	0.00%	0.00%
Diversified Hedge Funds	6.25%	9.50%	5.83%	5.75%	9.50%	5.33%	-0.50%	0.00%	-0.50%
GTAA	6.25%	10.00%	5.78%	6.00%	10.50%	5.48%	-0.25%	0.50%	-0.30%
Private Equity	10.00%	25.50%	7.16%	9.75%	25.50%	6.90%	-0.25%	0.00%	-0.26%
Commodities	5.75%	19.75%	3.95%	5.75%	19.75%	3.95%	0.00%	0.00%	0.00%
Diversified Inflation Strategies	5.25%	11.50%	4.63%	5.25%	11.50%	4.63%	0.00%	0.00%	0.00%
US Inflation	2.50%	3.00%	2.46%	2.50%	3.00%	2.46%	0.00%	0.00%	0.00%
Cash Equivalents	2.25%	3.00%	2.21%	2.50%	3.00%	2.46%	0.25%	0.00%	0.25%

Orange highlighted cells indicate values are being calculated based on a roll up of underlying asset classes.

Global Equity is a combination of 53.7% Broad US Equity and 46.3% Broad International Equity.

Broad US Equity is a combination of 92.0% Large/Mid Cap US Equity and 8.0% Small Cap US Equity.

Broad International Equity is a combination of 66.6% Dev'd Large/Mid Cap Int'l Equity, 10.8% Dev'd Small Cap Int'l Equity, and 22.5% Emerging Markets Equity.

Diversified Inflation Strategies is a combination of 1/3 TIPS, 1/3 Global REITs, and 1/3 Commodities.

The Custom GTAA Index is comprised of 30% MSCI ACWI, 25% BB US Agg, 5% Citi Non-US WGBI UH, 10% JPM GBI EM Gbl, 10% BB US TIPS, 10% BB US HY, and 10% DJ-UBS Commodities

The Custom DIS Index is comprised of 1/3 BB US Trsrg: US TIPS Index, 1/3 MSCI World Real Estate Index, and 1/3 DJ-UBS Commodity Index.



# Asset Allocation Inputs

## Correlations

	Custom Developed Equity	Emerging Markets Equity	Int. Duration Fixed Income	Custom Non-Core Fixed Income	Custom Real Return	Custom Real Estate	Custom Absolute Return Strategies	Custom Private Equity	Cash Equivalents
Custom Developed Equity	1.00	0.86	0.08	0.82	0.70	0.13	0.86	0.83	-0.26
Emerging Markets Equity	0.86	1.00	0.02	0.89	0.48	-0.03	0.74	0.66	-0.04
Int. Duration Fixed Income	0.08	0.02	1.00	-0.05	0.23	-0.16	0.12	-0.29	0.26
Custom Non-Core Fixed Income	0.82	0.89	-0.05	1.00	0.76	-0.07	0.89	0.76	-0.27
Custom Real Return	0.70	0.48	0.23	0.76	1.00	0.13	0.61	0.59	0.13
Custom Real Estate	0.13	-0.03	-0.16	-0.07	0.13	1.00	-0.05	0.44	-0.03
Custom Absolute Return Strategies	0.86	0.74	0.12	0.89	0.61	-0.05	1.00	0.78	0.16
Custom Private Equity	0.83	0.66	-0.29	0.76	0.59	0.44	0.78	1.00	-0.21
Cash Equivalents	-0.26	-0.04	0.26	-0.27	0.13	-0.03	0.16	-0.21	1.00

# Investment Constraint Impact

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- Prior to solving for optimal asset allocations, constraints are typically reviewed and set for all asset classes
- Constraints typically reflect subjective risk tolerances of an investor, which may not be directly captured by the return, risk and correlation assumptions alone
- Constraints can (and normally do) in effect define the target allocations to most asset classes and are therefore very significant
- Minimum and Maximum Target Allocation Constraints:
  - 50/50 Equity (0-50%)
  - Intermediate Duration Fixed Income (0-40%)
  - Non-Core Fixed Income (0-40%)
  - Custom Real Return (0-10%)
  - Real Estate (0-15%)
  - Hedge Funds (0-10%)
  - Private Equity (0-5%)



# Efficient Allocations: *Real World Constraints*

	Min	Max	1	2	3	4	5	6	7	8	9	10	Target	Current 12/31/2016
Custom Global Equity	0	50	10	13	16	18	23	27	32	37	42	50	35	44
Int. Duration Fixed Income	0	40	40	40	34	27	22	18	13	8	3	0	10	20
Custom Non-Core Fixed Income	0	40	15	7	10	15	15	15	15	15	15	30	20	8
Custom Real Return	0	10	10	10	10	10	10	10	10	10	10	0	10	9
Custom Real Estate	0	15	15	15	15	15	15	15	15	15	15	15	10	9
Diversified Hedge Funds	0	10	10	10	10	10	10	10	10	10	10	0	10	11
Private Equity	0	5	0	5	5	5	5	5	5	5	5	5	5	1
Total			100	100	100	100	100	100	100	100	100	100	100	100
Capital Appreciation			20	28	31	33	38	42	47	52	57	55	50	53
Capital Preservation			55	47	44	42	37	33	28	23	18	30	30	28
Alpha			10	10	10	10	10	10	10	10	10	0	10	11
Inflation			15	15	15	15	15	15	15	15	15	15	10	9
Expected Return			5.46	5.68	5.90	6.12	6.34	6.56	6.78	7.00	7.22	7.45	6.87	6.55
Risk (Standard Deviation)			6.59	7.07	7.75	8.47	9.23	10.02	10.84	11.68	12.54	14.22	11.50	10.72
Return (Compound)			5.25	5.44	5.62	5.78	5.94	6.09	6.23	6.37	6.49	6.52	6.26	6.01
Return/Risk Ratio			0.83	0.80	0.76	0.72	0.69	0.65	0.63	0.60	0.58	0.52	0.60	0.61
RVK Expected Eq Beta (LCUS Eq = 1)			0.24	0.28	0.32	0.36	0.40	0.45	0.49	0.54	0.58	0.69	0.54	0.52
RVK Liquidity Metric (T-Bills = 100)			62	61	60	58	59	59	59	59	60	63	61	70

# Asset Allocation Methodology

## Investment Policy Statement:

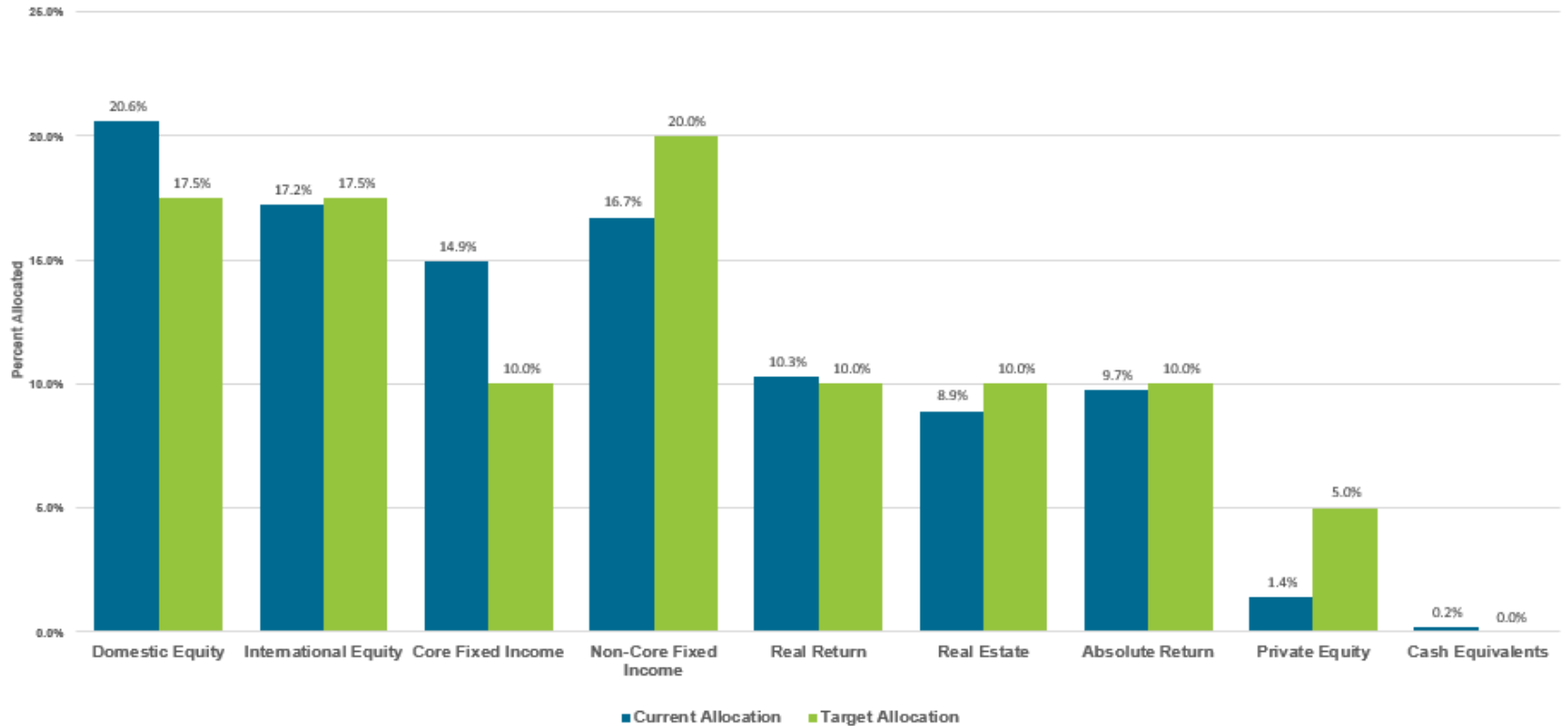
### *Current Strategic Allocation Target and Ranges*

The Strategic Target Allocation and acceptable ranges as determined by the Board to facilitate the achievement of long-term investment objectives within acceptable risk parameters are as follows:

<b>Asset Class</b>	<b>Minimum %</b>	<b>Strategic Target Allocation %</b>	<b>Maximum %</b>
US Equity	12.5	17.5	22.5
International Equity	12.5	17.5	22.5
Core Fixed Income	5	10	15
Non-Core Fixed Income	15	20	25
Real Estate	5	10	15
Real Return	5	10	15
Absolute Return	5	10	15
Private Equity	0	5	10
Cash Equivalents	0	0	10

# TMRS Investment Portfolio Asset Allocation and Performance

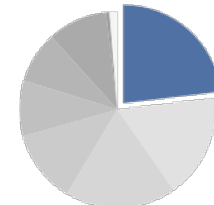
June 30, 2018



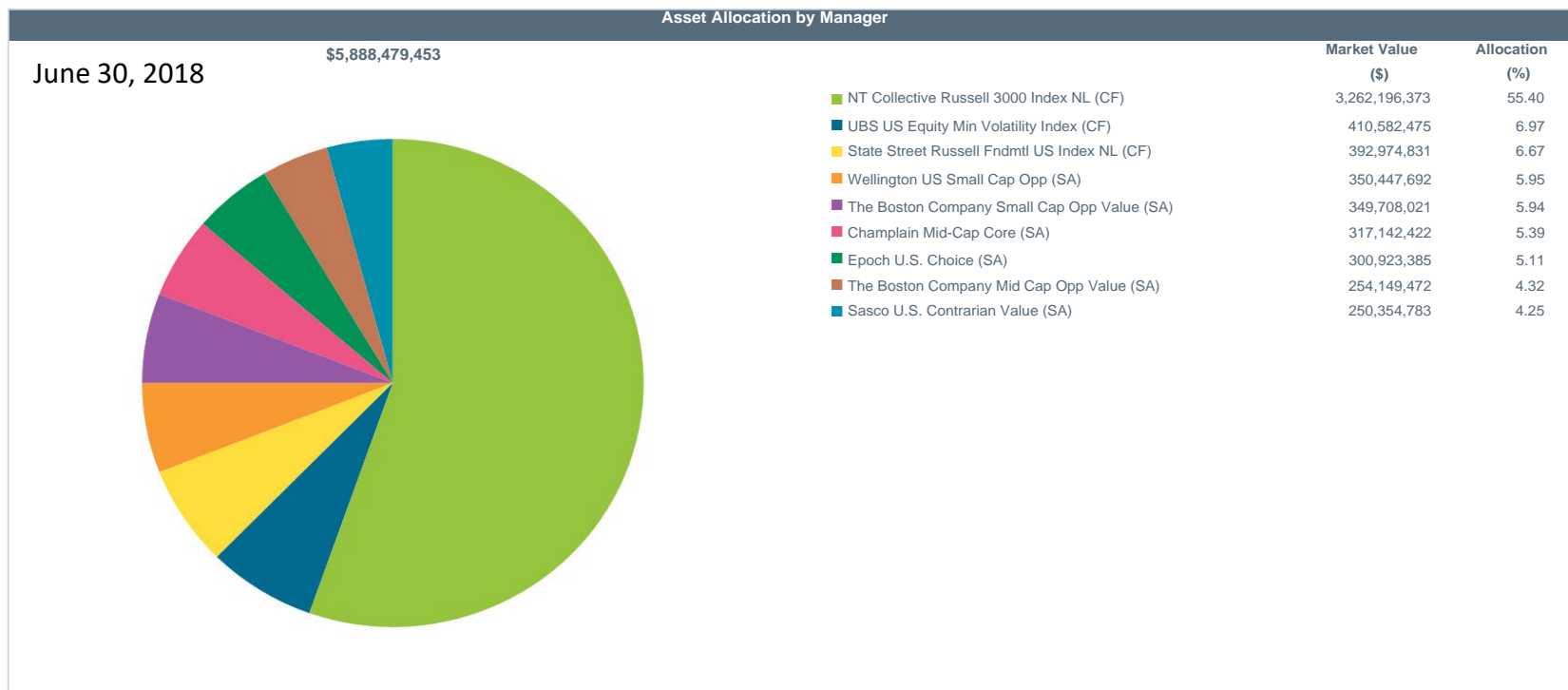
	Allocation		Performance (%)									
	Market Value (\$)	%	Quarter	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	15 Years	Since Incep.	Inception Date
Total Fund	28,619,063,378	100.00	0.76	0.93	7.53	6.51	7.01	6.45	6.75	6.05	8.52	01/01/1989
Actual Allocation Benchmark			0.84	0.74	7.09	6.12	6.78	6.22	6.58	5.69	7.96	

Performance shown is net of fees and provided by State Street. Performance is annualized for periods greater than one year. Please see Supplemental Information for custom benchmark definitions.





## Domestic Equity Composite Performance & Allocation

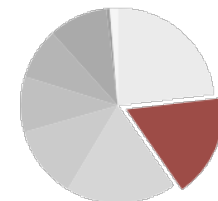


**Comparative Performance**

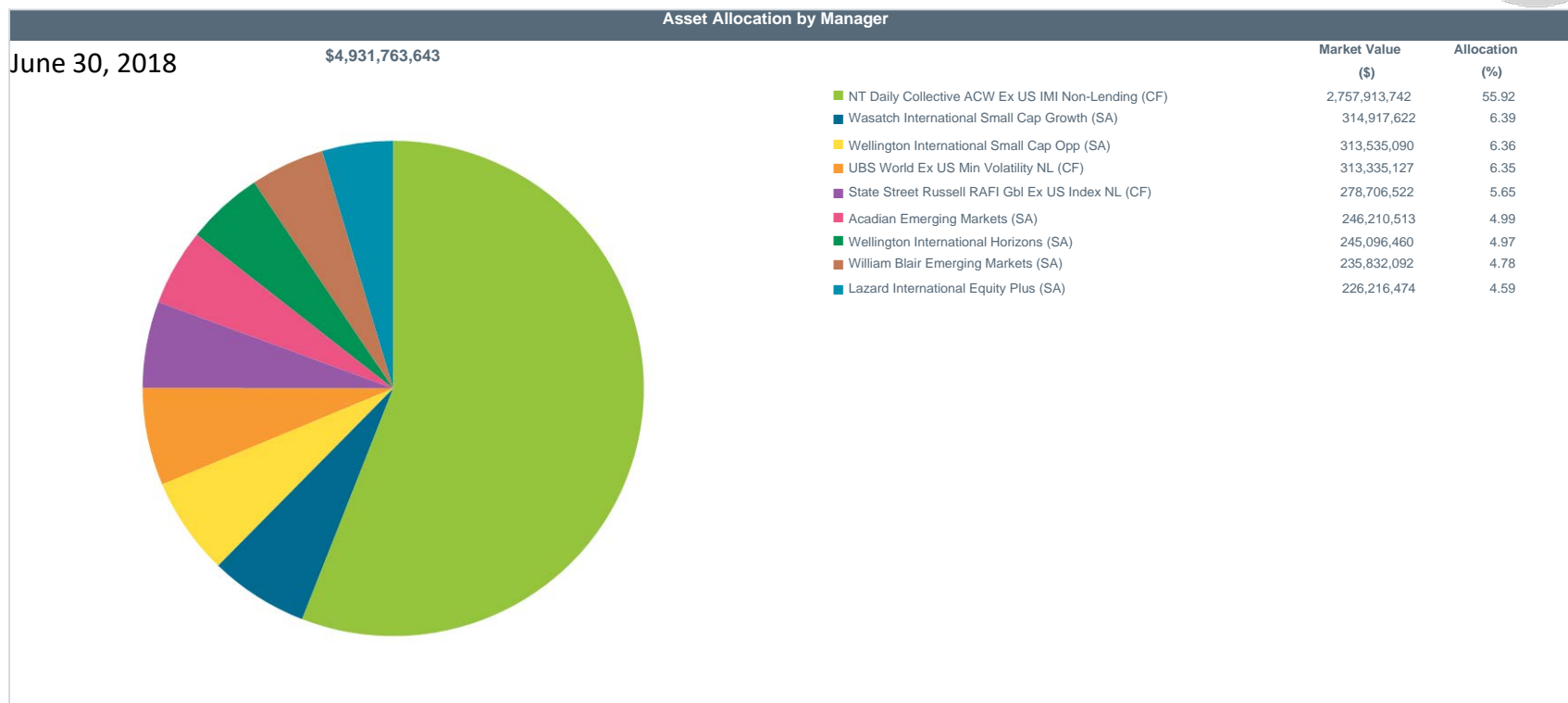
	1 Quarter	Year To Date	1 Year	3 Years	5 Years	10 Years	2017	2016	2015	2014	2013	Since Incep.	Inception Date
Domestic Equity	3.99	3.29	14.75	11.39	13.08	10.12	20.55	13.33	-0.32	12.61	33.20	9.13	02/01/2008
Russell 3000 Index	3.89	3.22	14.78	11.58	13.29	10.23	21.13	12.74	0.48	12.56	33.55	9.23	
Difference	0.10	0.07	-0.03	-0.19	-0.21	-0.11	-0.58	0.59	-0.80	0.05	-0.35	-0.10	

Performance shown is gross of fees. Allocations shown may not sum up to 100% exactly due to rounding. Total Domestic Equity market value excludes Citigroup Global Markets, Inc.





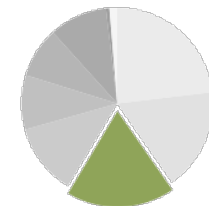
# International Equity Composite Performance and Allocation



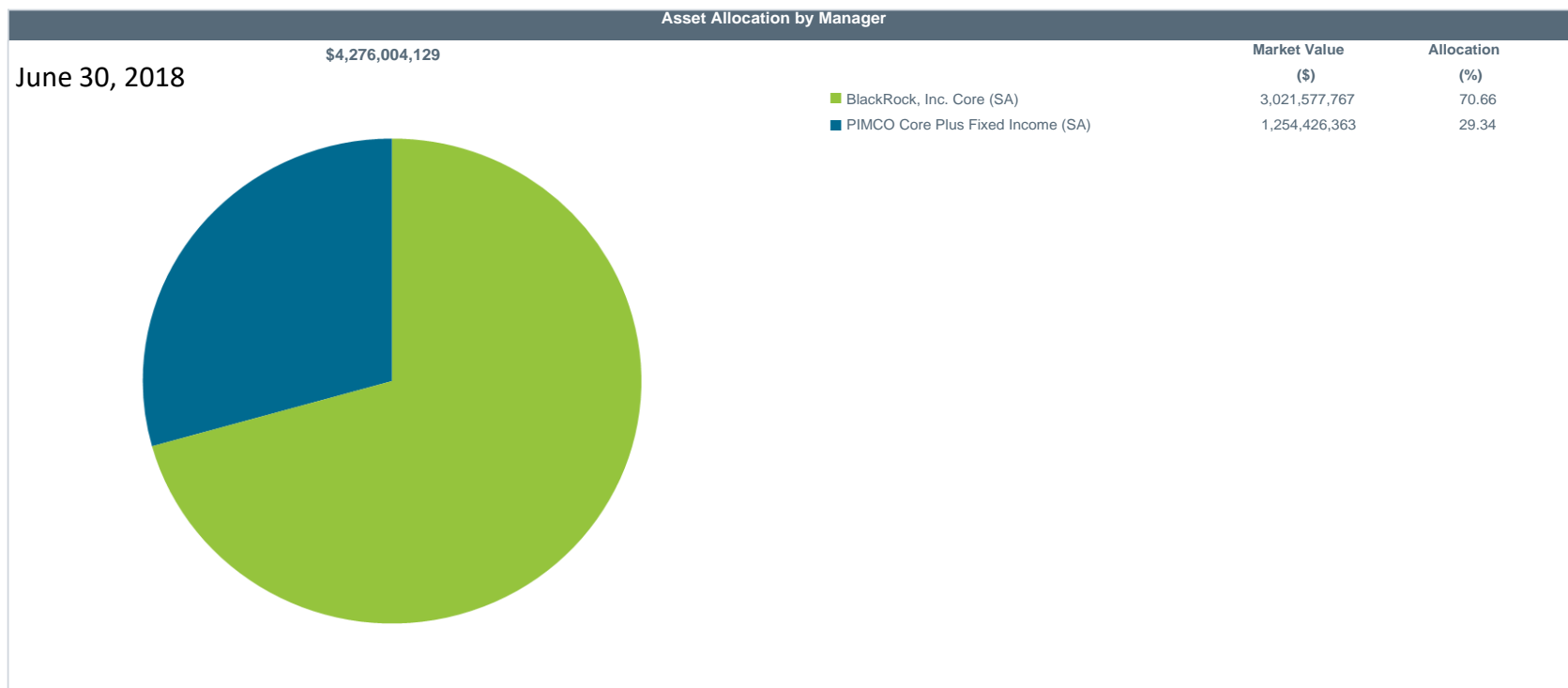
**Comparative Performance**

	1 Quarter	Year To Date	1 Year	3 Years	5 Years	10 Years	2017	2016	2015	2014	2013	Since Incep.	Inception Date
International Equity	-3.02	-2.64	9.27	6.39	7.19	2.79	29.41	3.72	-3.32	-3.11	16.31	2.52	02/01/2008
International Equity Benchmark	-2.61	-3.65	7.75	5.46	6.39	2.27	27.81	4.41	-4.60	-3.89	15.82	1.99	
Difference	-0.41	1.01	1.52	0.93	0.80	0.52	1.60	-0.69	1.28	0.78	0.49	0.53	

Performance shown is gross of fees. Allocations shown may not sum up to 100% exactly due to rounding. Please see Supplemental Information for custom benchmark definitions.



# Core Fixed Income Composite Performance and Allocation

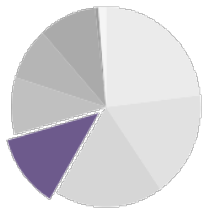


**Comparative Performance**

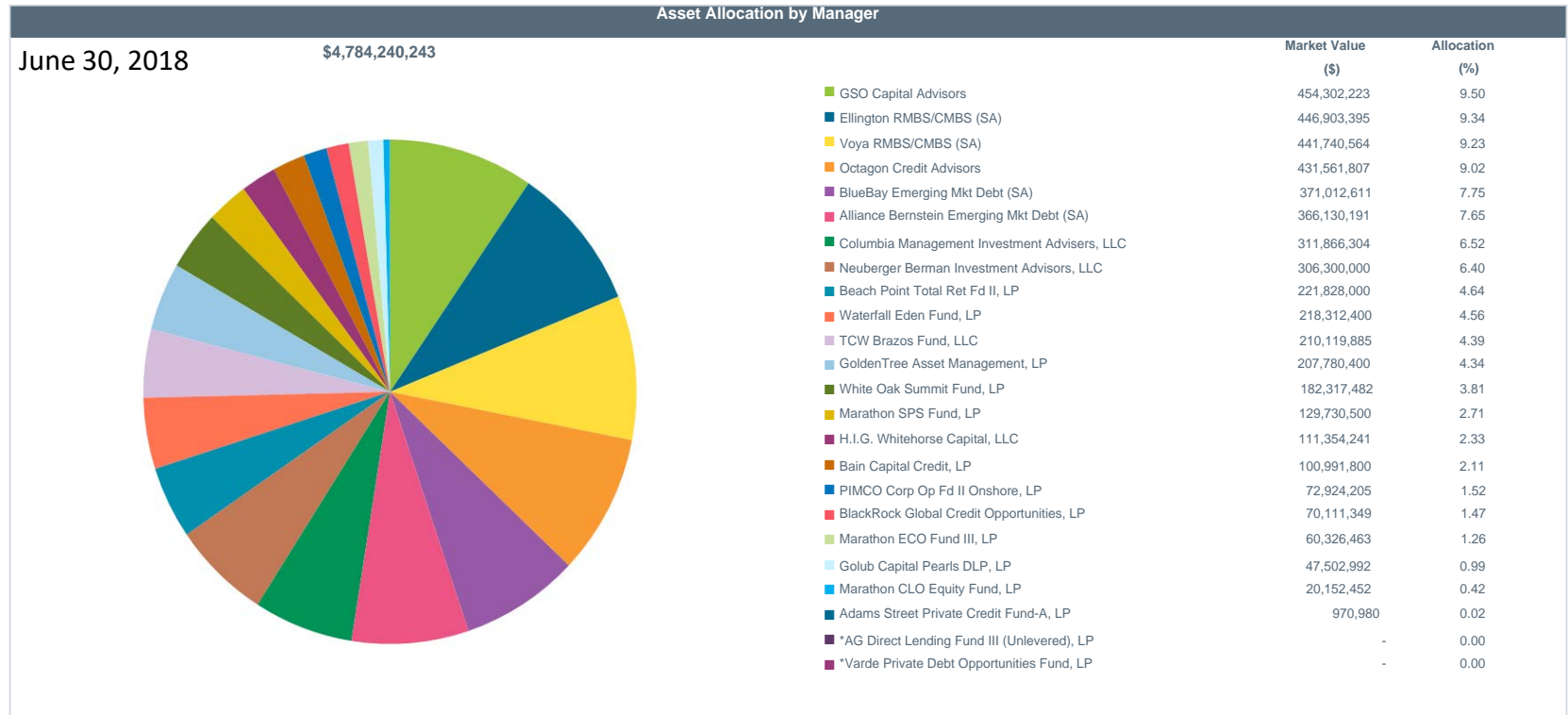
	1 Quarter	Year To Date	1 Year	3 Years	5 Years	10 Years	2017	2016	2015	2014	2013	Since Incep.	Inception Date
Core Fixed Income	0.01	-1.41	0.02	1.98	2.48	3.83	3.93	2.98	0.80	5.77	-1.94	7.52	01/01/1989
Fixed Income Benchmark	-0.16	-1.62	-0.40	1.72	2.27	3.65	3.54	2.65	0.55	5.97	-2.02	6.95	
Difference	0.17	0.21	0.42	0.26	0.21	0.18	0.39	0.33	0.25	-0.20	0.08	0.57	

Performance shown is gross of fees. Allocations shown may not sum up to 100% exactly due to rounding. Please see Supplemental Information for custom benchmark definitions.



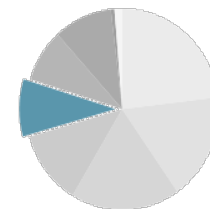


# Non-Core Fixed Income Composite Performance & Allocation

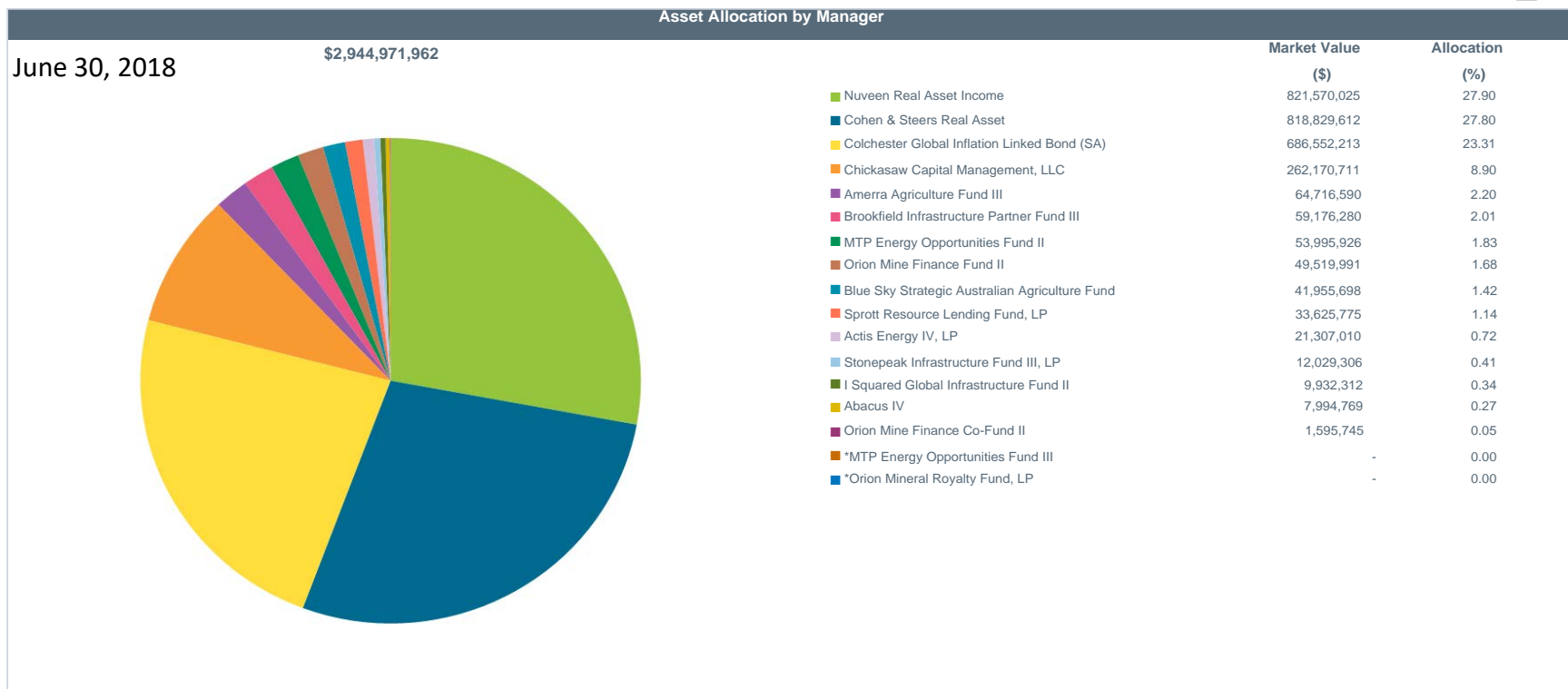


Comparative Performance													
	1 Quarter	Year To Date	1 Year	3 Years	5 Years	10 Years	2017	2016	2015	2014	2013	Since Incep.	Inception Date
Non-Core Fixed Income	0.05	1.48	4.61	5.39	N/A	N/A	8.06	7.96	1.09	N/A	N/A	5.13	10/01/2014
Non-Core Fixed Income Benchmark	0.05	1.18	3.52	3.65	N/A	N/A	5.54	7.14	-0.87	N/A	N/A	3.62	
Difference	0.00	0.30	1.09	1.74	N/A	N/A	2.52	0.82	1.96	N/A	N/A	1.51	

Performance shown is gross of fees. Allocations shown may not sum up to 100% exactly due to rounding. Please see Supplemental Information for custom benchmark definitions. \*Represents approved investments that have not been funded and/or are pending legal documents.



# Real Return Composite Performance and Allocation

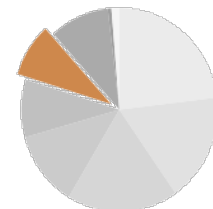


**Comparative Performance**

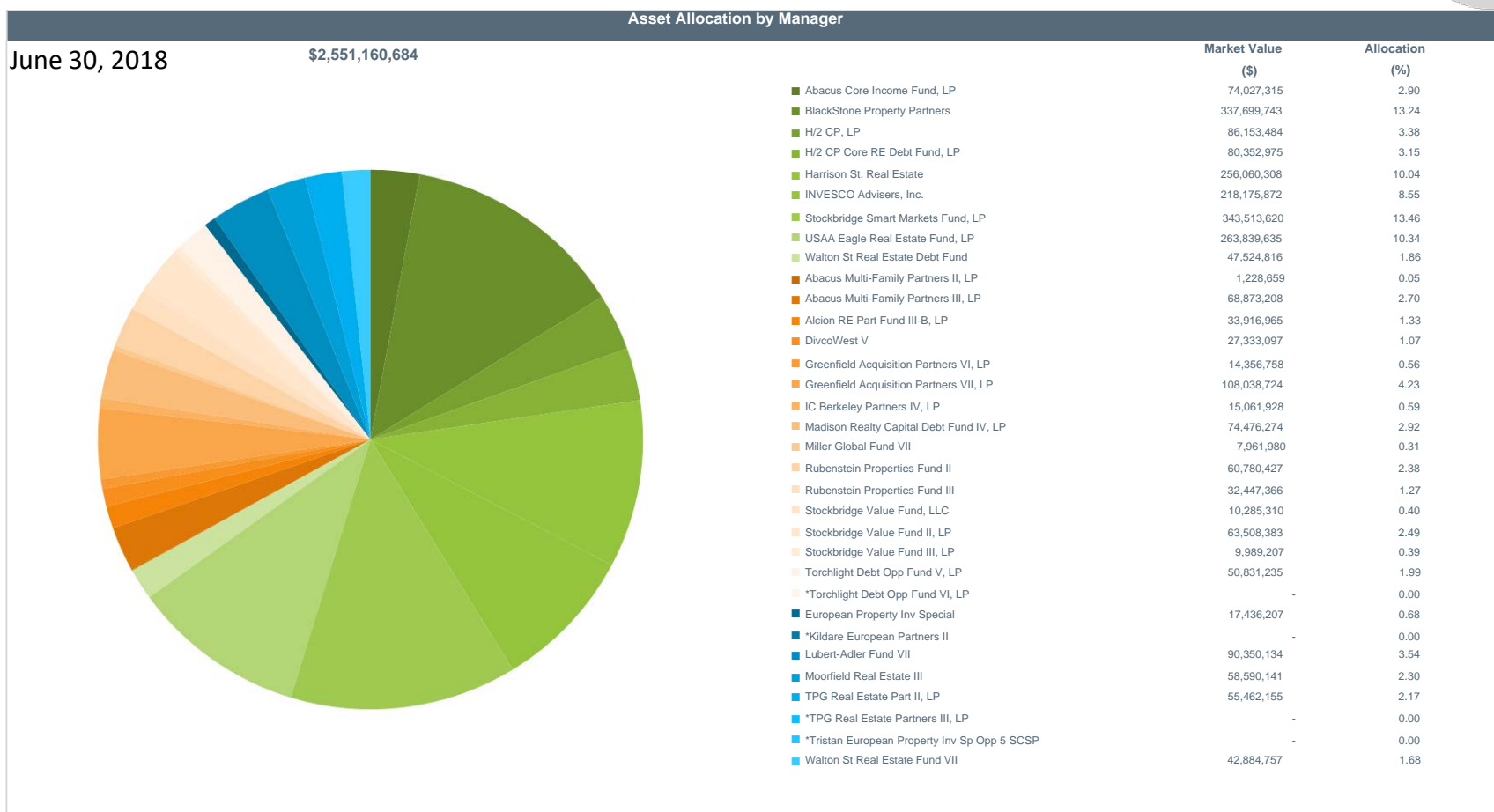
	1 Quarter	Year To Date	1 Year	3 Years	5 Years	10 Years	2017	2016	2015	2014	2013	Since Incep.	Inception Date
Real Return	1.65	-0.16	4.82	3.51	3.15	N/A	8.32	6.99	-5.55	4.44	-4.06	3.60	02/01/2011
Real Return Benchmark	1.73	-0.07	5.16	4.42	3.76	3.03	9.91	7.51	-4.70	4.08	-4.84	3.72	
Difference	-0.08	-0.09	-0.34	-0.91	-0.61	N/A	-1.59	-0.52	-0.85	0.36	0.78	-0.12	

Performance shown is gross of fees. Allocations shown may not sum up to 100% exactly due to rounding. Please see Supplemental Information for custom benchmark definitions. \*Represents approved investments that have not been funded and/or are pending legal documents.





# Real Estate Composite Allocation

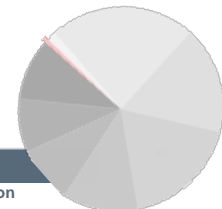


**Comparative Performance**

	1 Quarter	Year To Date	1 Year	3 Years	5 Years	10 Years	2017	2016	2015	2014	2013	Since Incep.	Inception Date
Real Estate	2.35	5.00	10.86	14.12	14.29	N/A	11.93	14.76	15.25	20.35	11.69	13.14	01/01/2012
Real Estate Benchmark	2.19	4.31	8.08	9.95	11.42	5.11	7.65	9.97	15.00	12.40	13.04	11.37	
Difference	0.16	0.69	2.78	4.17	2.87	N/A	4.28	4.79	0.25	7.95	-1.35	1.77	

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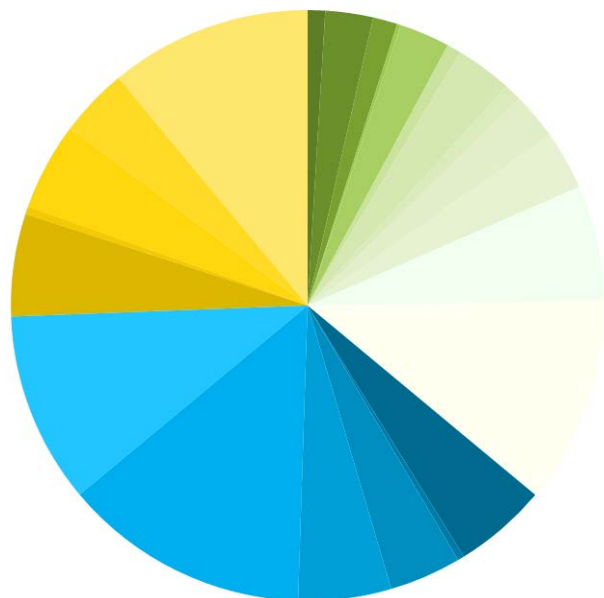
# Private Equity Performance and Allocation



## Asset Allocation by Manager

June 30, 2018

\$404,064,523

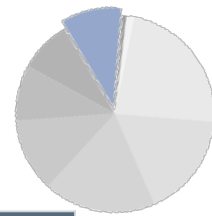


	Market Value (\$)	Allocation (%)
Altaris Constellation Partners IV, LP	3,851,071	0.95
Altaris Health Partners IV, LP	10,518,566	2.60
Capital Partners Private Equity Income Fund III, LP	5,375,858	1.33
*CapVest Equity Partners IV SCSp	-	0.00
*Dunes Point Capital Fund II, LP	-	0.00
GTCR Fund XII, LP	799,164	0.20
Harvest Partners VII	11,127,339	2.75
*H.I.G. Strategic Partners Fund	-	0.00
Incline Equity IV	3,086,035	0.76
Kainos Capital Partners II	12,512,449	3.10
Marlin Heritage II, LP	3,757,105	0.93
Marlin Equity V, LP	10,420,021	2.58
One Rock Capital Partners II, LP	12,971,153	3.21
*Providence Equity Partners VIII, LP	-	0.00
Searchlight Capital II	25,359,143	6.28
Tritium I, LP	45,989,518	11.38
Foundry Group Next Fund, LP	20,562,729	5.09
Foundry Group Next 2018, LP	1,462,500	0.36
FTV V	15,842,030	3.92
Mercato Partners Growth III, LP	20,447,548	5.06
Providence Strategic Growth II	54,297,952	13.44
*Providence Strategic Growth III, LP	-	0.00
Update Partners V, LP	42,256,203	10.46
Carlyle Energy Mezzanine Fund II	22,665,119	5.61
GSO COF III Co-investment Fund, LP	1,693,491	0.42
GSO Capital Opportunities Fund III, LP	19,385,543	4.80
H.I.G. Bayside Fund IV	15,245,253	3.77
*LightBay Investment Partners, LP	-	0.00
*TPG Opportunities Partners IV, LP	-	0.00
TSSP Adjacent Opportunities Fund III	44,438,733	11.00
*TSSP Adjacent Opportunities (D), LP	-	0.00

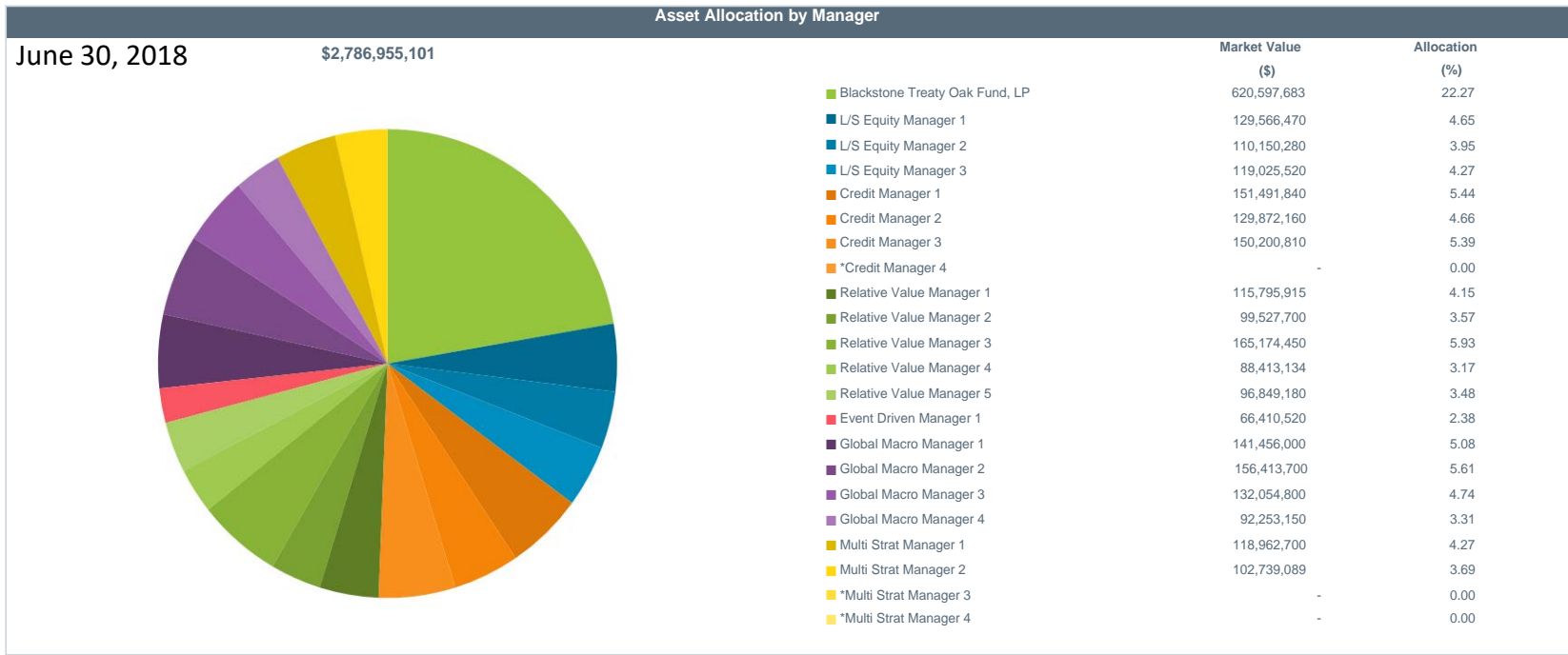
## Comparative Performance

	1 Quarter	Year To Date	1 Year	3 Years	5 Years	10 Years	2017	2016	2015	2014	2013	Since Incep.	Inception Date
Private Equity	10.33	23.31	35.00	N/A	N/A	N/A	19.69	1.68	N/A	N/A	N/A	17.02	12/01/2015
Private Equity - Buy Out	6.92	21.51	25.61	N/A	N/A	N/A	7.09	23.91	N/A	N/A	N/A	21.06	01/01/2016
Private Equity - Venture/Growth	16.83	30.15	57.42	N/A	N/A	N/A	34.71	N/A	N/A	N/A	N/A	22.24	07/01/2016
Private Equity - Special Situations	2.52	9.80	12.13	N/A	N/A	N/A	12.52	N/A	N/A	N/A	N/A	9.42	03/01/2016

Performance shown is gross of fees. Allocations shown may not sum up to 100% exactly due to rounding. \*Represents approved investments that have not been funded and/or are pending legal documents.



# Absolute Return Performance and Allocation



**Comparative Performance**

	1 Quarter	Year To Date	1 Year	3 Years	5 Years	10 Years	2017	2016	2015	2014	2013	Since Incep.	Inception Date
<b>Absolute Return</b>	0.97	2.39	7.09	5.21	N/A	N/A	11.35	2.97	3.39	N/A	N/A	5.30	08/01/2014
Absolute Return Benchmark	0.43	1.90	5.26	1.48	3.10	1.39	7.11	-1.34	0.79	4.72	8.61	2.40	
Difference	0.54	0.49	1.83	3.73	N/A	N/A	4.24	4.31	2.60	N/A	N/A	2.90	
<b>Blackstone Treaty Oak Fund, LP</b>	1.70	2.59	6.03	3.88	N/A	N/A	6.91	3.04	3.39	N/A	N/A	4.28	08/01/2014
Absolute Return Benchmark	0.43	1.90	5.26	1.48	3.10	1.39	7.11	-1.34	0.79	4.72	8.61	2.40	
Difference	1.27	0.69	0.77	2.40	N/A	N/A	-0.20	4.38	2.60	N/A	N/A	1.88	
<b>Absolute Return Direct Composite</b>	0.76	2.33	7.39	N/A	N/A	N/A	13.21	2.65	N/A	N/A	N/A	7.18	01/01/2016
Absolute Return Benchmark	0.43	1.90	5.26	1.48	3.10	1.39	7.11	-1.34	0.79	4.72	8.61	3.00	
Difference	0.33	0.43	2.13	N/A	N/A	N/A	6.10	3.99	N/A	N/A	N/A	4.18	

Performance shown is gross of fees. Allocations shown may not sum up to 100% exactly due to rounding. Please see Supplemental Information for custom benchmark definitions. \*Represents approved investments that have not been funded and/or are pending legal documents.

# Other Important Notes

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- Compliance
- Risk
- Audit
  - Internal
  - External

# QUESTIONS

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# DISCLOSURES

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