OKLAHOMA PENSION COMMISSION

PUBLIC FUNDS REVEIW

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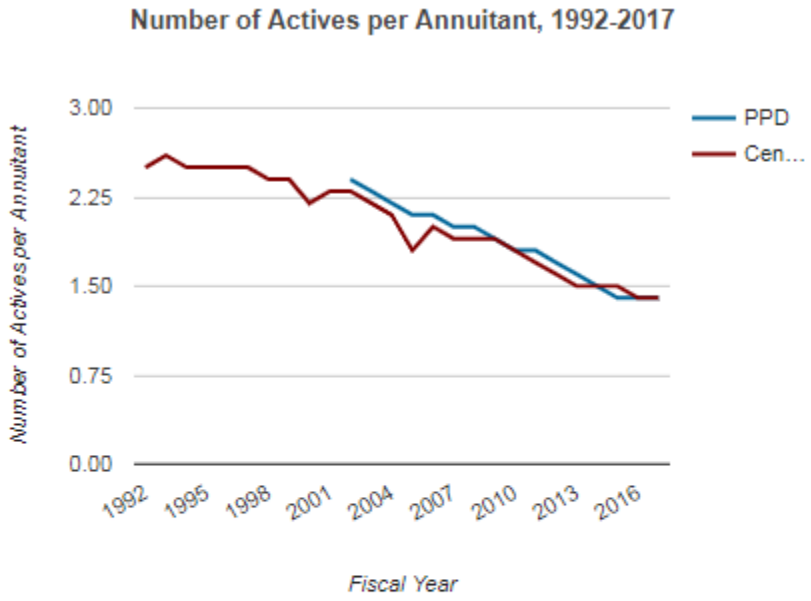
OVERVIEW OF US PUBLIC FUND MARKET

According to the U.S. Census Bureau, roughly 6,000 public sector retirement systems exist in the U.S. Some of the 299 state-administered plans and 5,977 locally-administered plans date back to the 19th century and each has evolved independently. Collectively, these plans have:

- $4.3 trillion in assets (9/30/2018)
- 14.7 million active (working) members and 10.3 million retirees
- $282.899 billion in benefit distributions annually



Note: PPD data begins in 2001. Total membership may include other members such as inactive vested and DROP participants.

Source: Census; Public Plans Database

National data averages are weighted by plan size.

2017 MEMBERSHIP IN MILLIONS

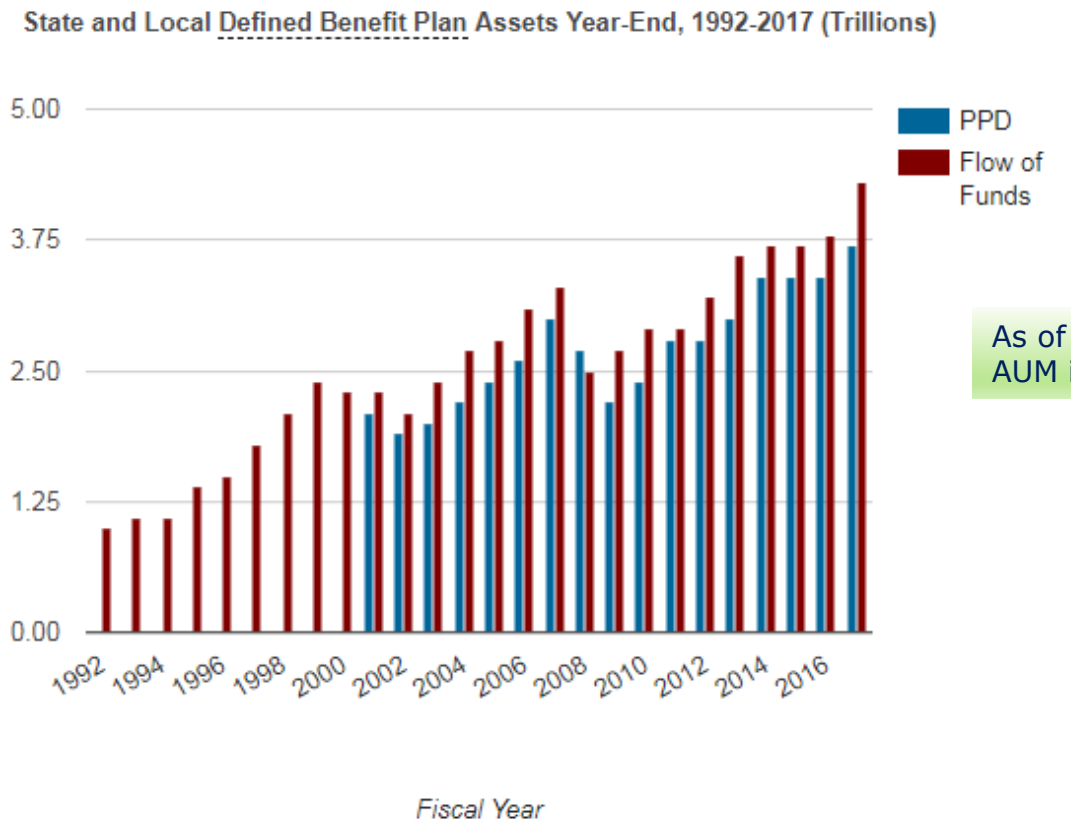
	Census	PPD
Actives	14.5	13.2
Beneficiaries	10.7	9.4
Total Membership	31.3	26.2

Source: Census; Public Plans Database

CHARACTERISTICS OF PUBLIC FUNDS

- **They are large; Aggregate US Public Fund assets total $4.33T**
  - Large enough to attract attention, but only a fraction of the ~200T Global investable universe.
- **Public Fund liabilities are larger – Aggregate funded level is 71%**
- **Public Funds are complex**
  - No longer invested in 60% public equity and 40% public bonds
- **Public Funds are the primary source of retirement income for the vast majority of public employees**
  - 14.7 million actives and 10.3 million retired
  - $282.9 billion in benefits distributed annually
- **Public Funds represent a significant spending outlay for public entities sponsoring defined benefit plans**
  - Employer Annual Required Contribution (ARC) as a percent of payroll is 16.5%

PUBLIC PENSION AUM > $4.3 TRILLION



As of September, 2018 Total AUM is $4.33T

Note: PPD data begins in 2001.

Source: Public Plans Database; Federal Flow of Funds

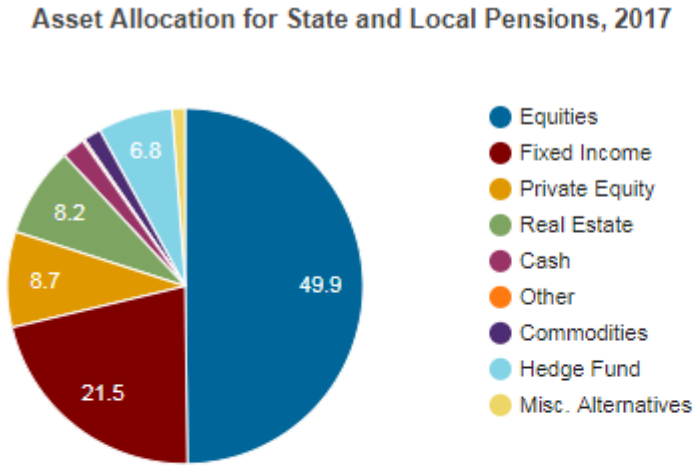
PF DB PLANS ARE SIGNIFICANTLY UNDERFUNDED

Note: The median discount rate for public pension plans was 8 percent from 1990-2011, and 7.75 percent in 2012.

Source: Public Plans Database and PENDAT

National data averages are weighted by plan size.

ASSET ALLOCATION - PUBLIC EQUITIES STILL DOMINATE



ASSET ALLOCATION, 2017

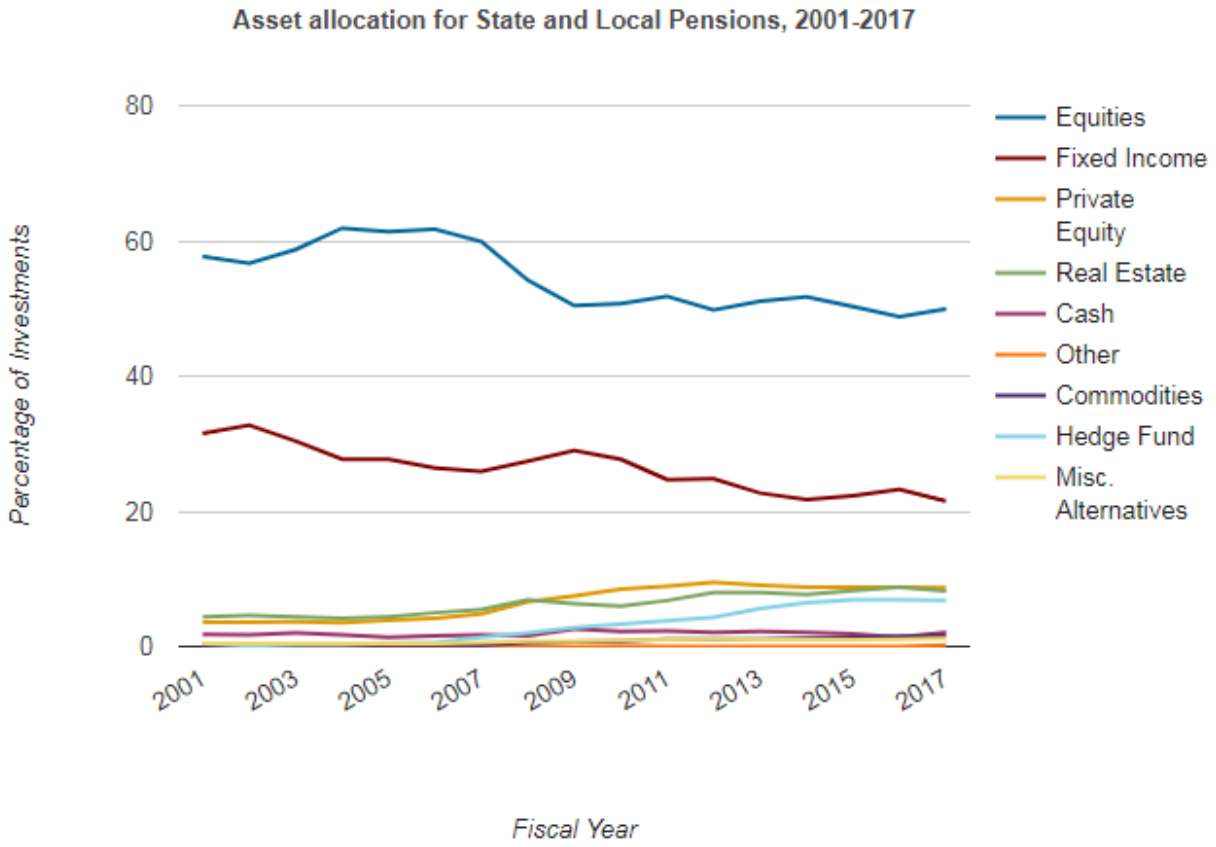
	Percent
Equities	49.9
Fixed Income	21.5
Private Equity	8.7
Real Estate	8.2
Cash	2.1
Other	0.2
Commodities	1.6
Hedge Fund	6.8
Misc. Alternatives	1.2

Source: Public Plans Database

Source: Public Plans Database

National data averages are weighted by plan size.

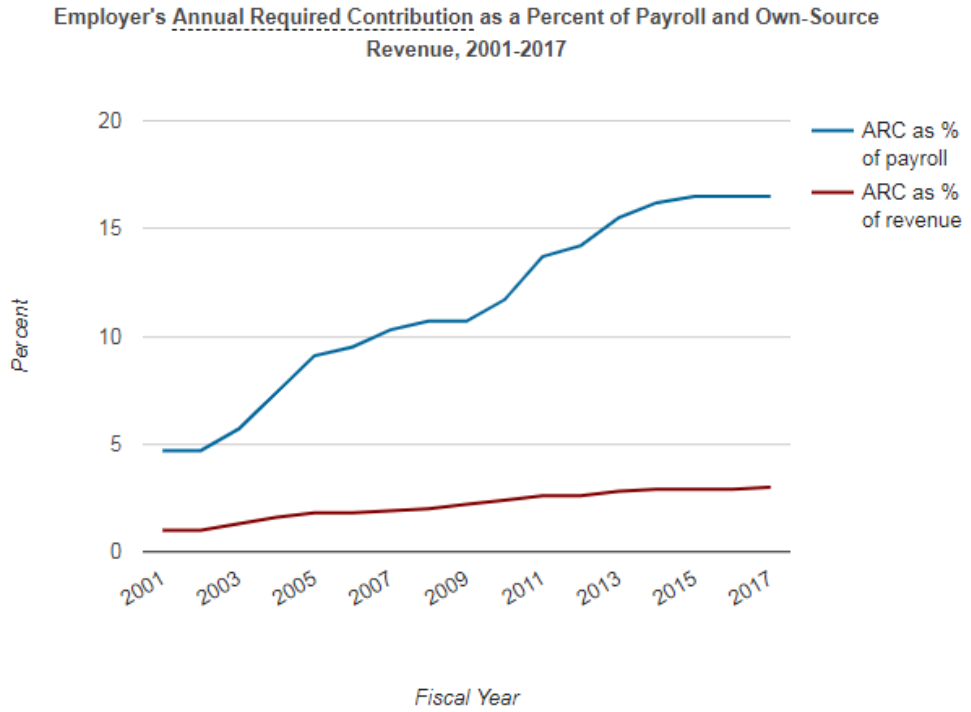
BUT PRIVATE MARKET ASSETS ARE GROWING



Source: Public Plans Database

National data averages are weighted by plan size.

IMPACT OF NEAR-TERM PERFORMANCE AND INSUFFICIENT PAST CONTRIBUTIONS = HIGHER CONTRIBUTIONS



Note: Figure reflects general employee and teachers plans covered by Social Security.

Source: Public Plans Database

National data averages are weighted by plan size.

TRENDS IN INVESTMENT MANAGEMENT

Public Plan Sponsor Challenges

- **Despite a strong market environment, Public Funds still face a cacophony of issues. Key challenges include rate of return and funding issues, volatility and potential drawdowns, and risk management, along with evergreen issues such as asset allocation and manager selection.**

- **Size of assets has attracted attention from politicians and interest groups**
  - Greater transparency
  - Pressure to reduce fees
  - In-state investing
  - Environmental, Social, Governance tilted investing

Source: Greenwich Associates

TRENDS INVESTMENT MANAGEMENT

Public Plan Sponsors as well as Endowments and Foundations will continue to feel pressure to:

- Generate improved levels of returns or maintain/ increase funding levels and grow assets.
- More aggressively manage risk by diversifying assets into a much broader mix of investments (international, real estate, private equity, private debt, alternatives, commodities, derivatives).
- Increased allocations to non-traditional investments to find the sources of improved returns.
- Adoption of more creative and differentiated "passive" products.
- Hire investment personnel that are highly specialized and expert in their field.
- For larger funds, consideration of in-house investment management

TRENDS IN INVESTMENT MANAGEMENT

Asset Management Industry Maturation

- The asset management business has entered the ‘maturity’ phase of the industry lifecycle.
- Passive demand and evolving client expectations are conspiring to reduce manager margins industrywide, increasing the need to achieve scale in certain asset classes.
- Not surprisingly, market share is concentrating among leading managers and consultants.
- Asset managers and consultants are placing a heightened focus on business management, investing in areas such as marketing and technology, in order to compete successfully.

INVESTMENT CONSULTING LANDSCAPE

NEPC, LLC

CURRENT CONSULTING INDUSTRY LANDSCAPE

- **The consulting industry continues to evolve and at a seemingly faster pace recently.**

- **Two of the largest shifts have been in the way clients use consultants and in the make-up of the players in the industry.**

Client utilization:

- Public Funds overwhelmingly continue to use consultants, but in different ways than historically.

Industry consolidation:

- Since 2009 approximately 1/3 of consulting firms have been acquired or no longer exist
- Successful and profitable consulting requires scale, which a significant number of mid-tier consulting firms lack;
- On the other end of the spectrum, larger more diversified companies face potential conflicts of interest.

CLIENT UTILIZATION

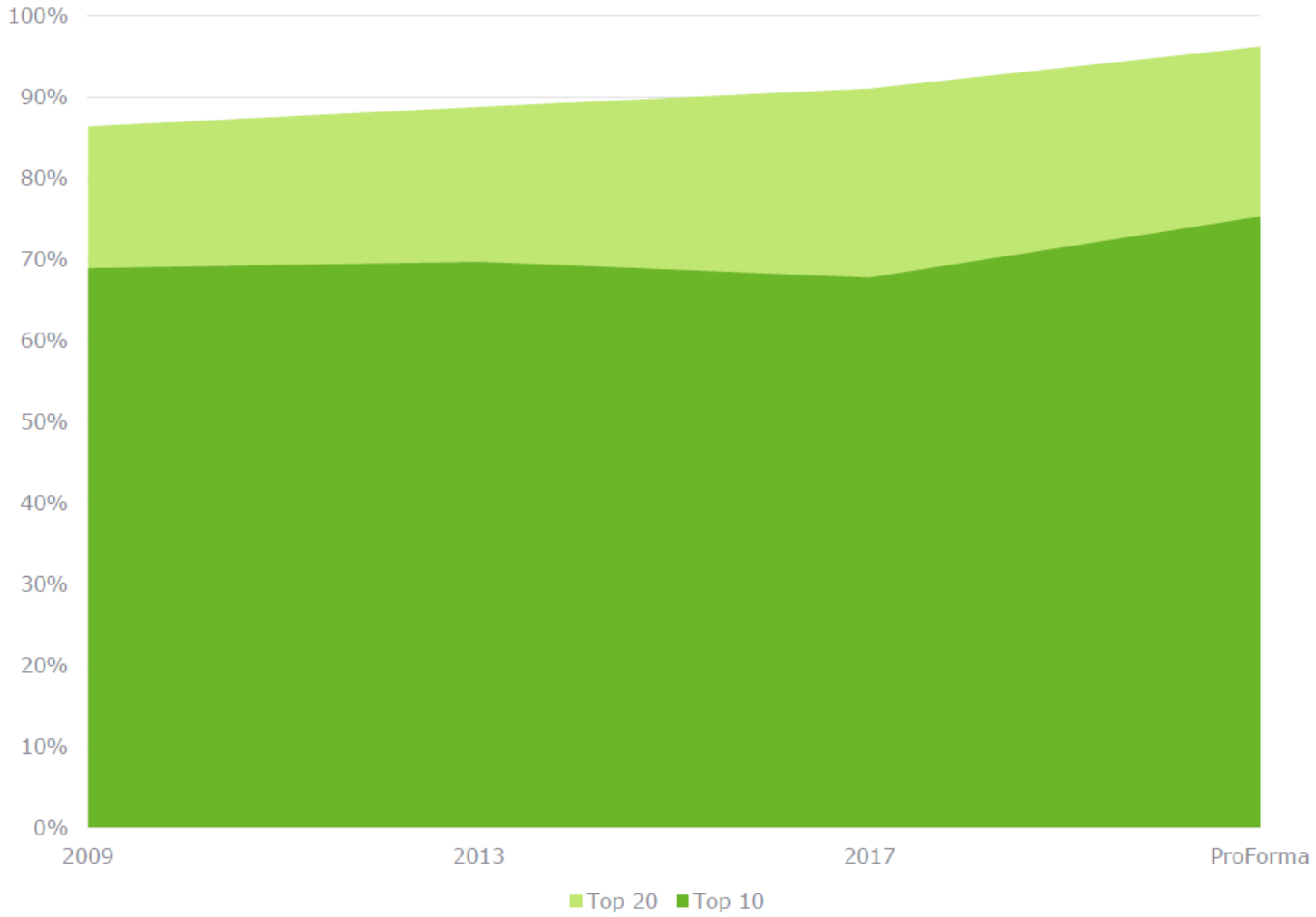
- **Historically Public Funds have employed investment consultants for:**
  - Investment policy development
  - Asset Allocation Advice
  - Manager Selection and vendor searches
  - Specialty asset class coverage
  - Performance Monitoring

- **Increasingly, larger Public Funds have delegated more authority to staff, broadened and differentiated their consultant support to include:**
  - Governance oversight
  - Fiduciary oversight of performance measurement
  - Independent review of internal investment processes
  - Operational due diligence
  - Staff support activities
    - Fee monitoring

INDUSTRY CONSOLIDATION

- **The industry has seen a lot of merger activity in the last 10 years**
- **Interestingly, the overall concentration for institutional clients has only increased slightly during that period**
  - The recent Mercer acquisitions did push the concentration higher and is shown as ProForma on the chart
  - We think there are some other potential mergers on the horizon
- **The data is from the Greenwich Associates survey**
  - There is probably some bias because they may not capture many clients moving to OCIO
  - Because Cambridge and Mercer are the biggest players in OCIO, the data likely underrepresents both their market position and, therefore, the overall industry concentration

INDUSTRY CONSOLIDATION



Note: ProForma reflects the recent Mercer acquisitions

INDUSTRY CONSOLIDATION SINCE 2009

- **Based on the 2009 list of the top 35 consulting firms , almost 1/3rd of have been acquired**

9	Summit Strategies Group
10	Strategic Investment Solutions
11	RogersCasey
21	Segal Advisors
22	Slocum
28	Marco Consulting Group
29	Stratford Advisory Group
30	Becker, Burke Associates
32	Watershed Investment Consultants
33	Brockhouse Cooper
35	Buck Consultants

ALLOCATION PROCESS (ASSET ALLOCATION DEFINED)

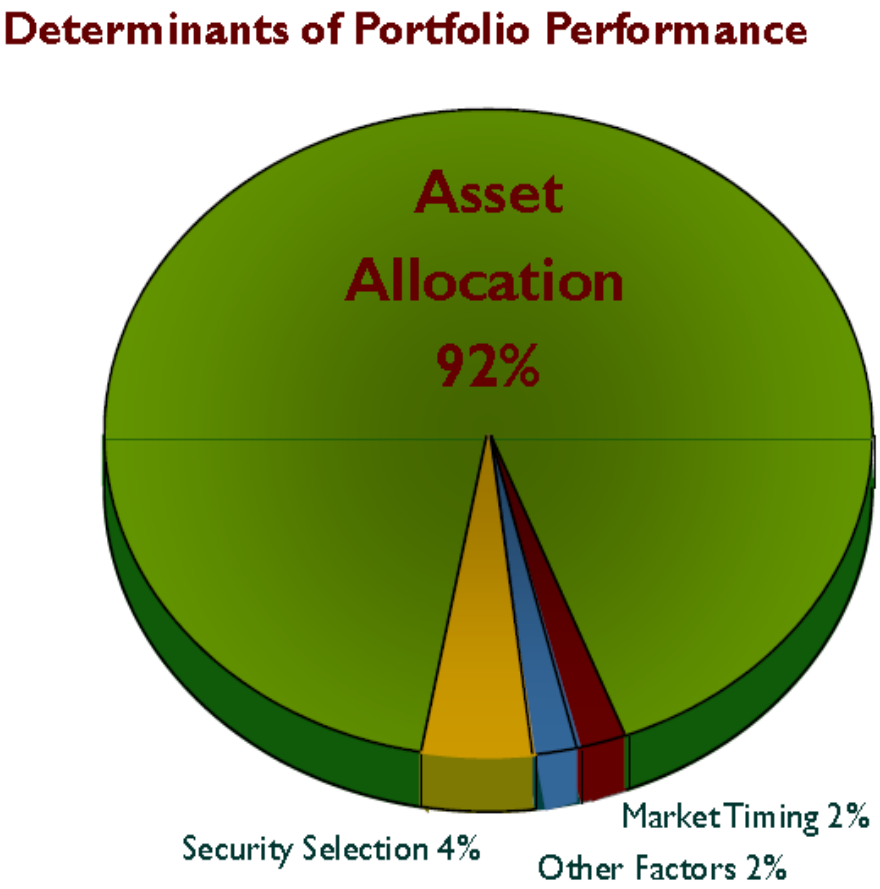
- **The process of allocating assets across a spectrum of investments to achieve an expected return at an expected level of risk**
  - "Expected" is a statistics term, which is different from the common use of the word.
  - Expected return is the weighted average of all possible returns, where the weights are the probabilities that each return will occur.

- **Asset allocation decisions include, but are not limited to:**
  - Equity/Fixed Income/Cash/Real Estate/Private Equity/Private Debt etc.
  - Domestic/International/Global
  - Liquid vs. illiquid

- **Structure: refers to implementation decision**
  - Core vs. Value/Growth
  - All Cap vs. Large/Medium/Small Cap
  - Active vs. Passive
  - Global vs. US/Foreign

- **Historically, asset allocation determined greater than 90% of portfolio returns**

ASSET ALLOCATION: THE KEY INVESTMENT DECISION



Source: Determinants of Portfolio Performance II: An Update, Brinson, et al, Financial Analysts Journal, May/June 1991, pp 40-48.

ASSET ALLOCATION – A PROGRESSIVE APPROACH

Be Dynamic

Build a **long-term** strategic allocation that can meet long-term objectives

Look for **medium-term** "opportunistic ideas" to tilt away from the strategic allocation to add value, AND

Build a Mosaic

No single asset allocation approach or model has all the answers

Minimize exposure to the shortcomings of any individual approach by using multiple perspectives and approaches

All analytical tools have the potential to provide useful insights but also including shortcomings

ANALYTICAL MODELING CAPABILITIES – PROPRIETARY TOOLS

- **NEPC uses a variety of proprietary tools developed internally to better assess strategic asset allocation changes and the impact of tactical adjustments**

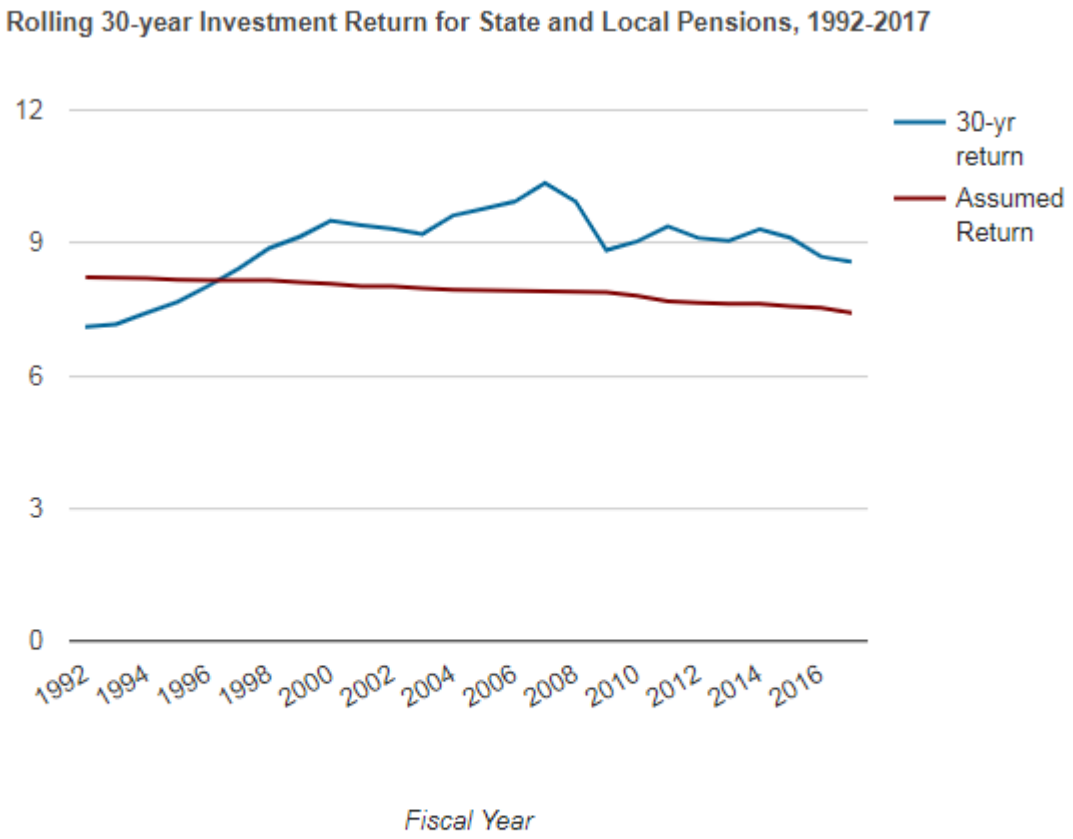
Approach	Advantages	Shortcomings
Mean-Variance	• Calculates most efficient portfolio for given volatility • Produces range of portfolios	• Relies on static assumptions and assumes normal distribution • Chosen constraints can drive results • Limits risk definition to volatility
Risk Budgeting	• Provides risk allocations • Recognizes that less efficient portfolios may have better risk balance	• Relies on Mean-Variance optimization assumptions • Defines risk as standard deviation • Ignores tail risks
Scenario Analysis	• Focuses on low-probability, high magnitude economic environments (tail risks) • Recognizes environmental biases of each asset class	• Offers opportunity to test risk tolerance to various outcomes but should not be used to construct best portfolio for each environment
Liquidity Analysis	• Recognizes a "risk" not captured in traditional tools: illiquidity • Highlights impact of changing cash flows (both investment-driven and exogenous)	• Requires portfolio specific cash flow and partnership details • Long-term planning tool – cannot easily adjust portfolio or compare different portfolios

- ***Final Result = Revised Asset Class Targets, Ranges, Benchmarks***

APPENDIX: PUBLIC FUND DATA

INVESTMENT RETURNS AND ASSUMED RATES OF RETURN

Investment returns have been strong



Source: Census of Governments

National data averages are weighted by plan size.

MEDIAN PUBLIC FUND >$1 BILLION GROSS OF FEES ENDED JUNE 30, 2018

	1 Yr(%)	3 Yrs(%)	5 Yrs(%)	10 Yrs(%)	15 Yrs(%)	20 Yrs(%)	25 Yrs(%)	30 Yrs(%)
InvestorForce Public DB > $1B Gross Median	8.7	7.2	8.3	6.6	7.6	6.3	7.8	8.3
Observations	62	62	61	58				

NATIONAL PUBLIC FUND INVESTMENT RETURNS AND ASSUMED RATES

Fiscal Year	Annual Return	Assumed Return
1992	10.17	8.22
1993	5.01	8.21
1994	10.88	8.20
1995	11.31	8.17
1996	14.54	8.15
1997	16.76	8.15
1998	17.45	8.15
1999	12.13	8.11
2000	15.50	8.07
2001	1.34	8.02
2002	2.22	8.02
2003	3.14	7.97
2004	17.18	7.94
2005	9.48	7.93
2006	11.20	7.92
2007	15.71	7.91
2008	-3.47	7.90
2009	-20.90	7.88
2010	14.11	7.80
2011	17.64	7.68
2012	2.98	7.65
2013	10.71	7.62
2014	15.83	7.62
2015	5.54	7.57
2016	0.69	7.53
2017	10.67	7.42

Source: PublicPlansData.org. 299 State Plans. 5,977 Local Plans. $4.3t in assets.