

PENNSYLVANIA SERS



**REAL ESTATE SEMI-ANNUAL
PERFORMANCE REVIEW (4Q17)**

July 25, 2018



BOSTON | ATLANTA | CHARLOTTE | CHICAGO | DETROIT | LAS VEGAS | PORTLAND | SAN FRANCISCO

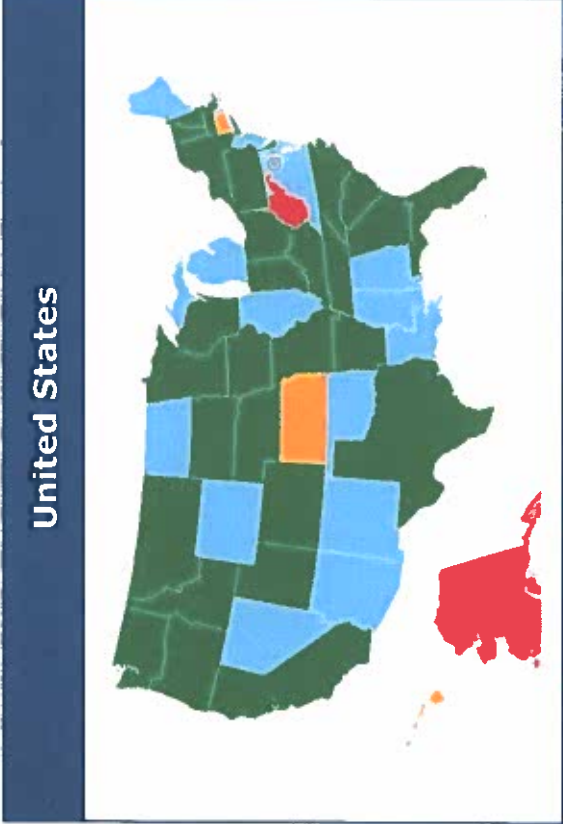
TABLE OF CONTENTS

Presentation:	
1. Real Estate Market Update	4
2. Real Estate Semi-Annual Performance Report	14
3. Real Estate Portfolio Construction	21
4. Tactical Portfolio Shift: Core to Core+	30
5. Implementation Preview: Core Reduction	34
Appendix	
1. Investment Level Performance	43
2. Alternative Investment Disclaimer	47

1. REAL ESTATE MARKET UPDATE

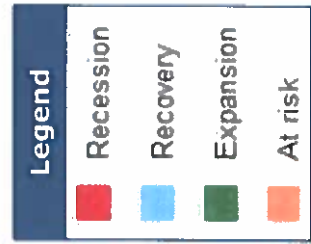
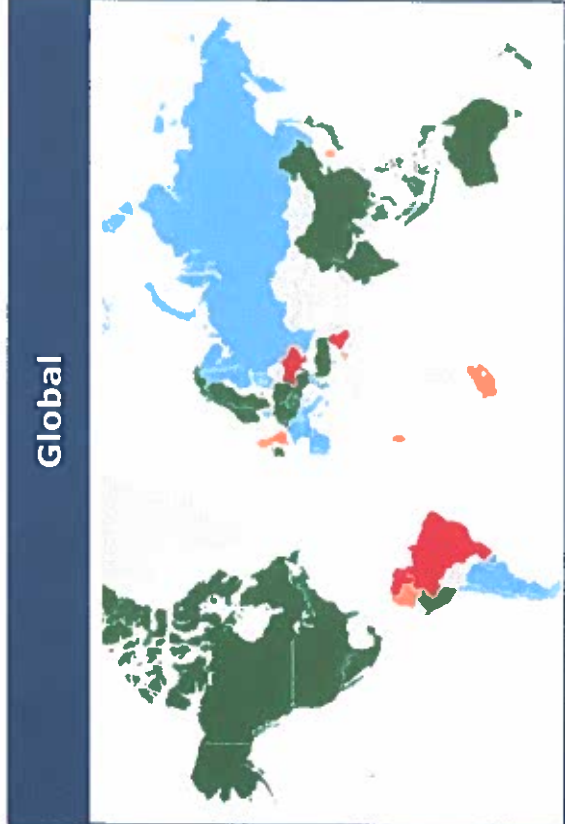
NEPC, LLC

STATUS OF GLOBAL ECONOMIES



Encouraging Fundamentals for Real Estate

- **Healthy domestic and international economic conditions**
- **Most states in US experiencing growth**
 - Recovery underway in energy-based states
- **Global economies are generally healthy**
 - Asia, Europe and North America broadly in expansion
- **Strong economic conditions are a positive signal for real estate**
- **Certain areas remain challenged**
 - Distressed opportunities may form
- **Geopolitical risk gives pause**



Source: Moody's Analytics, AEW

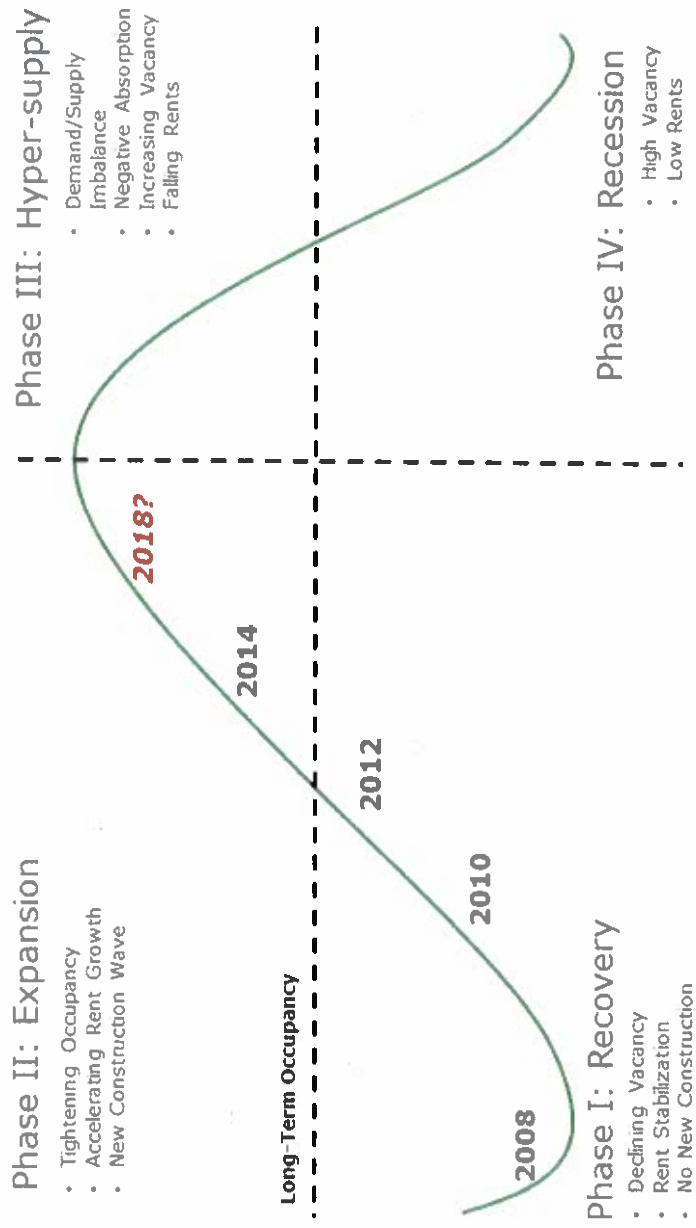


US REAL ESTATE MARKET CYCLE REVIEW

Strong Fundamentals Persist

- Expansion phase continues...2018 likely closer to peak than trough
- Over-supply not yet evident
- Income and capital markets will drive valuations in the near-term

Real Estate Cycle Will Eventually Impact Future Returns

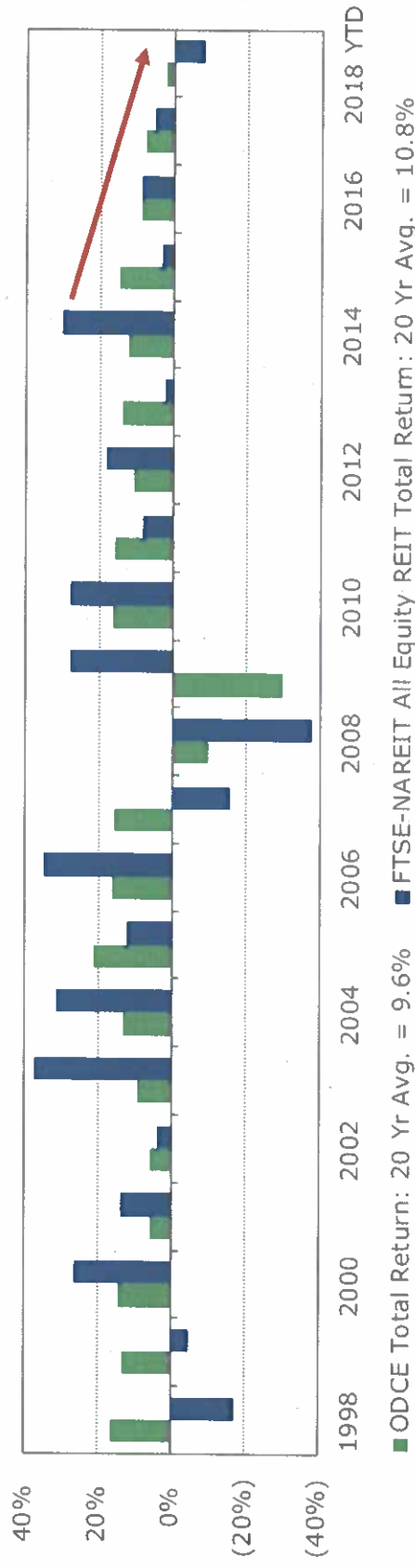


US CORE REAL ESTATE SNAPSHOT

Core/REIT Returns Normalizing

- **Trailing returns robust but normalizing**
 - Trailing 5-year average returns of 11.6% for the ODCE and 10% for the FTSE NAREIT Index
 - Trailing 1-year trailing gross returns of 7.7% for private core and 2.6% gross for REITS
- **Cap rate compression slowing**
 - Robust capital appreciation has driven above-average core returns since GFC
- **5-7 year core returns expectations below historical averages**
 - Property fundamentals and healthy capital markets are positive for market going forward
 - Highly competitive market coupled with high valuations creates concerns regarding cap rate expansion should rates rise quickly placing downward pressure on valuations
- **Areas for incremental income growth to outpace market going forward**

Core Real Estate Returns Slowing (Private & Public)

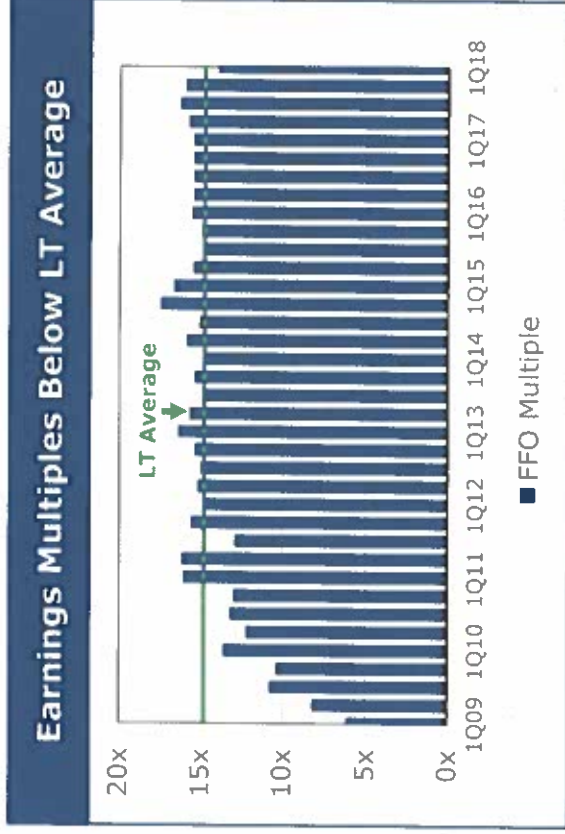
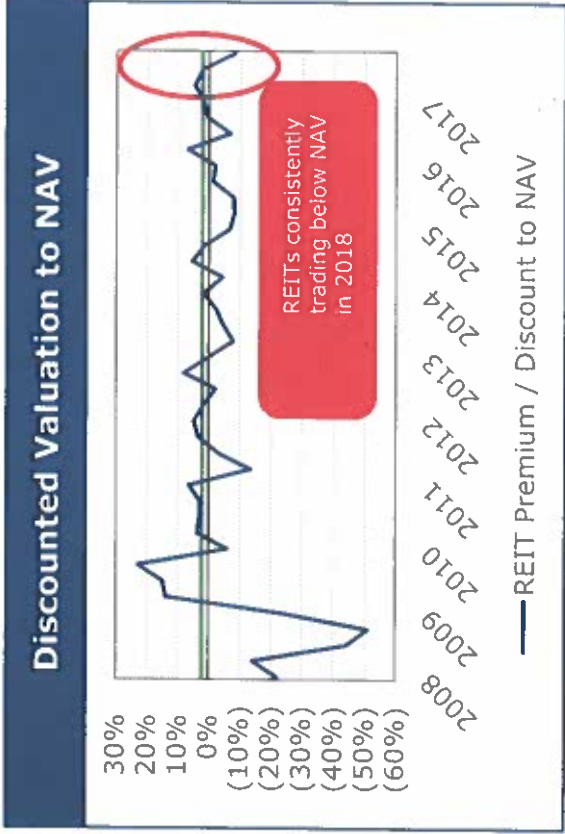


Source: NCREIF, Bloomberg; data as of March 31, 2018.

US REIT MARKET VALUATION UPDATE

REITs Inexpensive on Various Valuation Metrics

- **REITs trading at discount relative to NAV**
 - REITs have consistently traded below NAV in 2018, due to Q1 price declines
 - Wide dispersion among underlying sectors
- **FFO multiples depressed but relatively stable**
 - FFO multiple analogous to P/E multiples
 - May indicate high future return expectations... or relative attractiveness to other assets
 - Non-core sectors may have more multiple expansion remaining
- **Higher short-term volatility possible**
 - REITs perform like private core over longer periods of time but will exhibit more volatility, particularly as equity market volatility increases



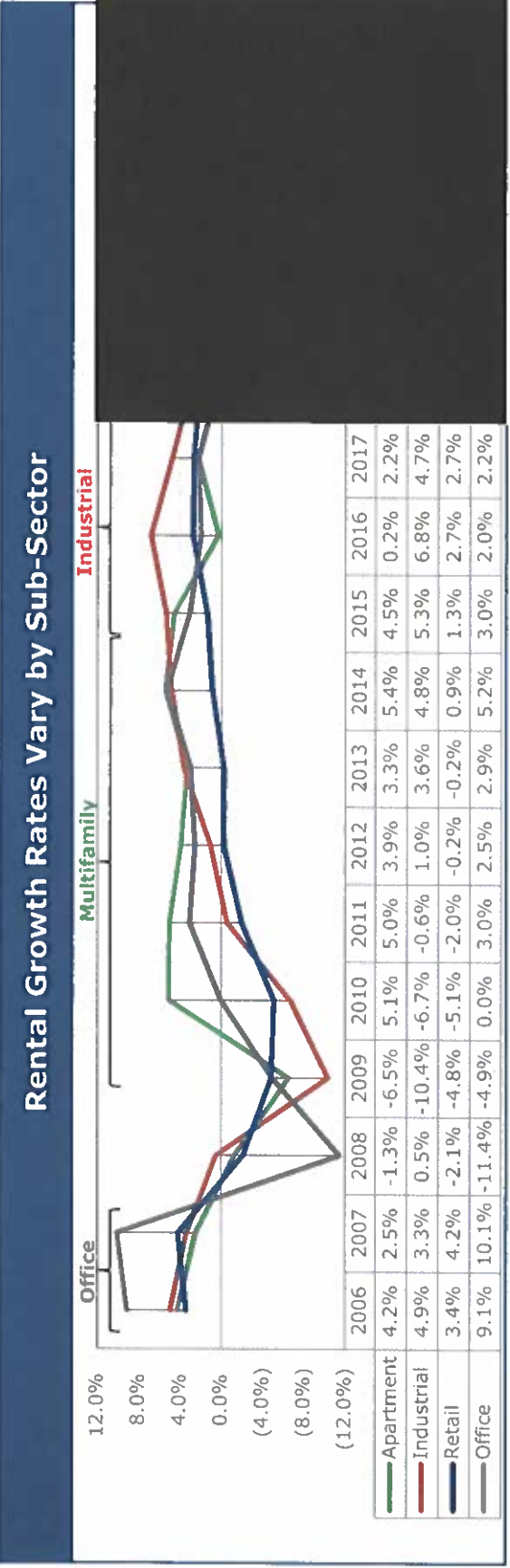
Source: Wells Fargo Securities; data as of April 13, 2018.



DIVERSIFICATION RECOMMENDED

Sector Performance Varies During Cycle

- **Diversified approach towards cyclical asset class**
 - Allows portfolio to benefit from opportunities presented in different parts of market as cycle shifts
- **Apartment returns may moderate**
 - Robust rental income growth in recent years to moderate due to new supply
- **Retail steady with potential for repositioning**
 - Lagging trailing returns but strong rent growth projected as economy improves and less supply comes online while existing assets are repositioned
- **Industrial is highly sought after**
 - Last mile industrial highly sought after in new economy (Amazon effect)



Source: CBRE Econometrics, NEPC Analysis; as of June 30, 2017.

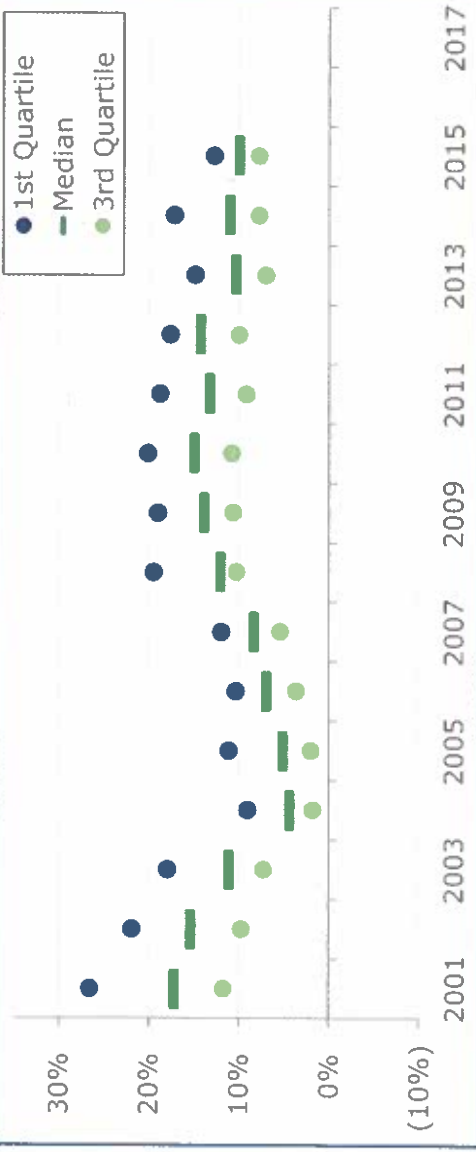


FUNDRAISING AND PERFORMANCE SNAPSHOT

Strong Investor Demand

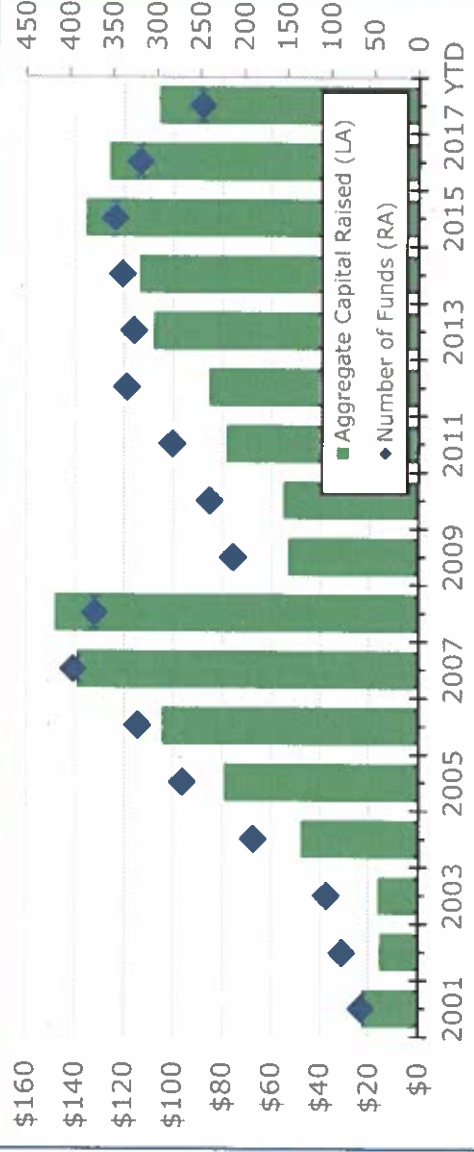
- **Post-GFC funds generating strong performance**
- **Recovery in Pre-GFC Funds**
 - 2005-2007 median funds returning capital to investors, in excess of cost

Private Fund Returns Remain Strong



- **Fundraising levels remain strong**
 - 2017 on pace to be largest fundraising year since 2008

Global Value-Add/Opportunistic Fundraising Robust



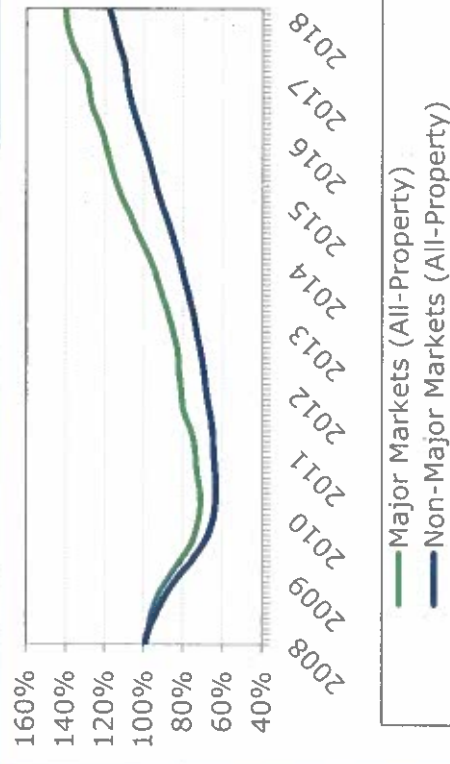
Source: Preqin and Thomson One. Data as of September 30, 2017.
 Note: Performance excluded for vintage years 2016-2017 as not meaningful.

PRIMARY VS SECONDARY MARKET SNAPSHOT

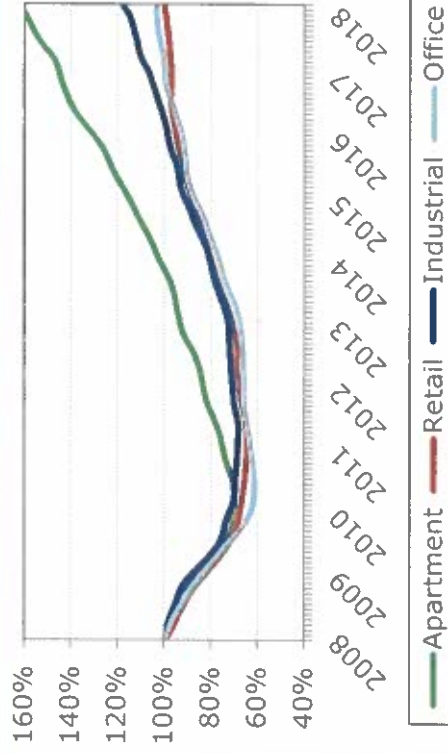
Non-Core Opportunities Remain

- **Institutional capital focus on major markets continues**
 - Major market asset prices approximately 40% above 2007 peak
- **Secondary market recovery trailing but still strong**
- **Non-core opportunities remain for managers that can reposition or renovate and sell stable yield**

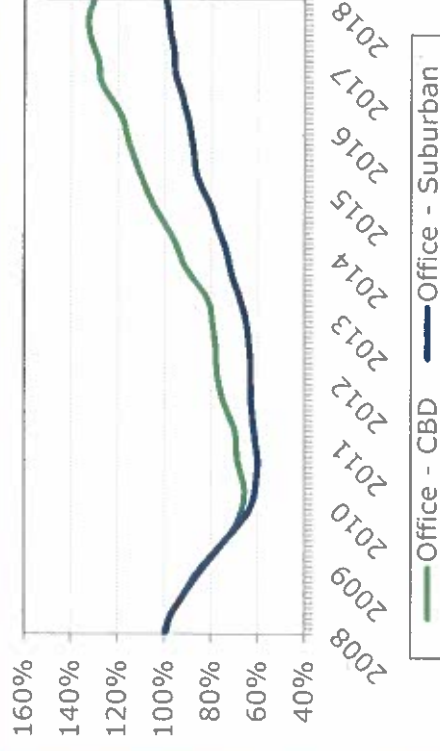
Broad Asset Price Recovery



Dispersion Among Property Types



CBD Office vs Suburban Office

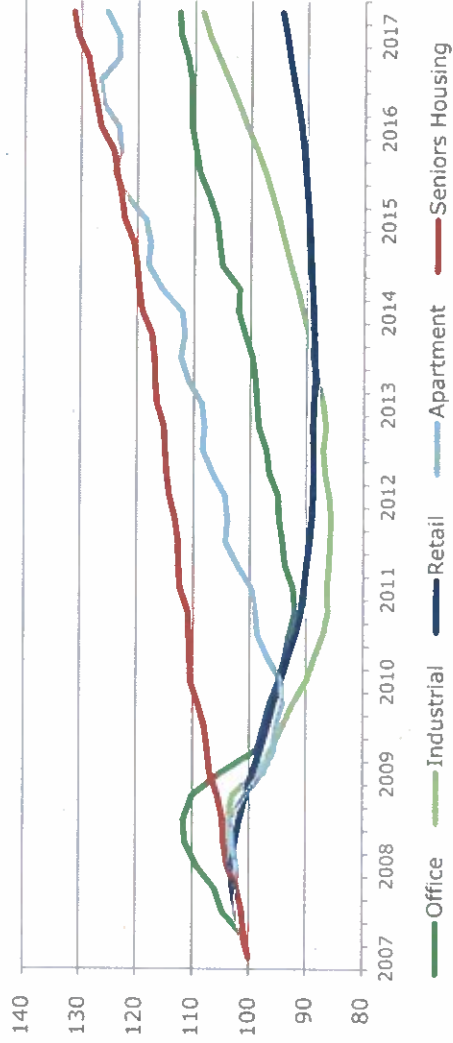


NON-CORE OPPORTUNITY OVERVIEW

Demographics Matter

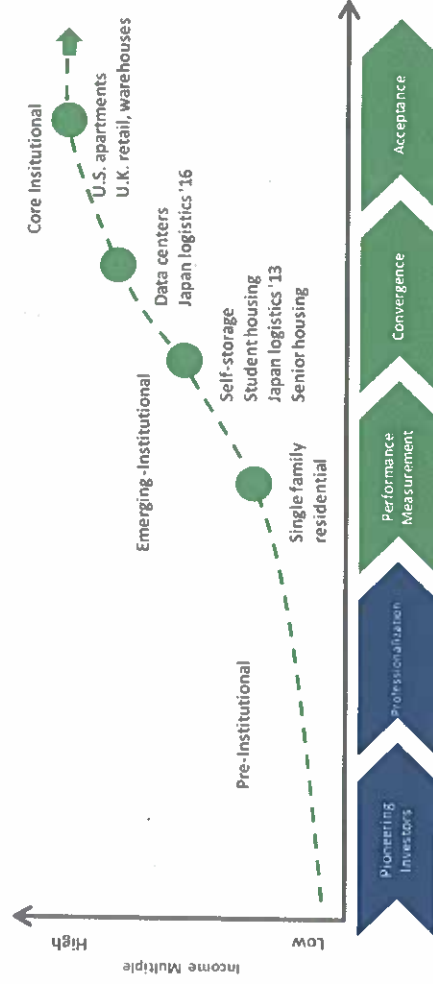
- **Most sectors are cyclical**
- **Demographic-driven sectors are less GDP-sensitive**
 - Senior housing and multifamily tends to protect downside during market corrections better GDP-driven sectors (office, retail, industrial)

Rent Index



- **“Emerging” asset classes have higher return potential and diversification benefits**
 - Cap rate compression possible as institutional flows grow
 - Property types include: self storage, student housing, senior housing, and medical office

“Emerging” Property Types

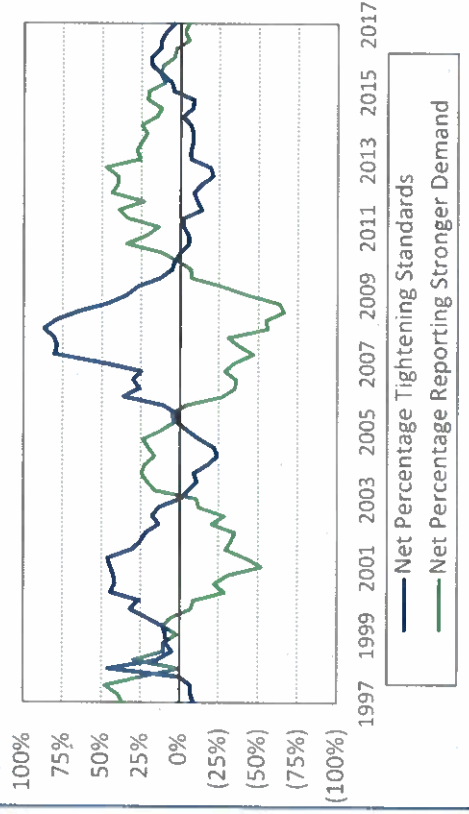


REAL ESTATE LENDING SNAPSHOT

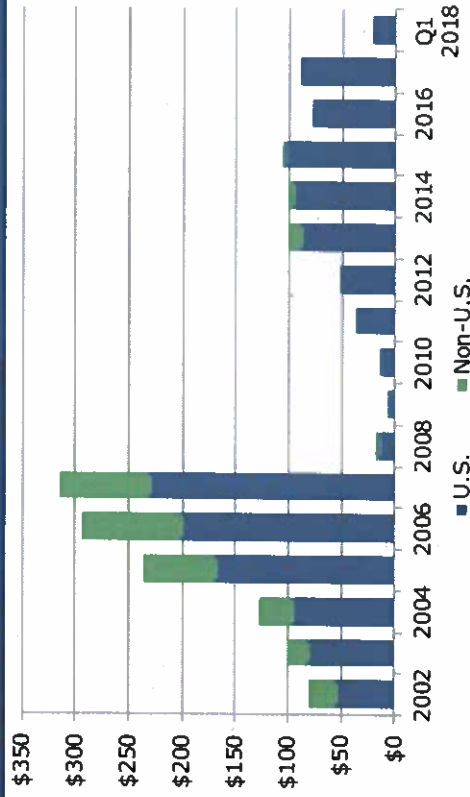
Lending Environment Healthy

- **Positive net lending to US real estate**
- **Private debt filling gap**
 - CMBS issuance 60% below 2007 peak
- **Credit standards remain healthy**
 - Especially for development projects
- **CRE loan maturities peaked**
 - Remains elevated (\$300B/year) to 2019

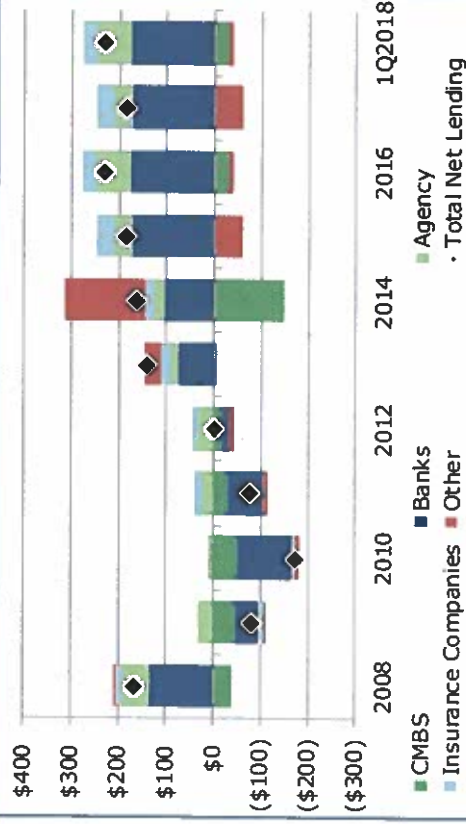
Lending Standards Remain High



CMBS Issuance Remains Muted...



...But Net Lending Remains Positive



Source: Federal Reserve, CMBS Alert; data as of March 31, 2018. Lending standards as of September 30, 2017.

**2. REAL ESTATE SEMI-ANNUAL
PERFORMANCE REPORT (AS OF
DECEMBER 31, 2017)**

NEPC, LLC

PORTFOLIO PERFORMANCE SUMMARY

The following table illustrates Pennsylvania State Employees Retirement System's Real Estate Portfolio Performance as of December 31, 2017.

- The Plan's real estate portfolio yielded total (net) return of 4.5% for trailing one-year.
 - Excluding Lowe/GTO/Timber separate accounts, the Plan yielded total (net) return of 6.0% for the trailing one-year.
- The Plan's Real Estate Performance is benchmarked against the NCREIF-ODCE Index (pool of open-end core funds) and ThomsonOne Benchmark (pool of closed-end value-add/opportunity funds), the two most widely used indices for real estate benchmarking.
- The S&P 500 Index reflects one measure of opportunity cost of investing in real estate versus publicly traded common stocks.
- Returns shown do not take into account risk/volatility of underlying strategies.

Portfolio Performance	1 Year	3 Year	5 Year	10 Year	Inception
Total: Pennsylvania State Employees Retirement System	4.5%	5.5%	8.6%	1.8%	7.2%
Total: Pennsylvania State Employees Retirement System (Excl. Lowe/GTO/Timber)	6.0%	7.5%	11.6%	3.9%	7.4%
NFI-ODCE Index¹	6.7%	9.4%	10.5%	4.1%	N/A
Thomson-One/Cambridge Real Estate Index²	13.9%	10.2%	11.9%	4.2%	N/A
S&P 500 Index	21.8%	11.4%	15.8%	8.5%	N/A

1. NFI-ODCE Index represents pooled returns of open-end comingled core funds in the ODCE Index as of December 31, 2017. Returns shown are time-weighted, net of fees.

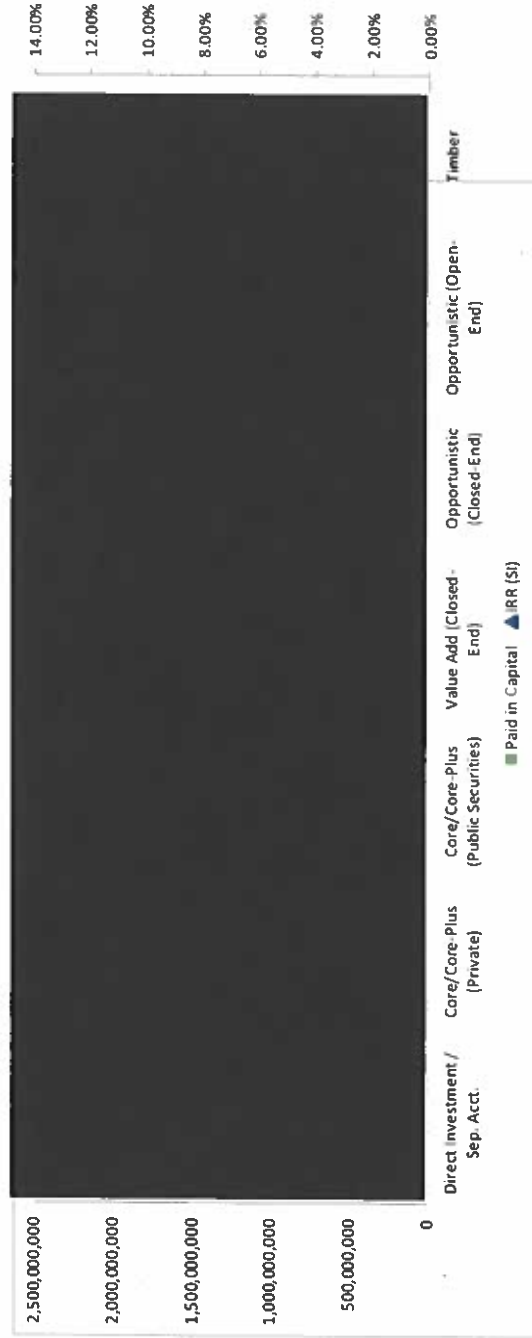
2. Thomson-One/Cambridge Benchmark represents pooled horizon internal rate of return (IRR) calculations, net of fees, across 970 real estate funds (including value-add/opportunistic) from 1986 to 2017. The timing and magnitude of fund cash flows are integral to the IRR performance. Benchmark indices that are time weighted measures should not be directly compared to dollar-weighted IRR calculations.

Note: Index data is continuously updated and is therefore subject to change.



PERFORMANCE BY INVESTMENT STRATEGY

In aggregate, current (active) investments in the portfolio, which are not fully liquidated, can be summarized in the following:



*Returns shown do not take into account risk/volatility of underlying strategies.

Investment Strategy (Active)	Commitment Amount	Paid in Capital	Capital to be Funded	Cumulative Distributions	Valuation	Total Value	Net Benefit	Call Ratio	DPI Ratio	TVPI Ratio	IRR (SI)
Total (Active Funds)	4,937,059,710	4,138,795,616	717,864,685	5,092,508,564	2,206,698,652	7,299,207,216	3,130,176,189	84%	1.22	1.75	7.06%
Total (Completed Funds)	2,080,619,792	2,030,035,191	0	3,039,461,664	0	3,039,461,664	997,480,794	100%	1.49	1.49	7.50%

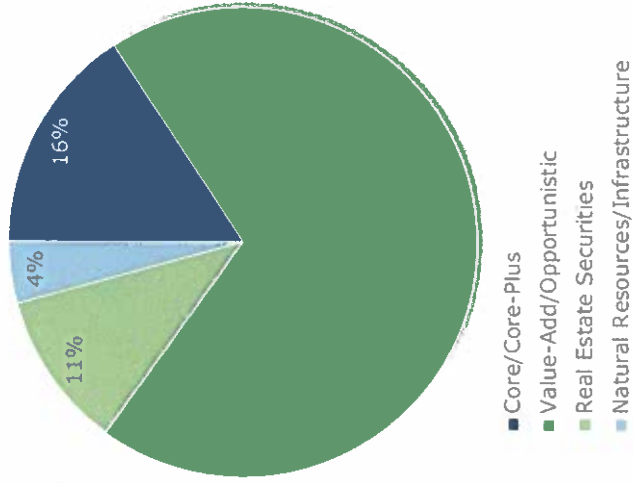
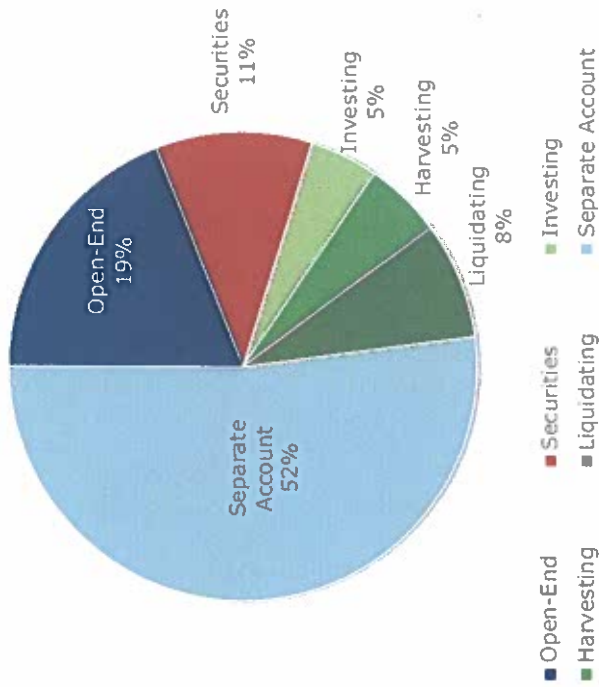
*Completed funds not shown on above graph.



Source: Data provided by managers as of December 31, 2017

PORTFOLIO COMPOSITION

PA SERS has significant concentration in Separate Accounts (52%), which will be reduced over time (with an orderly disposition plan).



Stage	Commitment	Called Capital	Call Ratio	Unrealized Value	Realized Value	Total Value	Gain /
Total	4,937,059,711	4,138,795,616	84%	717,884,686	5,092,508,561	7,299,207,214	3,130,176,188
							1.8x
							1.2x
							0.5x

Source: Data provided by managers as of December 31, 2017

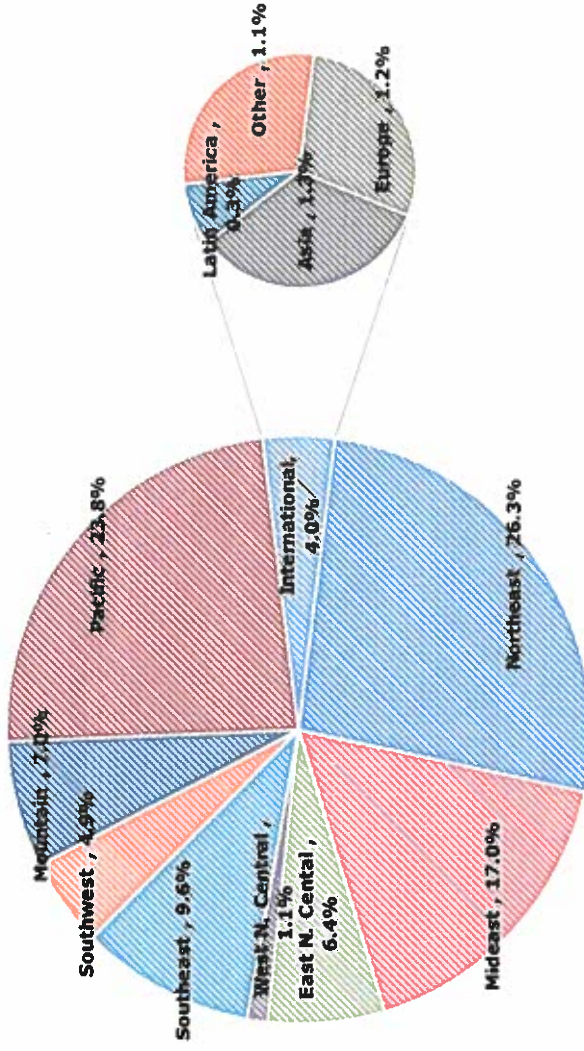


PORTFOLIO DIVERSIFICATION

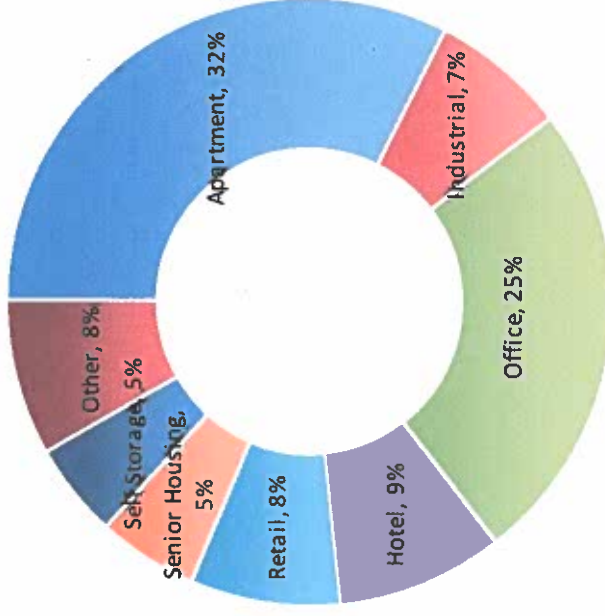
PA SERS is broadly diversified by property type and geography, although there is heavy concentration to the U.S. geographic regions.

The Plan should build towards additional international exposure to benefit from less correlated real estate cycles between U.S., Europe, and Asia.

Geography



Property Type



HISTORICAL PERFORMANCE BY VINTAGE

The following graph illustrates investment performance (net IRR) by vintage year as of December 31, 2017.

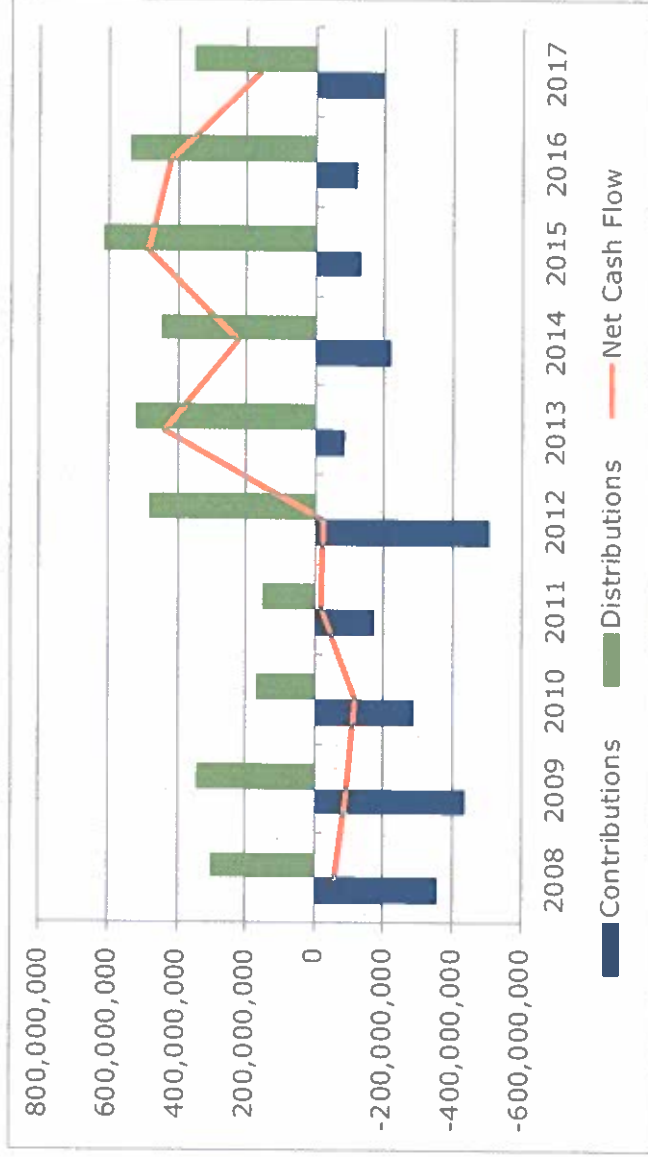
- Portfolio Performance has been negatively impacted by inconsistent pacing.
- Select years of strong (IRR) performance were mitigated by heavy capital investments in concentrated vintage years that yielded lower returns.



10-YEAR CASH FLOWS

The following graph illustrates PA SERS' cash flows over the past ten years as of December 31, 2017.

- As of December 31, 2017, the Plan received approximately \$160 million in net distributions as mature investments are liquidating from both asset sales and income distributions.
- This has partially contributed to the SERS' current underfunded net asset exposure of approx. 7.5% to real estate relative to a target allocation of 12%.



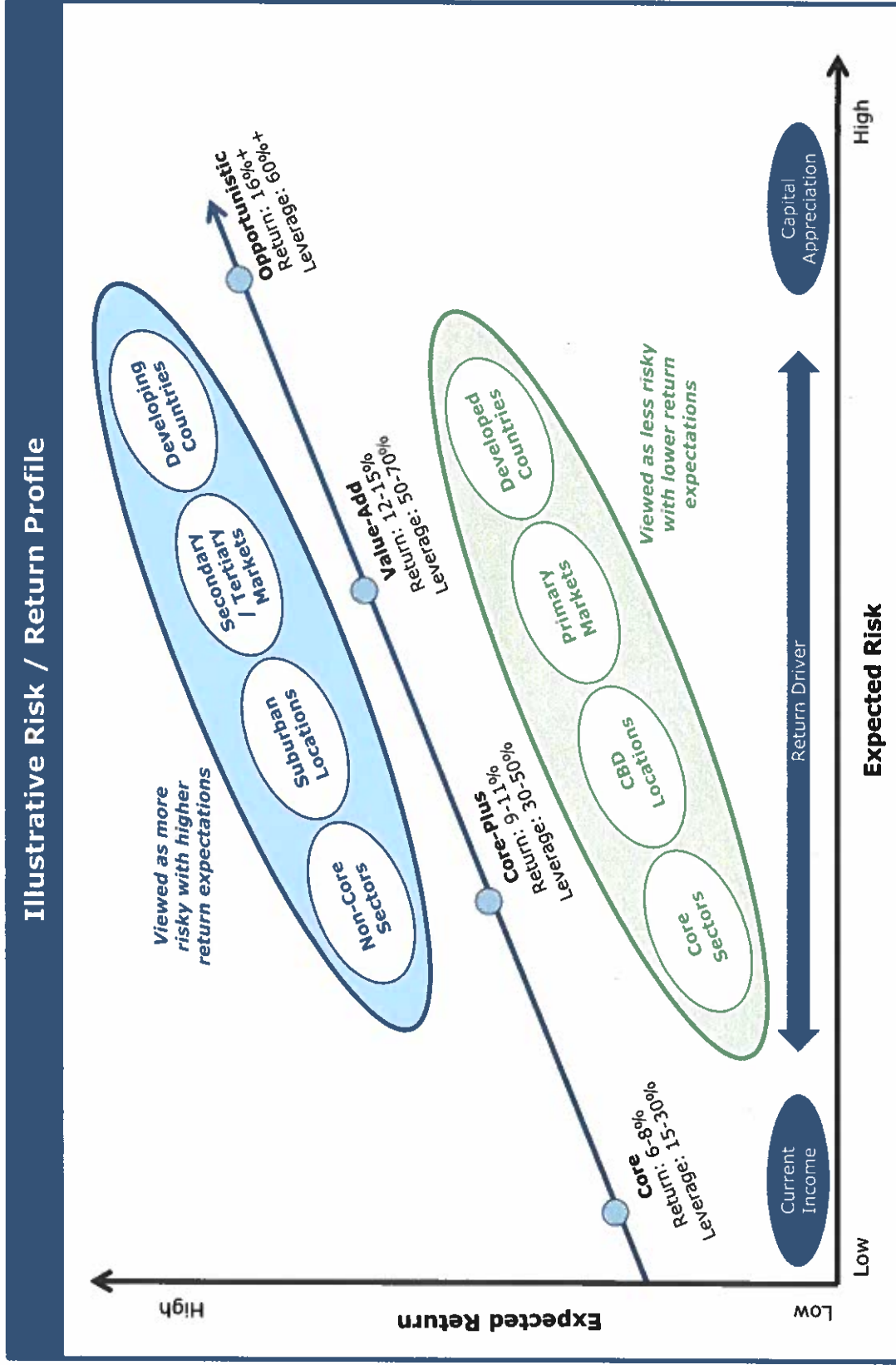
3. PORTFOLIO CONSTRUCTION (2018 PACING PLAN)

NEPC, LLC

SPECTRUM OF REAL ESTATE INVESTMENT STRATEGIES

	Real Estate Investment Style / Overview	Investment Strategy	Portfolio Role	Considerations
Core Strategies	Core / Core-Plus <ul style="list-style-type: none"> Return driver: income Primary vehicle: open-end funds Historical avg. returns: 7-8% / 8%-10% Leverage: 15-40% / 40%-50% Hold period: long-term 	Stabilized income producing assets	<ul style="list-style-type: none"> Current income Broad exposure to commercial real estate (asset class beta) Inflation protection 	<ul style="list-style-type: none"> Vehicles are semi-liquid (entrance/exit queues) Limited alpha producing opportunities
	RE Securities <ul style="list-style-type: none"> Return driver: income Primary vehicle: REIT funds Historical avg. returns: 7-9% Leverage: 30-50% Hold period: long-term 	Stabilized income producing assets	<ul style="list-style-type: none"> Current income (dividends) Long-term exposure to commercial real estate (beta) Long-term inflation protection 	<ul style="list-style-type: none"> Volatility Equity correlation
Non-Core Strategies	Value-Add <ul style="list-style-type: none"> Return driver: income/appreciation Primary vehicle: varies Historical avg returns: 8-10% Leverage: 40-70% Hold period: 3-5 years 	Properties requiring lease-up, repositioning, renovation or rehabilitation	<ul style="list-style-type: none"> Provides part current income and capital appreciation Some inflation protection 	<ul style="list-style-type: none"> Vehicles are semi-liquid or illiquid Vintage year is important Higher leverage vs core Poor benchmarks
	Opportunistic <ul style="list-style-type: none"> Return driver: appreciation Primary vehicle: closed-end funds Historical avg. returns: 10-12% Leverage: 60%+ Hold period: varies 	Distressed investments, recapitalizations, development, etc.	<ul style="list-style-type: none"> Real estate alpha through capital appreciation with minimal current income 	<ul style="list-style-type: none"> Vehicles are illiquid Vintage year is important High leverage Poor benchmarks

RELATIVE EXPECTED RISK RETURN PROFILE



- Notes:
- Debt-related strategies can span the illustrative risk / return spectrum depending on the specific strategy
 - Manager-specific risk, operations and leverage can skew expected risk / return profile

PORTFOLIO CONSTRUCTION

Investment Strategy	Primary Return Driver	NEPC Model Assumed Net Return	Example Target Allocations		
			- 1 - Income Focused	- 2 - Blended Approach	- 3 - Appreciation Focused
Core/Core Plus	Income	7 - 8%	70% ± 20%	40% ± 20%	0% ± 0%
Value-Add (Inc. Sep. Acct.)	Income + Capital Appreciation	8 - 10%	5% ± 5%	15% ± 10%	50% ± 10%
Opportunistic	Capital Appreciation	10 - 12%	5% ± 5%	20% ± 10%	40% ± 10%
RE Securities	Income + Capital Appreciation	7 - 9%	10% ± 10%	10% ± 10%	10% ± 10%
Volatility / Risk Expectation			Lower	Moderate	Higher
Weighted Return Expectation (Mean Return, Net)			8.0%	8.7%	9.7%
- % of Return Expected from Income			70%	60%	30%
- % of Return Expected from Capital Appreciation			30%	40%	70%

Analysis based on 12/31/2017 plan data and 12/31/17 fund data.



GENERAL PLAN ASSUMPTIONS (FROM 2017)

General Plan Assumptions

Total Plan Assets \$29,400

Total Real Estate & Real Assets NAV \$2,246

Total Real Estate & Real Assets Capital to be Funded \$744

Total Real Estate & Real Assets Exposure \$2,990

Total Real Estate & Real Assets NAV / Total Plan Assets 7.6%

Total Real Estate & Real Assets Exposure / Total Plan Assets 10.2%

Target Real Estate & Real Assets Allocation % (Current Target) 12.0%

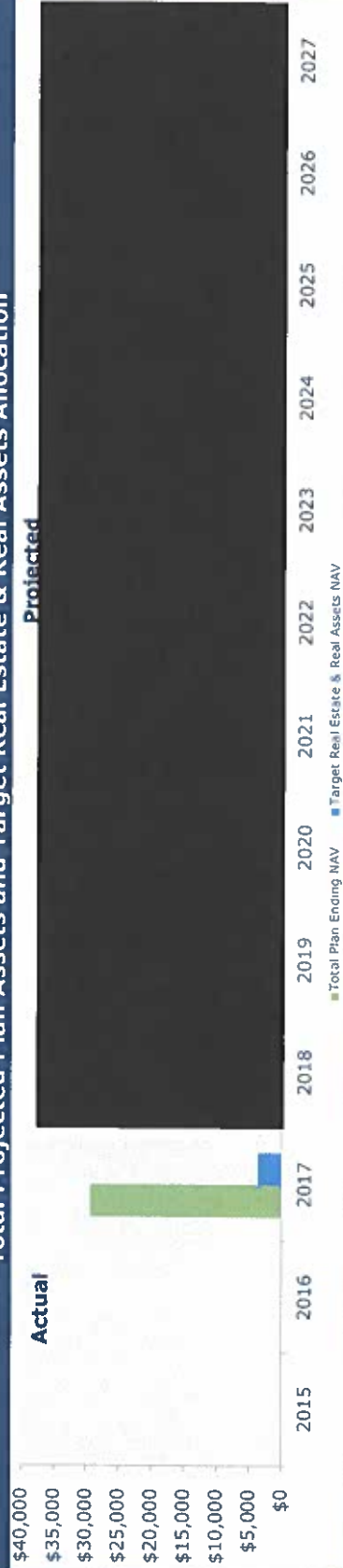


Plan-Level data as of 12/31/17
Fund-Level data as of 12/31/17

Total Projected Plan Assets

	Actual			Projected									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Total Plan Net Growth Rate	NA	NA	NA										
Total Plan Beginning NAV	\$0	\$0	\$0										
Yearly Net Growth	\$0	\$0	\$29,400										
Total Plan Ending NAV	\$0	\$0	\$29,400										
Target Real Estate & Real Assets Allocat	12.0%	12.0%	12.0%										
Target Real Estate & Real Assets NAV	\$0	\$0	\$3,528										

Total Projected Plan Assets and Target Real Estate & Real Assets Allocation



Analysis based on 12/31/2017 plan data and 12/31/17 fund data.



REAL ESTATE PLAN PROJECTIONS

- **Red line** is the target RE allocation based on projected plan total NAV; **Black dashed line** is the over-commitment.
- Goal is to keep real estate NAV (**green bar**) plus uncalled capital commitments (**blue bar**), between red line and black dashed line.



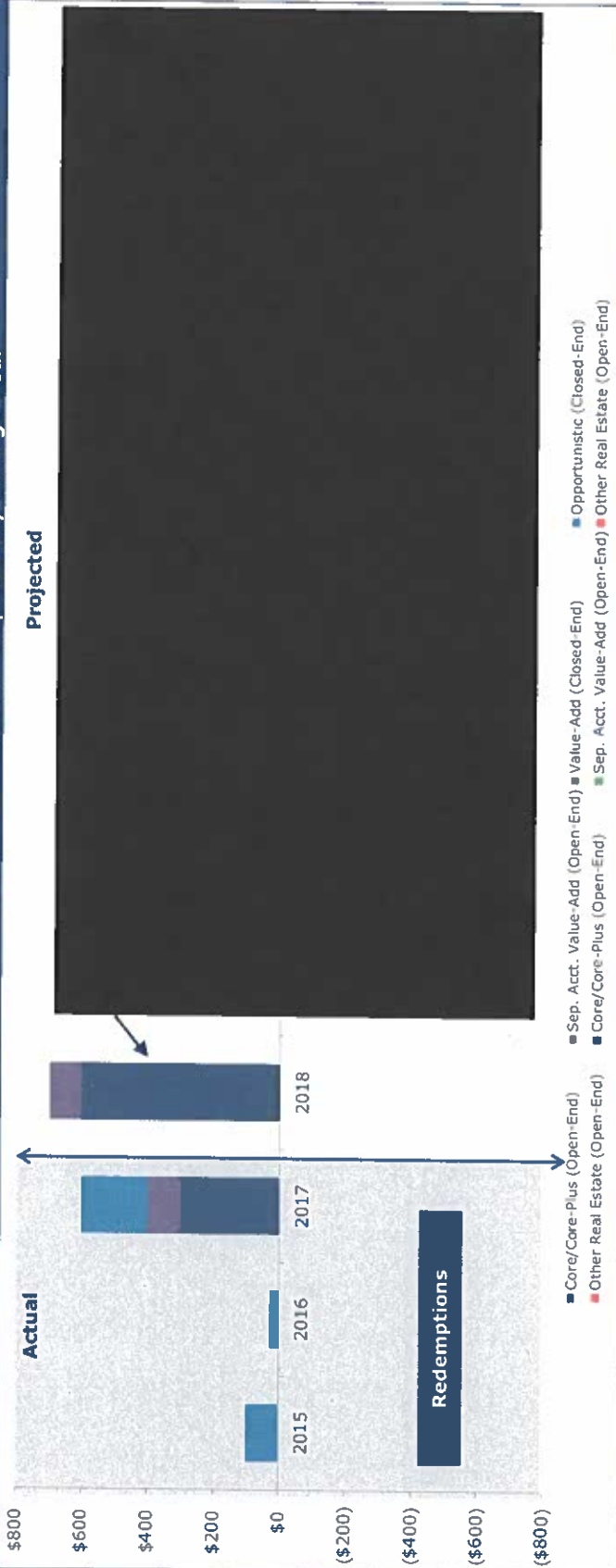
	Actual			Projected									
Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Real Estate & Real Assets NAV	\$0	\$0	\$2,246										
Uncalled Capital Commitments	\$0	\$0	\$744										
RE & RA NAV + Uncalled Capital Commitments	\$0	\$0	\$2,990										
Target Real Estate & Real Assets NAV	\$0	\$0	\$3,528										
Weighted Over-Commitment Pace	1.1x	1.1x	1.1x										
Target Real Estate & Real Assets Over Allocation	\$0	\$0	\$4,022										
Percent of Total Plan Assets													
Real Estate & Real Assets NAV (%)	NA	NA	7.6%										
RE & RA Uncalled Capital Commitments (%)	NA	NA	2.5%										
NAV + Uncalled Capital Commitments (%)	0.0%	0.0%	10.2%										
Target Real Estate & Real Assets Allocation (%)	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Target Real Estate & Real Assets Over Allocation (%)	13.7%	13.7%	13.7%										

Analysis based on 12/31/2017 plan data and 12/31/17 fund data.



REAL ESTATE COMMITMENTS & REDEMPTIONS

Real Estate & Real Assets Commitments & Redemptions by Vintage Year



Real Estate & Real Assets Commitments & Redemptions by Vintage Year

Commitments	Actual					More Certain					Less Certain				
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027		
Core/Core-Plus (Open-End)	\$0	\$0	\$300												
Sep. Acct. Value-Add (Open-E	0	0	0												
Value-Add (Closed-End)	0	0	100												
Opportunistic (Closed-End)	100	30	200												
Other Real Estate (Open-End)	0	0	0												
Total Commitments	\$100	\$30	\$600												
Redemptions	Actual	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027		
Core/Core-Plus (Open-End)	NA	NA	NA												
Sep. Acct. Value-Add (Open-E	NA	NA	NA												
Other Real Estate (Open-End)	NA	NA	NA												
Total Redemptions	NA	NA	NA												

Analysis based on 12/31/2017 plan data and 12/31/17 fund data.

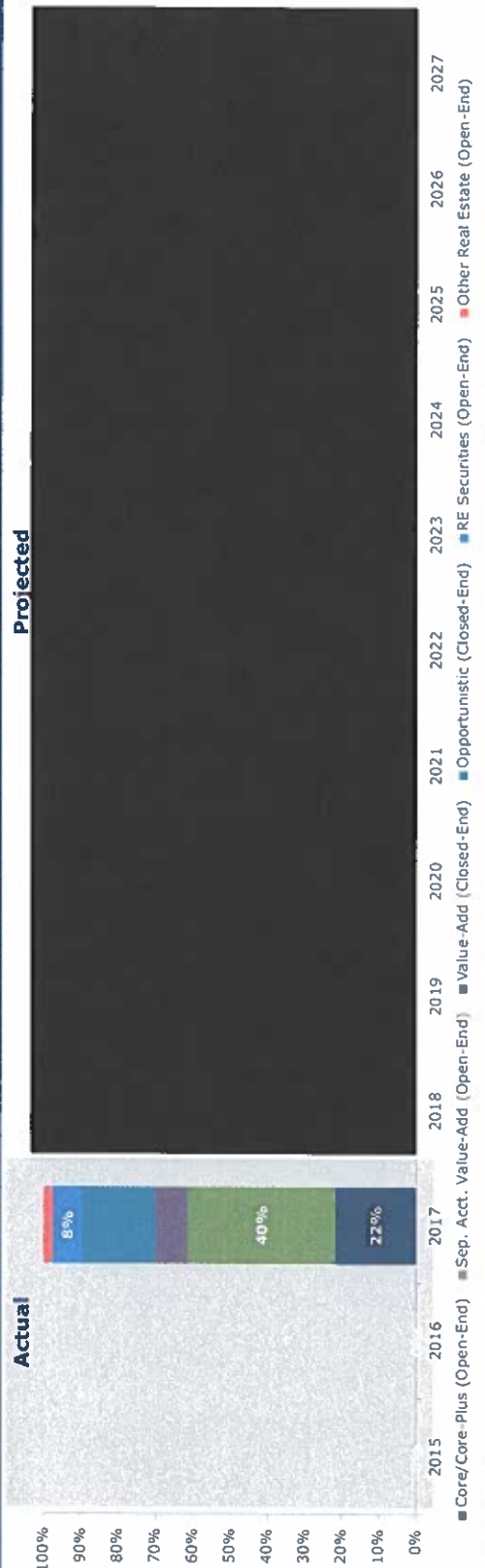


BUILDING DIVERSIFIED PORTFOLIO

Real Estate & Real Assets Allocation by NAV
Projected



Real Estate & Real Assets Allocation by NAV + Uncalled Capital Commitments
Projected



Analysis based on 12/31/2017 plan data and 12/31/17 fund data.



PORTFOLIO ACTIVITY SUMMARY

Real Assets Portfolio Sub-Strategy	Core/Core Plus	Value-Add/ Opportunistic	RE Securities	Real Assets (Timber, Infrastructure, etc.)
Return Profile	Income Driven	Income + Capital Appreciation	Income + Capital Markets	Various
Current Exposure (NAV) (as of 12/31/17)	16%	67%	11%	4%
Current Target Allocation	35% +/- 20%	55% +/- 15%	10% +/- 10%	0-20%
Manager Recommendations 2017 through 2018 (Commitment Amount)	Blackstone Property Partners (\$300M) (Core+)	Oak Street Capital IV (\$100M) (VA) C-III Recovery III (\$100M) (VA) Singerman III (\$100M) (VA/Opp)	N/A	N/A
		Mesirow Real Estate Value Fund III (\$25M) (VA)		
Anticipated 2018-2019 Activity				



4. TACTICAL PORTFOLIO SHIFT (CORE TO CORE+)

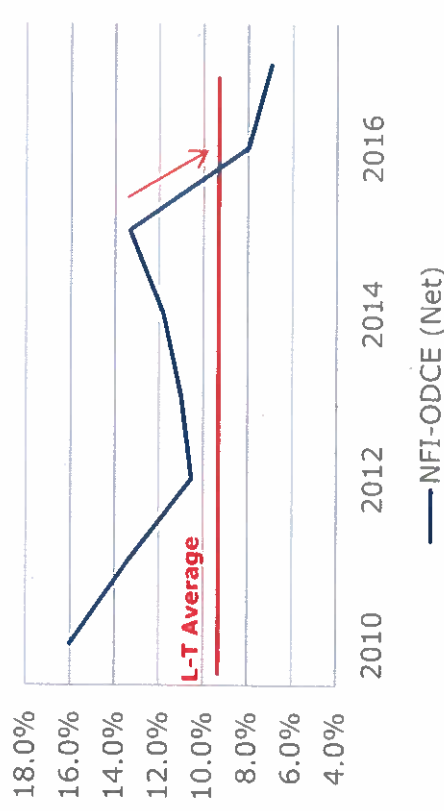
NEPC, LLC

REBALANCING CORE IN A SLOWING MARKET

Core ODCE Returns Moderating

- **Core real estate returns are moderating below historical average**
 - Appreciation returns are dissipating as expected
- **Forward return expectations are lower as a result**
 - Some cap rate expansion to be expected as rising interest rate environment returns
- **Income growth can help sustain total return potential**
 - High net operating income growth can help partially offset the impact of rising cap rates

Recent Returns Below Average



5-Year Core Return Forecast Sensitivities

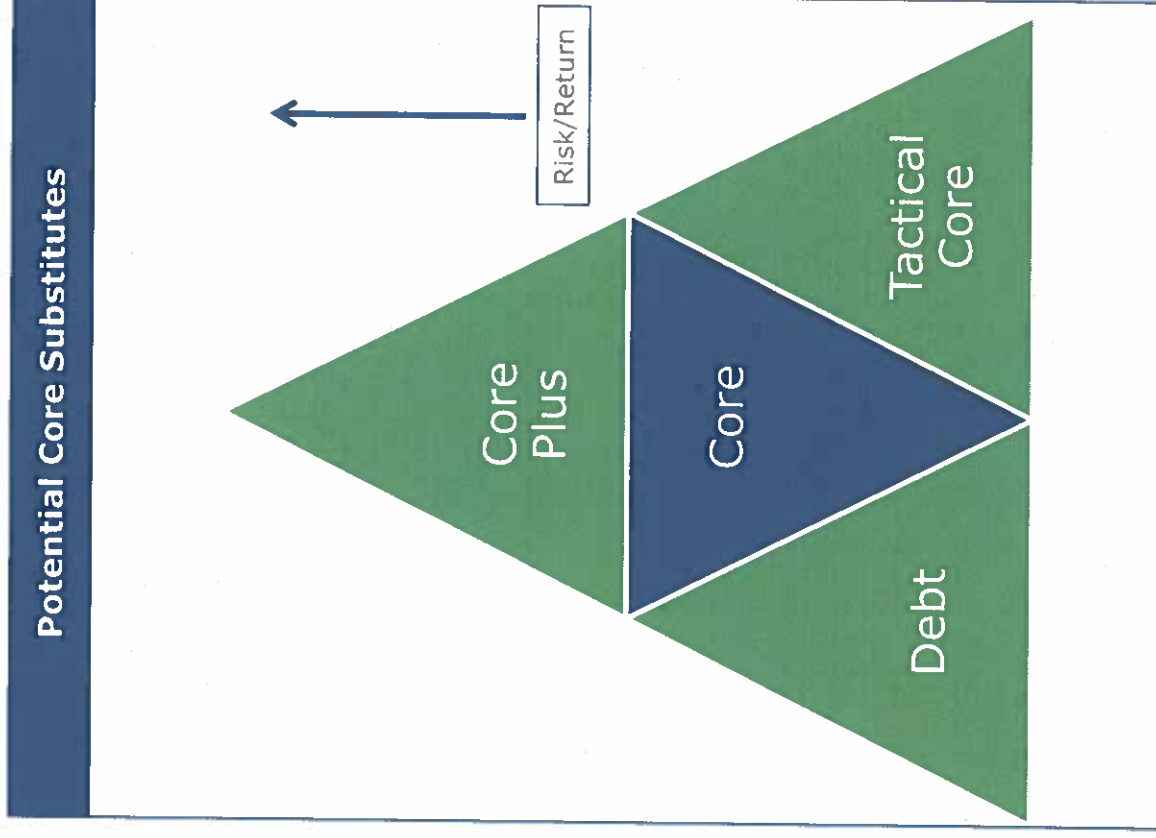
STRATEGIES TO IMPROVE RETURN POTENTIAL

Ways to Beat Market Going Forward

- **Consider reallocation while eyeing similar risk spectrum**
 - Instead of moving far out the risk curve to chase higher returns (e.g. value-add/opportunistic) that may have limited visibility on cash flows, consider ways to generate incremental returns above beta in this environment

...options to consider:

- 1. Tactical Core**
 - Target funds with reduced fees or embedded value available for capture
- 2. Debt Funds**
 - Current income focus with a hedge against equity value declines
- 3. Core-Plus Funds**
 - Moderately shift risk profile higher for higher return potential

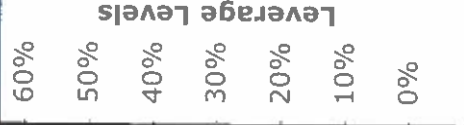
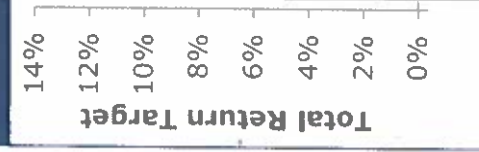


CORE PLUS - INCREMENTAL RETURNS

Core Plus Can Add Incremental Returns to Core Portfolio

- **Core-plus can add 200-300 bps to returns over core**
 - Combination of alpha and leverage
- **Higher income growth potential and light repositioning are sources of alpha**
 - Accounts for 55%-65% of incremental return potential
- **Increased leverage raises return potential but also risk**
 - Accounts for 35%-45% of incremental return potential
 - Risk is partially mitigated by core-adjacent assets that are well located with strong occupancy
- **Complementary exposure to beat core market going forward**
 - Core investors can find incremental returns by being creative and do not need to move far out on the risk curve

Moderate Increase in Risk Can Help Drive Incremental Returns



Analysis

**5. IMPLEMENTATION PREVIEW:
CORE REDUCTION**

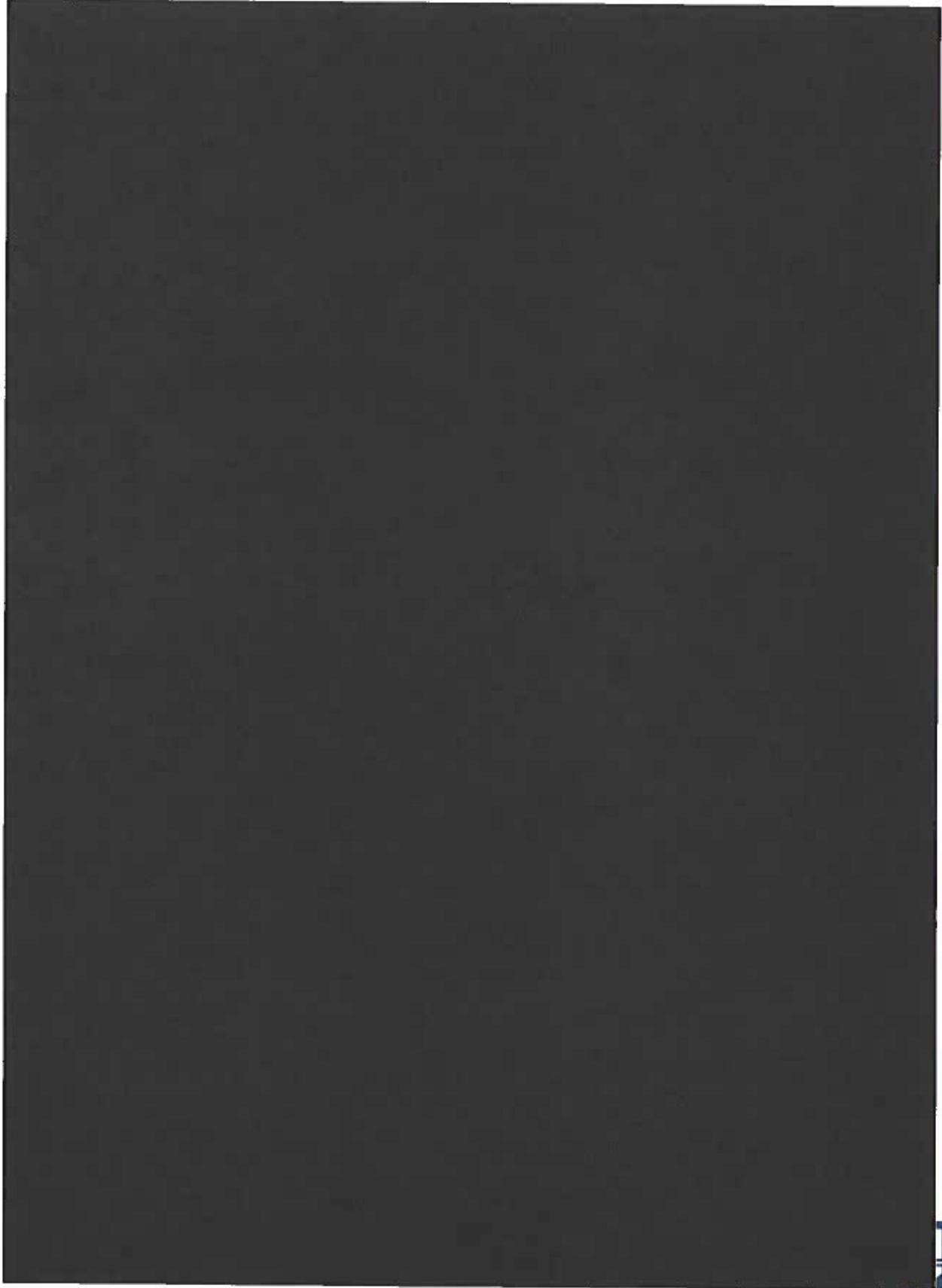
REDUCE LOW YIELDING INVESTMENTS



FUND PROFILE: HEITMAN



HEITMAN AMERICA REAL ESTATE TRUST



FUND PROFILE: UBS (TPF)



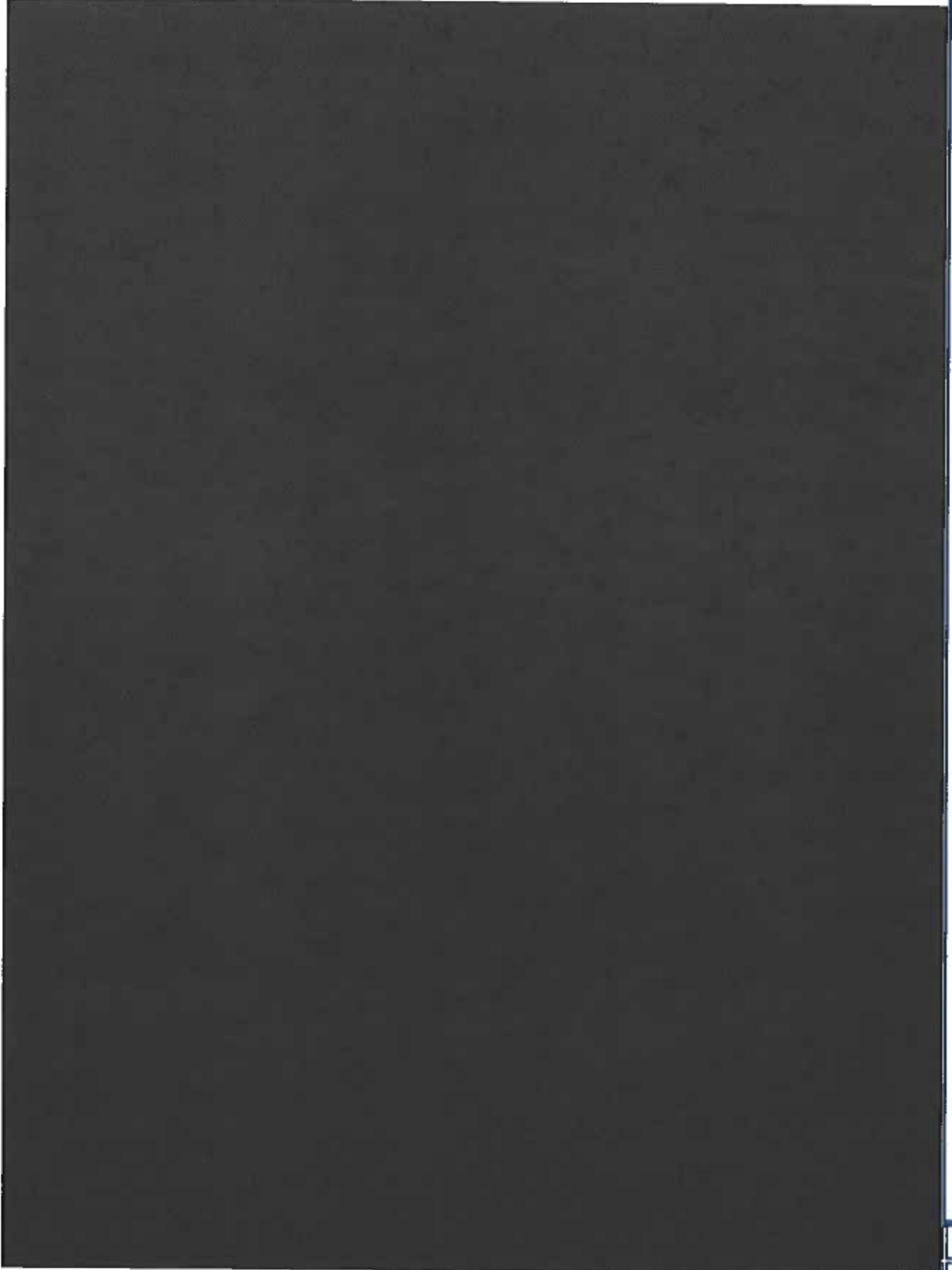
UBS TRUMBULL PROPERTY FUND



FUND PROFILE: UBS (TPI)



UBS TRUMBULL PROPERTY INCOME FUND



FUND PROFILE: FIDELITY



**APPENDIX 1: INVESTMENT LEVEL
PERFORMANCE (AS OF DECEMBER
31, 2017)**

NEPC, LLC

ACTIVE INVESTMENTS

Investment	Vintage Year	Commitment Amount	1 Year	3 Year	5 Year	7 Year	10 Year	Inception
1 AG Asia Realty Fund, L.P.	2007	25,000,000						
2 Apollo Real Estate Fund III	1998	50,000,000						
3 Blackstone Property Partners	2017	300,000,000						
4 Blackstone Real Estate Partners IV	2003	25,000,000						
5 Blackstone Real Estate Partners V	2006	50,000,000						
6 Blackstone Real Estate Partners VI	2007	75,000,000						
7 Blackstone Real Estate Partners VII	2011	75,000,000						
8 BPG Investment Partnership IX	2012	25,000,000						
9 BPG Investment Partnership V	1999	25,000,000						
10 BPG Investment Partnership VI	2002	25,000,000						
11 BPG Investment Partnership VII	2005	25,000,000						
12 BPG Investment Partnership VIII	2007	15,588,238						
13 C-III Recovery Fund III	2017	100,000,000						
14 CBRE Clarion Securities	1996	210,848,120						
15 CenterSquare Real Estate Securities	2002	26,282,779						
16 Clerestory Small Cap Real Estate Fund I, LP	2010	18,000,000						
17 Colony Investors VIII	2007	22,500,000						
18 Fidelity Real Estate Opportunistic Income Fund	2007	35,000,000						
19 Fillmore West Fund	2008	30,000,000						
20 Forest Separate Account	1992	124,231,969						
21 Hawkeye Scout Fund I	2009	75,000,000						
22 Hawkeye Scout Fund II	2016	30,000,000						
23 Heitman America Real Estate Trust, L.P.	2007	100,000,000						
24 Heitman Separate Account	1988	813,635,039						
25 LaSalle Separate Account	1994	444,715,936						
26 LEM Real Estate High-Yield Debt Fund III	2013	25,000,000						
27 Lowe GTO Separate Account	2012	349,069,212						
28 Lowe Separate Account	1994	706,229,496						
29 Lubert-Adler Real Estate Fund III	2000	30,000,000						
30 Lubert-Adler Real Estate Fund IV	2004	25,000,000						
31 Lubert-Adler Real Estate Fund V	2006	30,000,000						
32 Lubert-Adler Real Estate Fund VI	2008	20,927,116						
33 Lubert-Adler Real Estate Fund VI-A	2010	4,072,884						
34 Lubert-Adler Real Estate Fund VII	2014	25,000,000						
35 Oak Street Real Estate Capital Fund IV, L.P.	2017	100,000,000						
36 OCM Real Estate Opportunities Fund III	2003	25,000,000						
37 Oxford GSA Strategy	2006	30,000,000						
38 Prudential Latin America Residential Fund III	2008	29,654,968						
39 Prudential Latin America Retail Fund	2006	25,000,000						
40 Prudential SHP IV	2011	25,000,000						

ACTIVE INVESTMENTS CONT.

Investment	Vintage Year	Commitment Amount	1 Year	3 Year	5 Year	7 Year	10 Year	Inception
41 Prudential SHP V	2015	50,000,000						
42 Rockpoint Finance Fund I	2007	50,000,000						
43 Rockpoint Real Estate Fund II	2005	35,000,000						
44 Rockpoint Real Estate Fund III	2007	50,000,000						
45 Rockpoint Real Estate Fund V	2015	50,000,000						
46 Singerman Opportunity Fund III Select Co-Invest	2018	50,000,000						
47 Singerman Real Estate Opportunity Fund III	2018	50,000,000						
48 Starwood Opportunity Fund IV	1997	37,750,000						
49 Starwood Opportunity Fund VI	2001	50,000,000						
50 Starwood Opportunity Fund VII	2006	35,000,000						
51 Starwood Opportunity Fund VIII	2009	50,000,000						
52 UBS Trumbull Property Fund	1988	25,558,525						
53 UBS Trumbull Property Income Fund	1988	33,332,027						
54 Valstone Opportunity Fund V	2014	14,663,402						
55 Westbrook Real Estate Fund V	2004	25,000,000						
56 Westbrook Real Estate Fund VI	2006	35,000,000						
57 Westbrook Real Estate Fund VII	2007	50,000,000						
58 Westbrook Real Estate Fund VIII	2009	50,000,000						
Total: Pennsylvania State Employees Retirement System		4,937,059,710						



PERFORMANCE BY INVESTMENT STRATEGY

Investment Name	Vintage Year	Commitment Amount	Paid in Capital	Capital to be Funded	Cumulative Distributions	Valuation	Total Value	Net Benefit	Call Ratio	DPI Ratio	TVP Ratio	IRR
1 Helman Separate Account	1988	813,635,039	813,635,039	813,635,039	1,082,759,873							
2 LaSalle Separate Account	1994	444,715,936	444,715,936	444,715,936	504,745,665							
3 Lowe GTO Separate Account	2012	349,663,211	349,663,211	349,663,211	230,770,000							
4 Lowe Separate Account	1994	705,229,456	705,229,456	705,229,456	849,781,978							
Direct Investment/Sup. Account		2,313,549,682	2,313,549,682	2,313,549,682	2,879,057,515							
1 Helman America Real Estate Trust, L.P.	2007	100,000,000	100,000,000	100,000,000	0							
2 UBS Turnbull Property Fund	1988	25,558,525	25,558,525	25,558,525	67,285,772							
3 UBS Turnbull Property Income Fund	1988	33,332,027	33,332,027	33,332,027	87,606,992							
4 Blackstone Property Partners	2017	300,000,000	300,000,000	300,000,000	0							
Core/Core-Plus (Private)		458,890,552	458,890,552	458,890,552	154,872,764							
1 CBRE Clanton Securities	1996	210,848,120	210,848,120	210,848,120	669,514,323							
2 CenterSquare Real Estate Securities	2002	26,781,779	26,781,779	26,781,779	36,168,336							
Core/Core-Plus (Public Securities)		237,130,899	237,130,899	237,130,899	705,682,659							
1 BPG Investment Partnership IX	2012	25,000,000	24,303,409	24,303,409	19,005,759							
2 BPG Investment Partnership V	1999	25,000,000	24,136,964	24,136,964	43,475,859							
3 BPG Investment Partnership VI	2002	25,000,000	24,543,712	24,543,712	41,480,101							
4 BPG Investment Partnership VII	2005	25,000,000	25,000,000	25,000,000	3,754,800							
5 BPG Investment Partnership VIII	2007	15,588,238	14,912,018	14,912,018	1,149,367							
6 C-III Recovery Fund III	2017	100,000,000	100,000,000	100,000,000	0							
7 Lubert-Adler Real Estate Fund III	2000	30,000,000	28,725,020	28,725,020	44,171,118							
8 Lubert-Adler Real Estate Fund IV	2004	25,000,000	23,620,755	23,620,755	11,552,208							
9 Lubert-Adler Real Estate Fund V	2006	30,000,000	30,000,000	30,000,000	5,783,261							
10 Lubert-Adler Real Estate Fund VI	2008	20,927,116	19,200,081	19,200,081	14,348,215							
11 Lubert-Adler Real Estate Fund VI-A	2010	4,072,884	3,347,634	3,347,634	5,839,736							
12 Lubert-Adler Real Estate Fund VII	2014	25,000,000	23,750,000	23,750,000	869,566							
13 Oak Street Real Estate Capital Fund IV, L.P.	2017	100,000,000	4,849,273	4,849,273	11,691							
14 Westbrook Real Estate Fund V	2004	25,000,000	25,000,000	25,000,000	44,485,779							
15 Westbrook Real Estate Fund VI	2006	35,000,000	35,000,000	35,000,000	29,901,214							
16 Westbrook Real Estate Fund VII	2007	50,000,000	50,000,000	50,000,000	50,363,635							
17 Westbrook Real Estate Fund VIII	2009	50,000,000	50,000,000	50,000,000	62,318,055							
Value Add (Closed-End)		610,588,238	406,592,816	406,592,816	390,510,365							
1 AG Asia Realty Fund, L.P.	2007	25,000,000	23,500,000	23,500,000	20,812,500							
2 Apollo Real Estate Fund III	1998	50,000,000	50,000,000	50,000,000	74,810,023							
3 Blackstone Real Estate Partners IV	2003	25,000,000	25,000,000	25,000,000	36,171,714							
4 Blackstone Real Estate Partners V	2006	50,000,000	47,812,974	47,812,974	85,312,461							
5 Blackstone Real Estate Partners VI	2007	75,000,000	71,319,075	71,319,075	140,531,132							
6 Blackstone Real Estate Partners VII	2011	75,000,000	63,654,891	63,654,891	56,008,195							
7 Clearytoy Small Cap Real Estate Fund I, LP	2010	18,000,000	11,228,956	11,228,956	13,188,711							
8 Colony Investors VII	2007	22,500,000	21,655,800	21,655,800	7,962,017							
9 Finmore West Fund	2008	30,000,000	29,342,336	29,342,336	24,774,532							
10 Hawkeye Scout Fund I	2009	75,000,000	75,000,000	75,000,000	116,323,890							
11 Hawkeye Scout Fund II	2016	30,000,000	23,697,679	23,697,679	0							
12 LEM Real Estate High-Yield Debt Fund III	2013	25,000,000	13,170,257	13,170,257	17,029,017							
13 OCM Real Estate Opportunities Fund III	2003	25,000,000	25,000,000	25,000,000	42,218,554							
14 Oxford GSA Strategy	2006	30,000,000	21,369,627	21,369,627	18,394,338							
15 Prudential Latin America Residential Fund III	2008	29,654,968	24,708,749	24,708,749	11,380,777							
16 Prudential Latin America Retail Fund	2006	25,000,000	2,271,117	2,271,117	8,162,626							
17 Prudential SHP IV	2011	25,000,000	20,799,516	20,799,516	10,063,208							
18 Prudential SHP V	2015	50,000,000	23,554,280	23,554,280	902,591							
19 Rockpoint Finance Fund I	2007	50,000,000	2,527,500	2,527,500	1,899,395							
20 Rockpoint Real Estate Fund II	2005	35,000,000	34,138,784	34,138,784	30,679,156							
21 Rockpoint Real Estate Fund III	2007	50,000,000	46,391,772	46,391,772	64,061,153							
22 Rockpoint Real Estate Fund V	2015	50,000,000	20,725,983	20,725,983	0							
23 Sangerman Real Estate Opportunity Fund III	2018	50,000,000	0	0	0							
24 Sangerman Opportunity Fund III Select Co-Inves	2018	50,000,000	0	0	0							
25 Starwood Opportunity Fund IV	1997	37,750,000	37,750,000	37,750,000	81,398,229							
26 Starwood Opportunity Fund VI	2001	50,000,000	50,000,000	50,000,000	51,146,283							
27 Starwood Opportunity Fund VII	2006	35,000,000	35,000,000	35,000,000	24,839,109							
28 Starwood Opportunity Fund VIII	2009	50,000,000	45,356,281	45,356,281	65,247,263							
29 Valstone Opportunity Fund V	2014	14,663,402	14,224,170	14,224,170	2,549,834							
Opportunistic (Closed-End)		1,157,566,370	863,299,698	863,299,698	1,006,046,511							
1 Fidelity Real Estate Opportunistic Income Fund	2007	35,000,000	35,000,000	35,000,000	0							
Opportunistic (Open-End)		35,000,000	35,000,000	35,000,000	0							
1 Forest Separate Account	1992	124,231,969	124,231,969	124,231,969	157,338,750							
Timber		124,231,969	124,231,969	124,231,969	157,338,750							
Total		4,937,059,710	4,138,795,616	4,138,795,616	5,092,508,564							



**APPENDIX 2: ALTERNATIVE
INVESTMENT DISCLAIMER**

NEPC, LLC

DISCLAIMER

- Past performance is no guarantee of future results.
- The opinions presented herein represent the good faith views of NEPC as of the date of this report and are subject to change at any time.
- Information used to prepare this report was obtained directly from the investment managers or custodians, and market index data was provided by other external sources. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.
- This report may contain confidential or proprietary information and may not be copied or redistributed to any party not legally entitled to receive it.

ALTERNATIVE INVESTMENT DISCLOSURES

In addition, it is important that investors understand the following characteristics of non-traditional investment strategies including hedge funds, real estate and private equity:

1. Performance can be volatile and investors could lose all or a substantial portion of their investment
2. Leverage and other speculative practices may increase the risk of loss
3. Past performance may be revised due to the revaluation of investments
4. These investments can be illiquid, and investors may be subject to lock-ups or lengthy redemption terms
5. A secondary market may not be available for all funds, and any sales that occur may take place at a discount to value
6. These funds are not subject to the same regulatory requirements as registered investment vehicles
7. Managers may not be required to provide periodic pricing or valuation information to investors
8. These funds may have complex tax structures and delays in distributing important tax information
9. These funds often charge high fees
10. Investment agreements often give the manager authority to trade in securities, markets or currencies that are not within the manager's realm of expertise or contemplated investment strategy