Verus

PERSPECTIVES THAT DRIVE ENTERPRISE SUCCESS

FEBRUARY 2018

Asset Liability Study: Phase 1

Fresno County Employees' Retirement Association

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Introduction

Executive summary

This education session is designed to assess the System's **ability** and **willingness** to accept investment risk.

To assess the ability component, we will review:

- The details from the most recent actuarial valuation;
- A fiscal assessment of the Plan Sponsor relative to comparable counties.

To assess the willingness component, the findings from the Trustee Questionnaire will be summarized.

- Because there is a fiduciary obligation to the participants, individual trustee perspectives on risk should be reconciled with the ability of the Plan as a whole.

We will also review the current asset allocation relative to other SACRS plans to set a baseline.

Future sessions will drill down into how alternative asset allocations impact the future health of the Plan under a range of different scenarios.

While risk tolerance is a function of FCERA's economic picture, it is prudent to review how others in similar situations are allocating capital

Session objectives

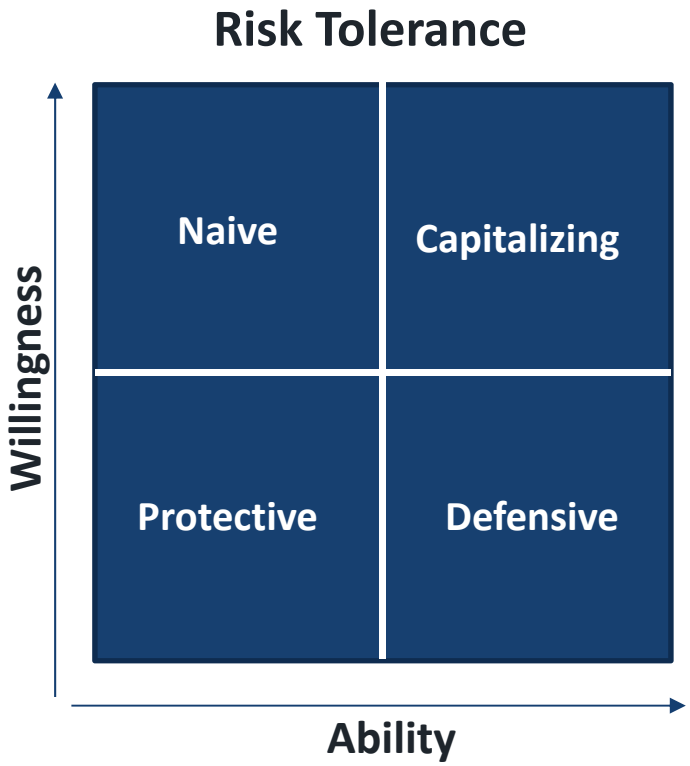
- Improve understanding of current financial position of the Plan
- Gain perspective on the financial strength of the Plan Sponsor
  - "Don't bite the hand that feeds you"
- Review Trustee's preferences on risk tolerance and reconcile potential inconsistencies
- Formulate views on what a given risk tolerance means
  - What does "above average" or "below average" risk tolerance look like?

Enterprise risk tolerance in context

— Properly assessing Enterprise Risk Tolerance has important and practical implications for investment strategy development.

— It involves assessing the Plan's ability and the Board's willingness to accept risk.

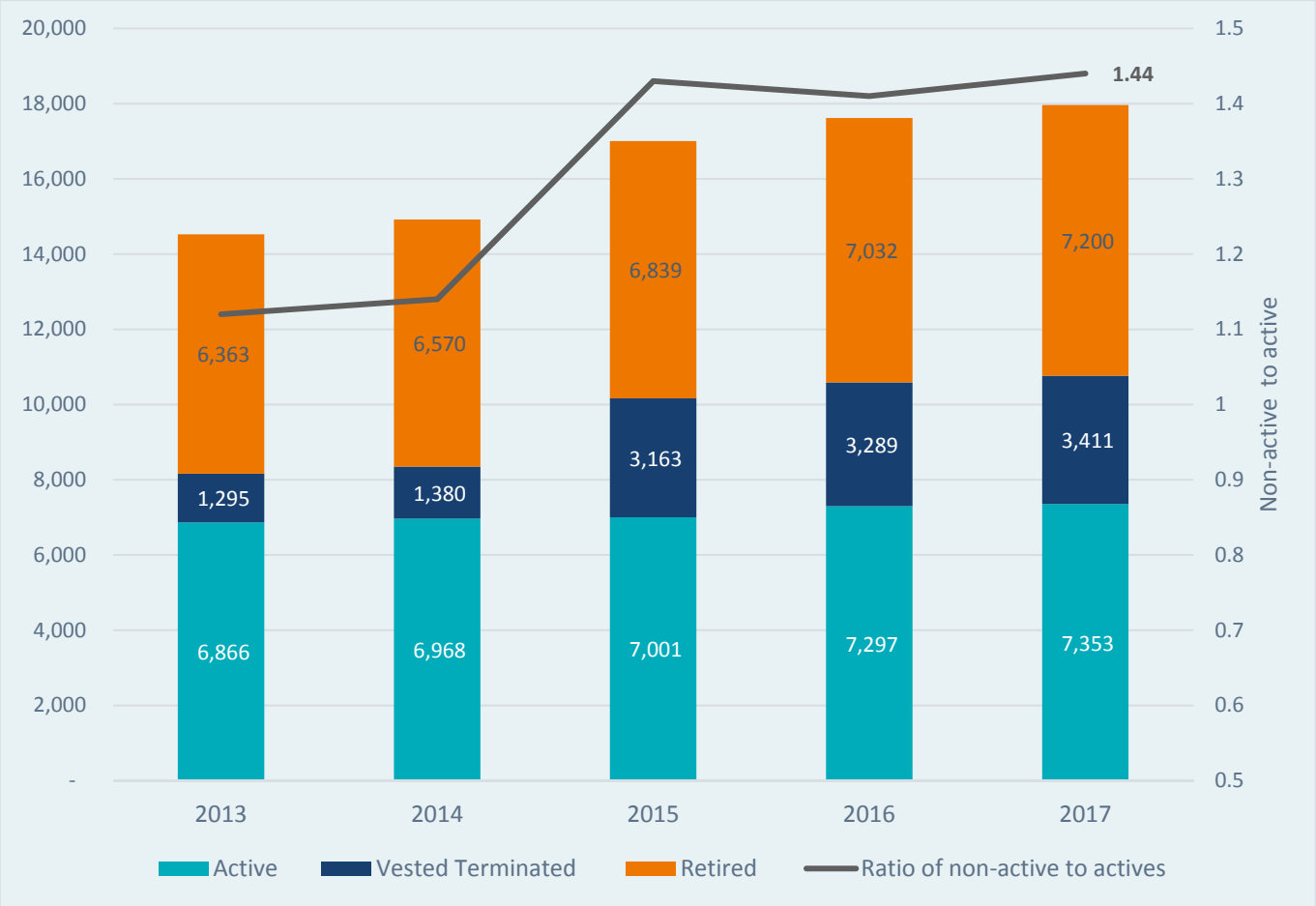
— Although the Board's fiduciary duty is to the Members, understanding how the County's financial situation impacts its ability to make contributions cannot be overlooked.



Plan review

Plan demographics

FCERA MEMBER POPULATION



For fiscal years ending 6/30. Source: Segal. Growth rates cited are cumulative

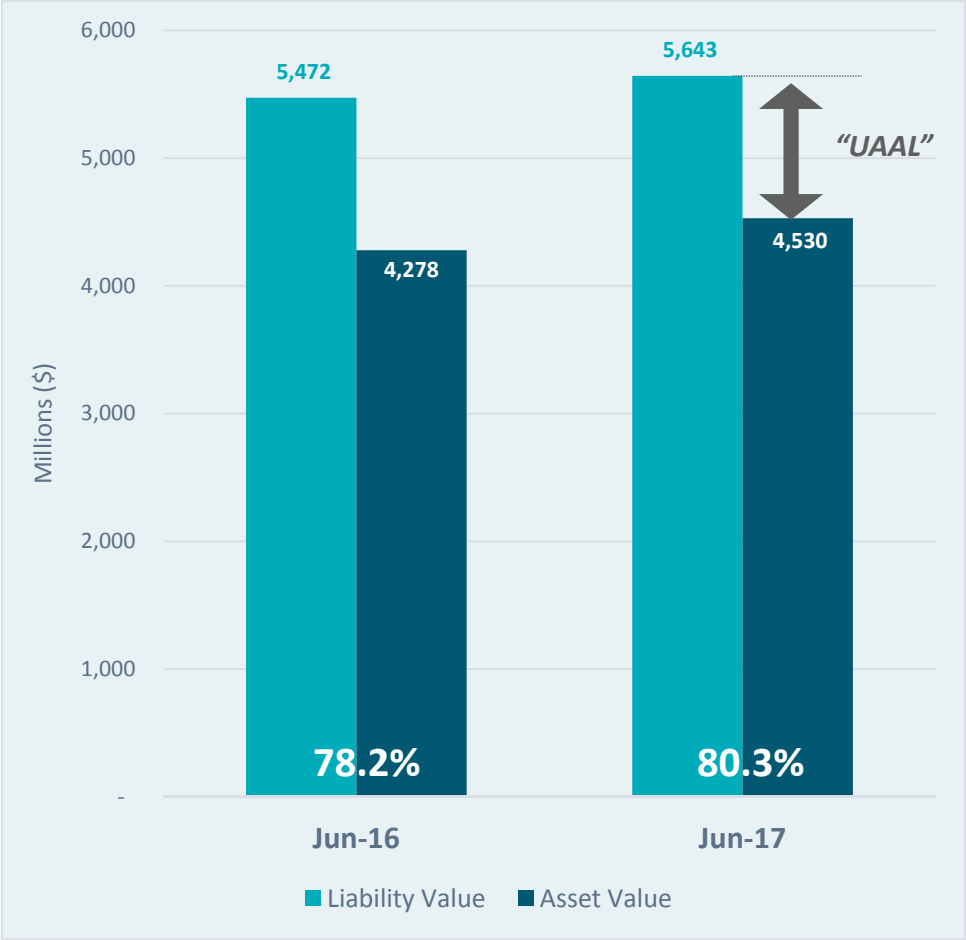
As of June 30, 2017, there were 7,200 retired members, 7,353 active members, and 3,411 vested terminated members.

For every 1 active employee there are 1.44 inactive employees.

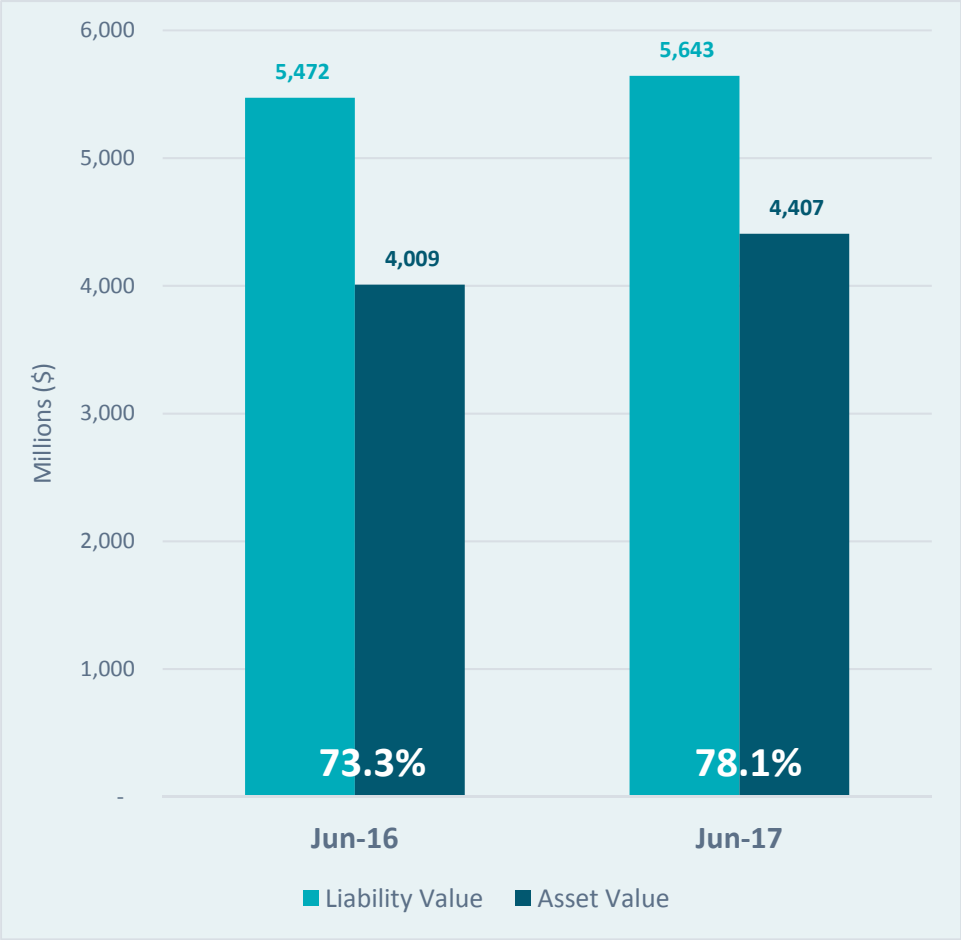
Since 2013, the active population has grown 7.1% while in-actives have grown 38.6%.

Funded status

ACTUARIAL (SMOOTHED) BASIS



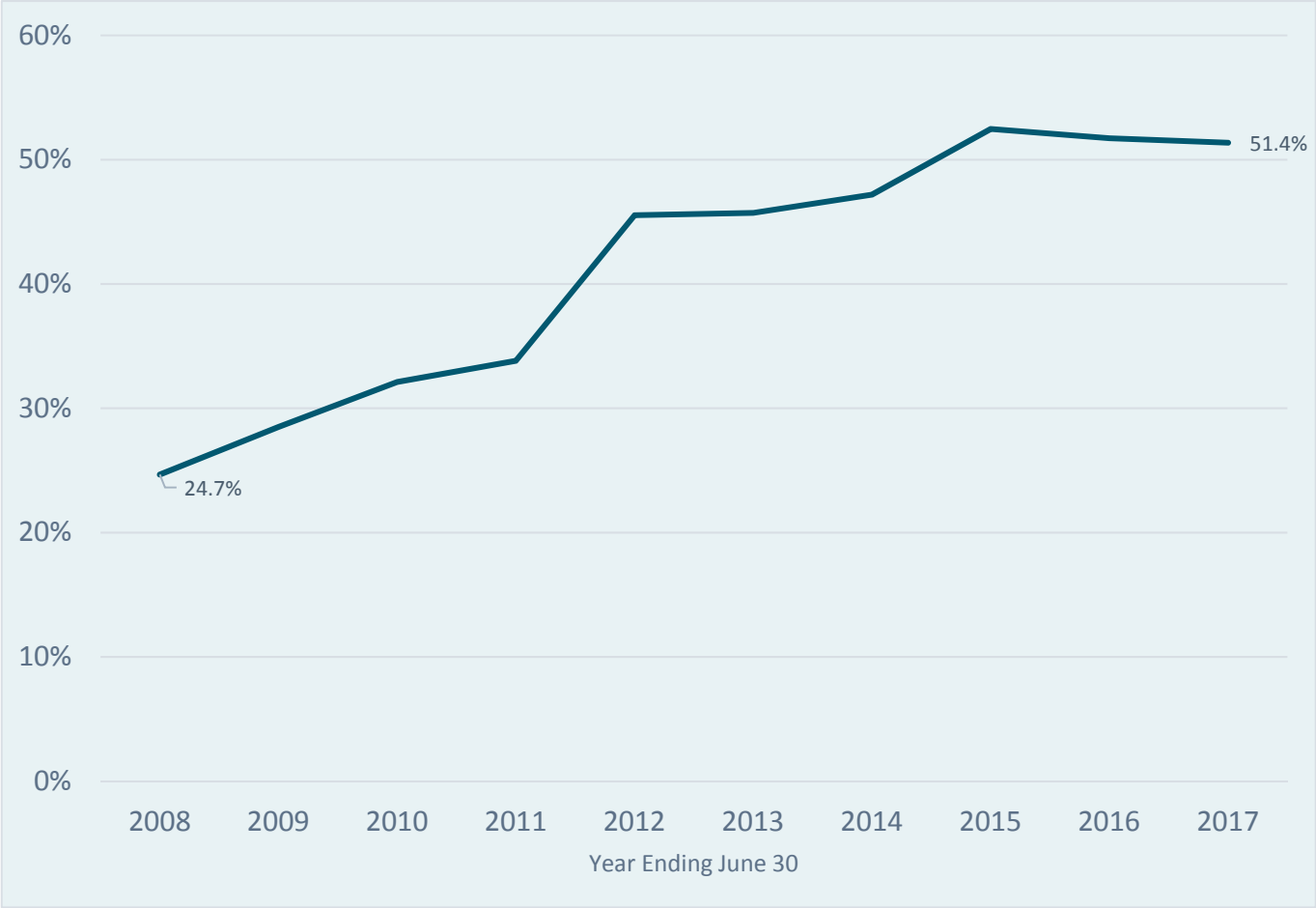
MARKET VALUE BASIS



Source: Segal. The UAAL refers to Unfunded actuarial accrued liability, and is the difference between assets and liabilities.

Historical employer contributions

HISTORICAL CONTRIBUTIONS AS A % OF COVERED PAYROLL



Source: Segal

Losses from the 2008 Great Financial Crisis resulted in subsequently higher contributions.

The Unfunded Actuarial Accrued Liability (UAAL) is amortized over 15 years.

Projected contributions

Employers

— The contribution rates determined in the June 30, 2017 valuation drive contributions in the next fiscal year (year ending 6/30/19).

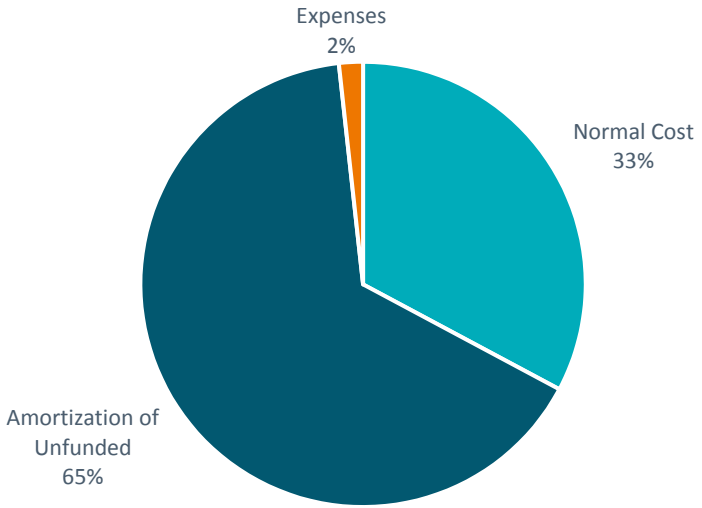
— The aggregate recommended employer contribution rate is 54.09%.*

Employees

— The aggregate member rate decreased from 9.51% to 9.47%.

— The decrease was driven by demographic changes among active members.

COMPONENTS OF 2017 RECOMMENDED EMPLOYER CONTRIBUTION

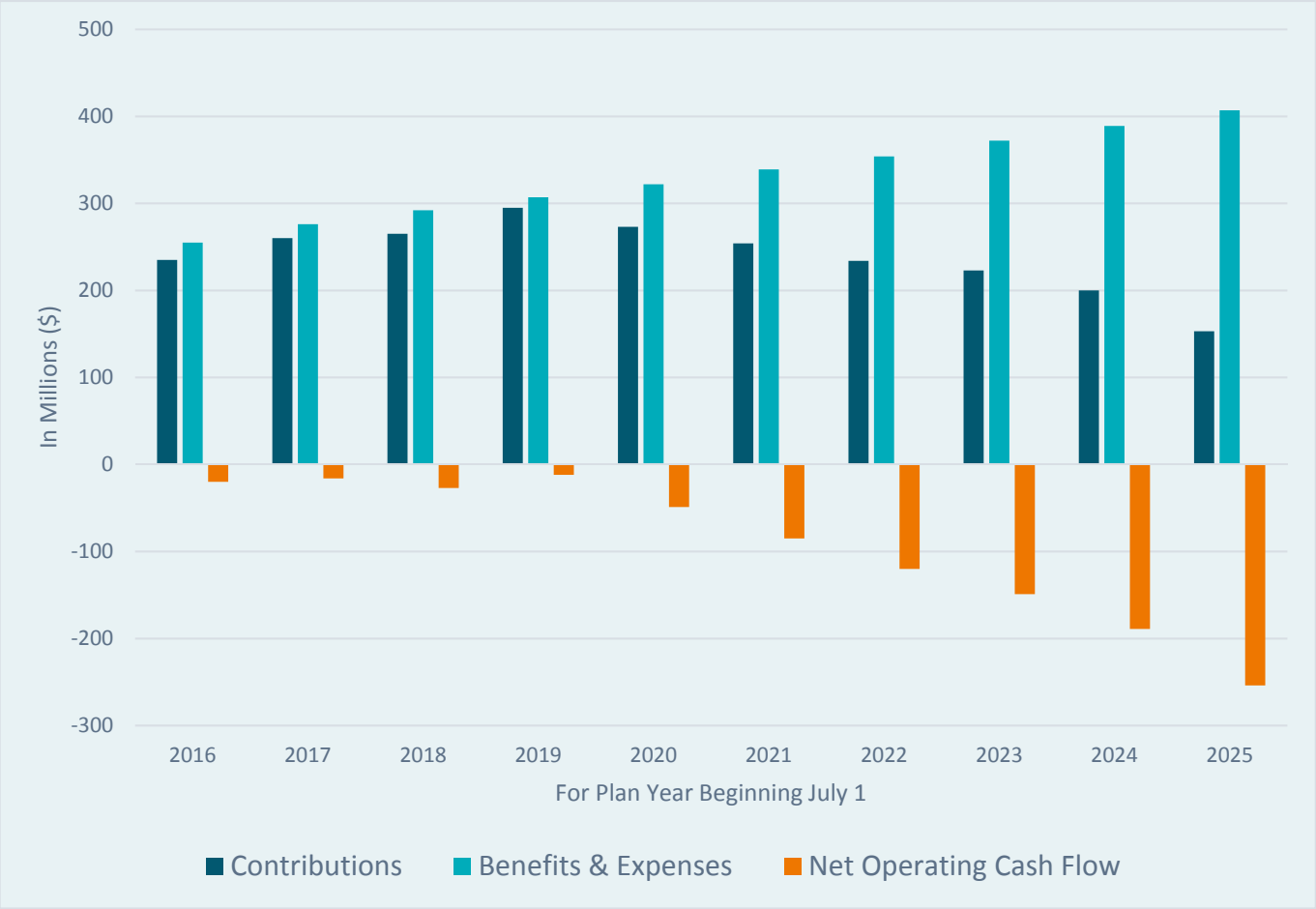


	2018/2019 Projected Contributions		
	As a % of Projected Payroll	In Dollars	As a % of Plan Assets
Employer:	54.1%	$231,400,000	5.3%
Members:	9.5%	$ 39,184,000	0.9%

** The recommended employer contribution when ignoring the 3 year phase-in of cost-impact changes from 2016 valuation is 55.93%.*

Projected cash flows

PROJECTED FUTURE CASH FLOWS



These projections assume all assumptions are met, and investment returns are 7% per year.

Source: Segal

Plan sponsor review

Peer group for comparisons

A peer group has been created to help assess the Plan Sponsor's financial health relative to other SACRS counties.

The peer group has been created by identifying two 37-Act Plans with populations larger than Fresno County and two with populations smaller than Fresno County:

— **Larger: Sacramento, Contra Costa**

— **Smaller: Kern, Ventura**

This peer group may also be appropriate because they are similar in terms of geography and several are also agriculturally-driven economies.

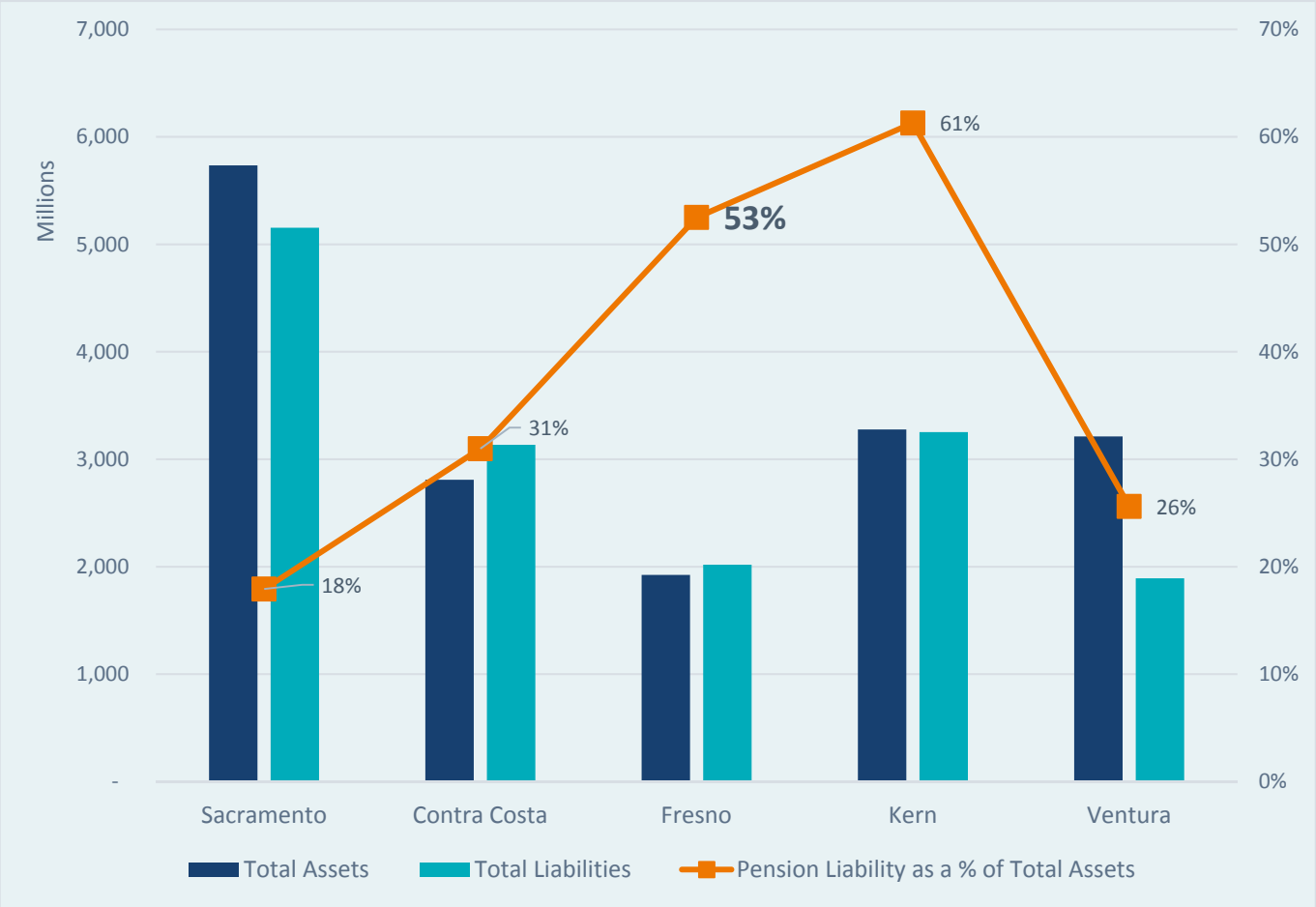
The following pages contain comparisons of financial data garnered from review of each county's CAFR. Every effort was made to ensure 'fair' comparisons, recognizing that each county has unique characteristics that make perfect comparison impossible.

1937 Act Systems	Population
Los Angeles	10,170,292
San Diego	3,299,521
Orange	3,169,776
San Bernadino	2,128,133
Alameda	1,638,215
Sacramento	1,501,335
Contra Costa	1,126,745
Fresno	**974,861**
Kern	882,176
Ventura	850,536
San Mateo	765,135
San Joaquin	726,106
Stanislaus	538,388
Sonoma	502,146
Tulare	459,863
Santa Barbara	444,769
Merced	268,455
Marin	261,221
Imperial	180,191
Mendocino	87,649

Source: Wikipedia

Balance sheet by county

ASSETS & LIABILITIES



Source: County CAFRs as of 6/30/16. Includes both governmental and business-type activities. This pension liability excludes pension obligation bonds

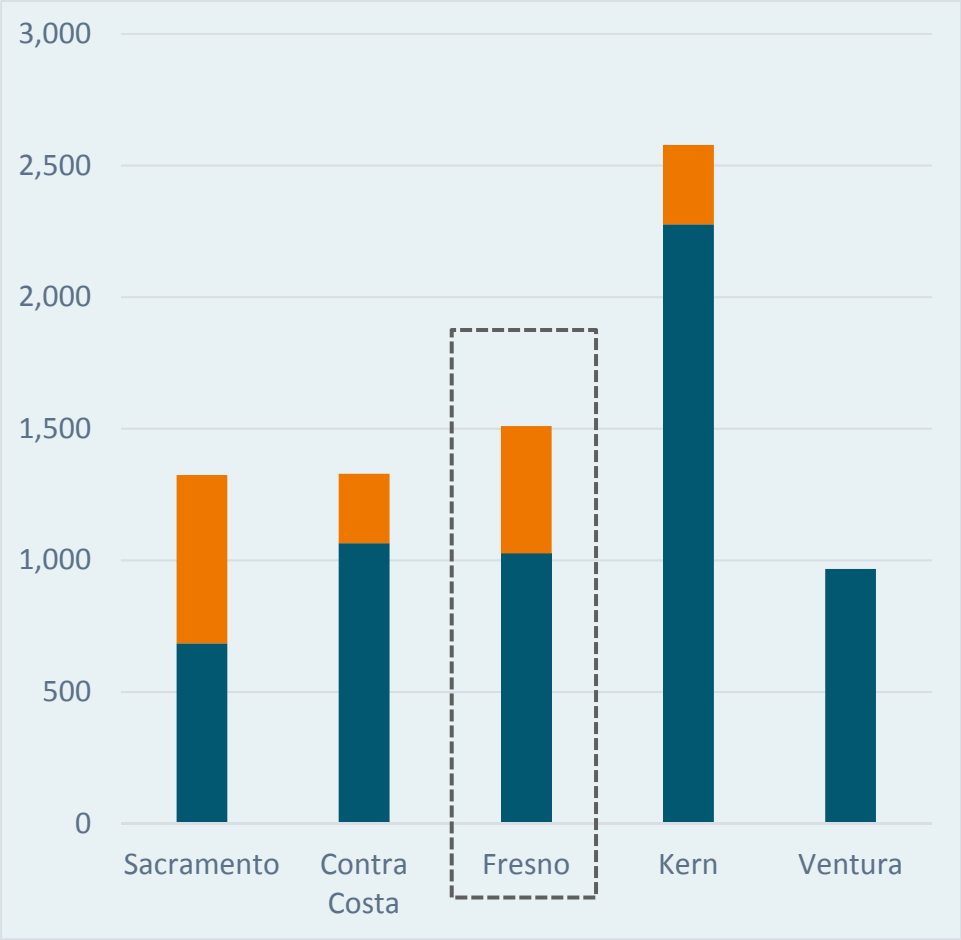
Fresno County's operations, in general, are on the smaller side relative to the counties being compared.

The accrued pension liability is more than half of total assets or liabilities (2nd highest).

County's pension liability

"TRUE" COST OF PENSION LIABILITY

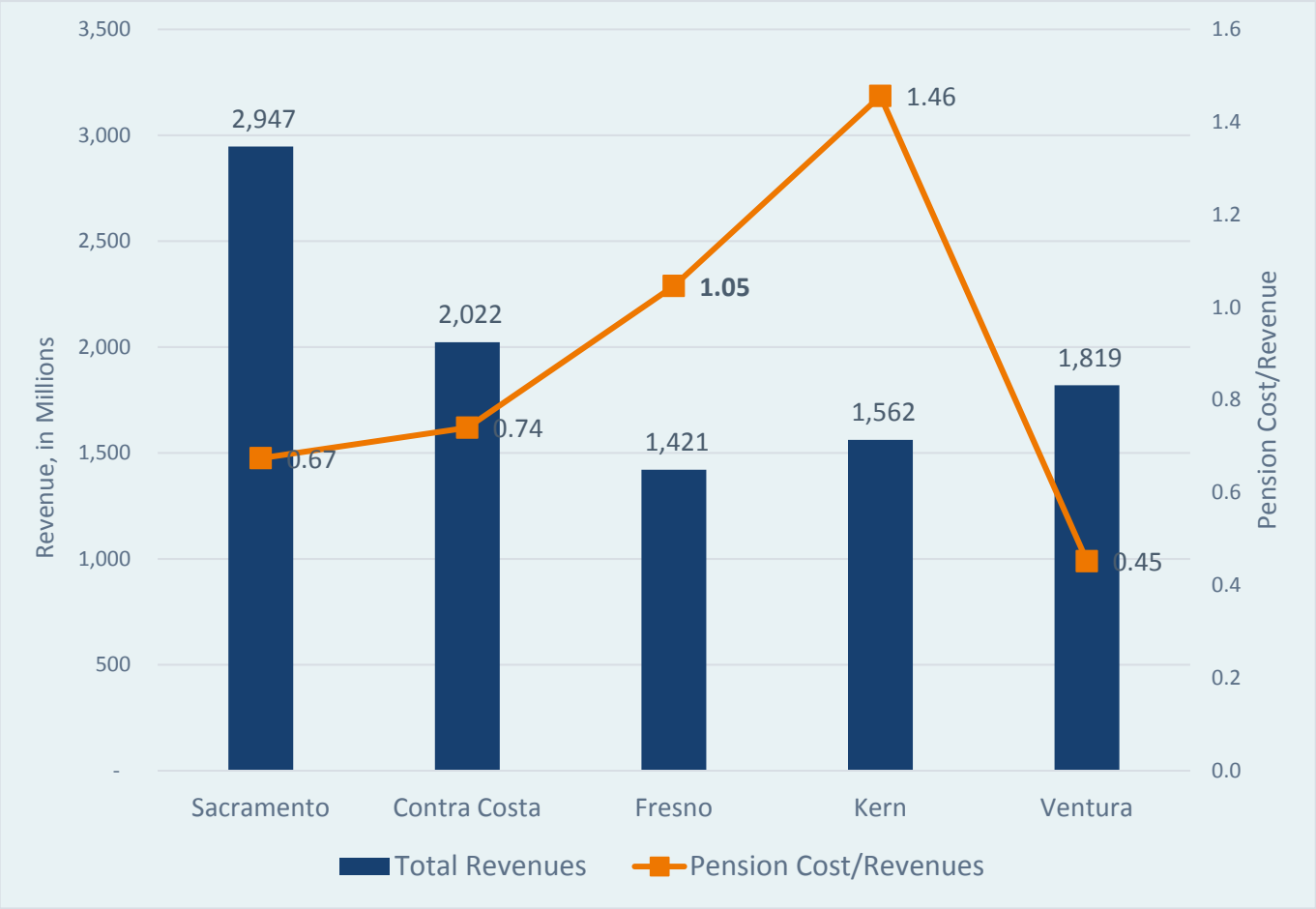
PENSION LIABILITY, PER CAPITA



Source: County CAFRs as of 6/30/16.

County revenues

REVENUES BY COUNTY



Fresno County's total revenue for fiscal 2016 was $1.42 billion.

The "true" pension cost (unfunded liability + POBs outstanding) was $1.49 billion).

Source: County CAFRs as of 6/30/16.

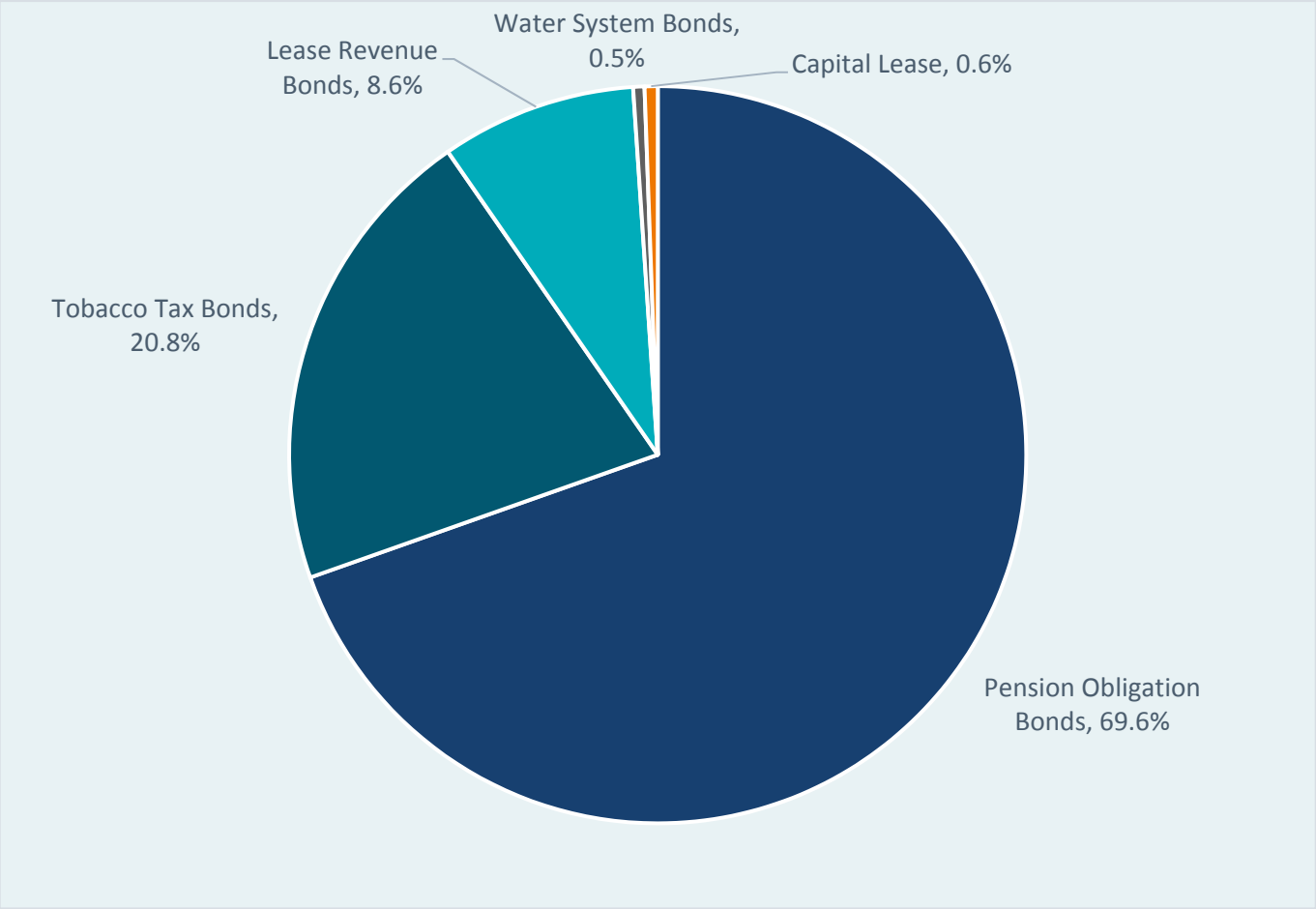
County contributions

2016 CONTRIBUTIONS BY COUNTY

Relative to county revenues, FCERA had the highest contributions of the 5 counties.

Fresno County debt structure

OUTSTANDING DEBT BY TYPE



Source: 2016 County CAFRs

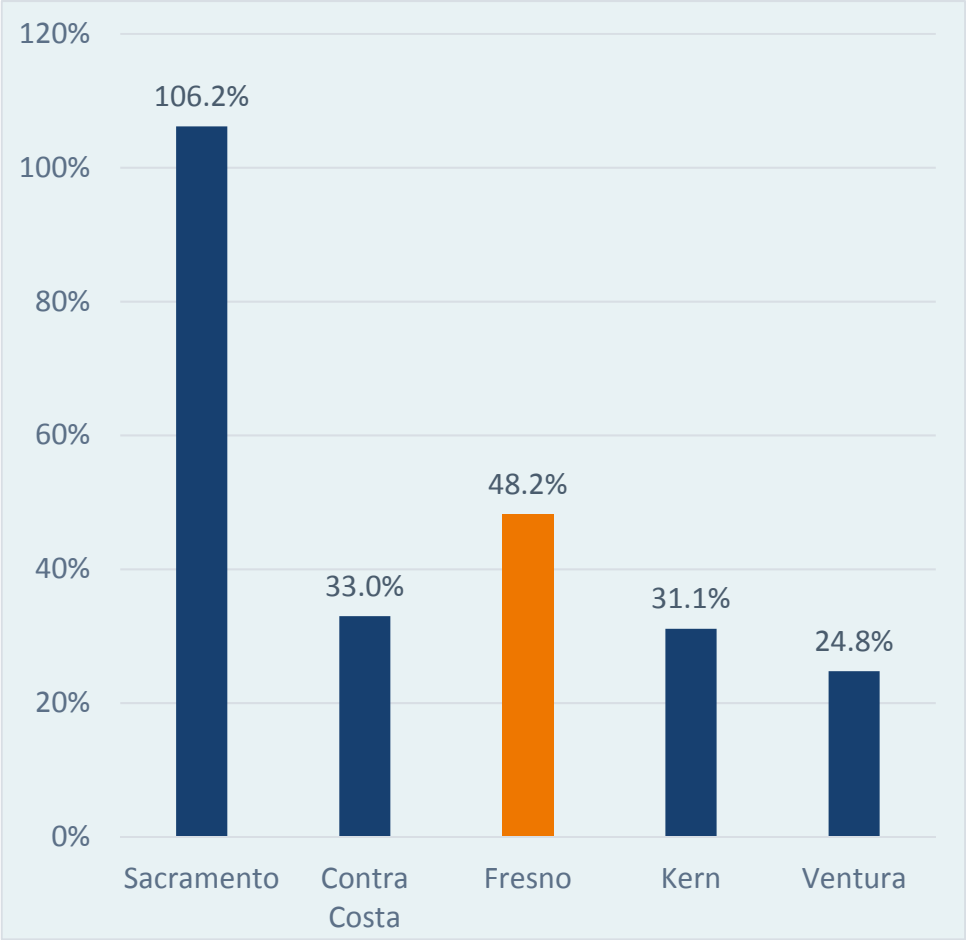
Compared with FCERA's ~70% debt associated with PO Bonds:

- Sacramento: 36%
- Contra Costa: 45%
- Kern: 55%
- Ventura: 0%

FCERA has $476 million in Pension Obligation Bonds outstanding; this amount is 25% of total assets.

Debt vs. revenue, population

TOTAL DEBT AS A PERCENT OF ANNUAL OF REVENUE



TOTAL DEBT PER CAPITA

Source: CAFRs. A significant portion of Sacramento's debt is associated with revenue bonds.

Credit ratings

Fresno's credit ratings are similar to other counties.

Credit ratings are generally specific to certain types of debt issued by municipalities.

- Rating agencies will factor in the type of bond (i.e. Revenue vs. GO vs. Pension Obligation).
- Because of the differing types of bonds, an "apples to apples" comparison can be difficult.
- The **teal** squares indicate current ratings for various bonds & counties.

Fresno County has Pension Obligation Bonds & Revenue Bonds in current circulation that rate:

- S&P: AA- & A
- Moody's: Baa1 & Baa
- These bonds, in general, have comparable ratings to the other Counties.

Credit ratings impact the cost of borrowing for the Plan Sponsor.

Municipal Bond Ratings: Standard & Poors

	Fresno	Contra Costa	Kern	Sacramento	Ventura
AAA					
AA+		■			
AA		■		■	■
AA-	■	■			
A+		■	■		
A	■				
A-				■	
BBB+					
BBB					
BBB-					

Municipal Bond Ratings: Moody's

	Fresno	Contra Costa	Kern	Sacramento	Ventura
Aaa					
Aa1		■			
Aa2					■
Aa3		■			
A1					
A2				■	
A3					
Baa1	■			■	
Baa2	■		■		
Baa3					

Source: Bloomberg as of 1/26/18. Refer to appendix for detailed explanations of credit ratings.

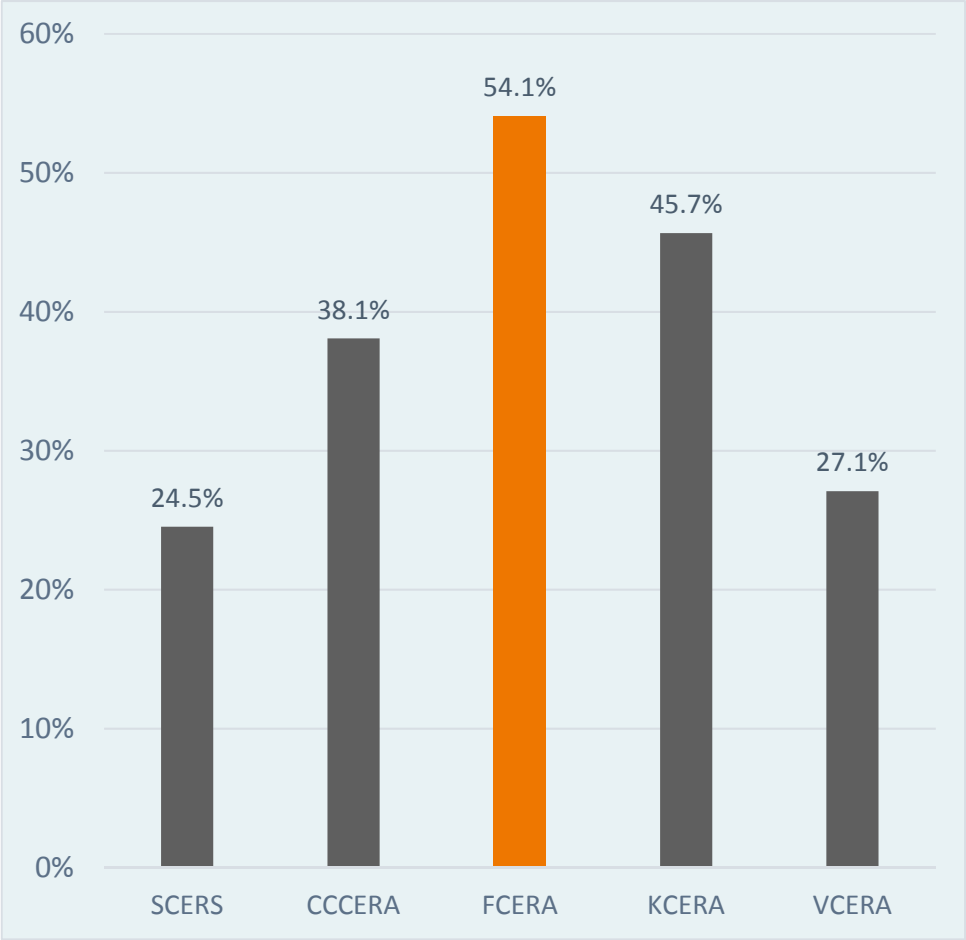
Peer Review

The following section compares the pension plans supported by these counties.

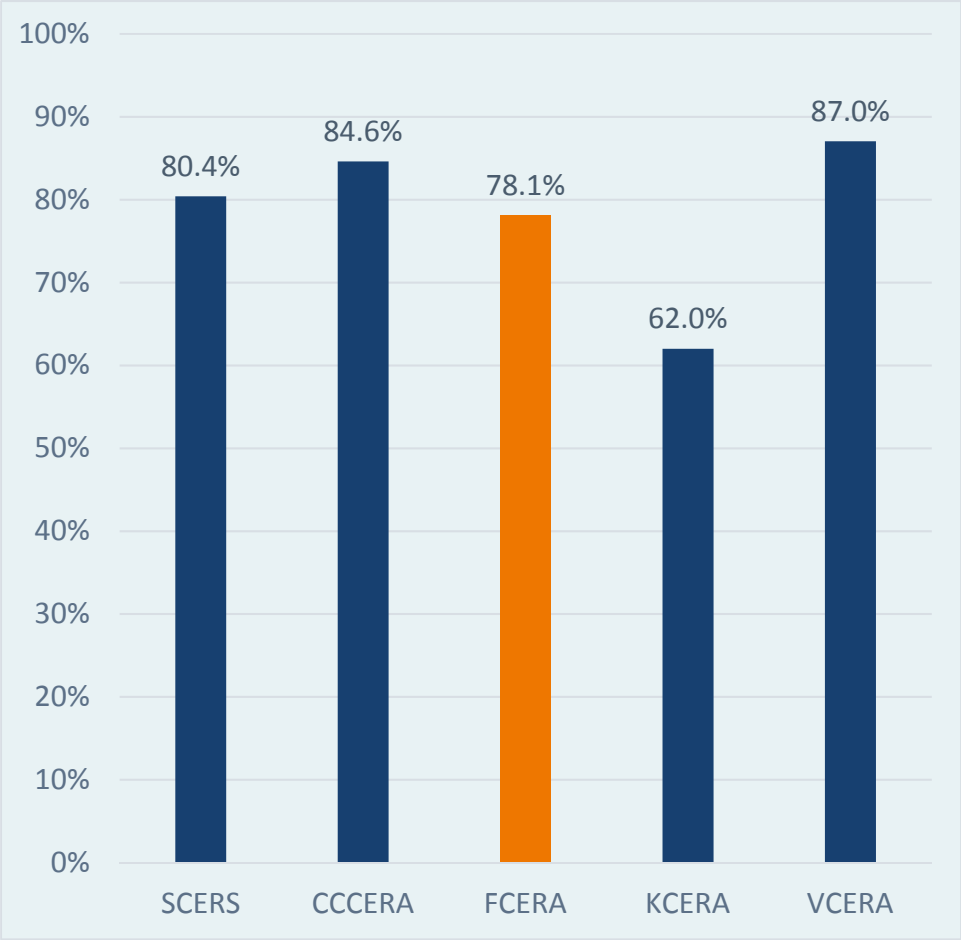
Data was obtained from the most recent actuarial valuation for each plan (all as of 6/30/17 with the exception of Contra Costa, which was valued at 12/31/16).

Contributions & funded status

EMPLOYER CONTRIBUTIONS AS A % OF PAYROLL



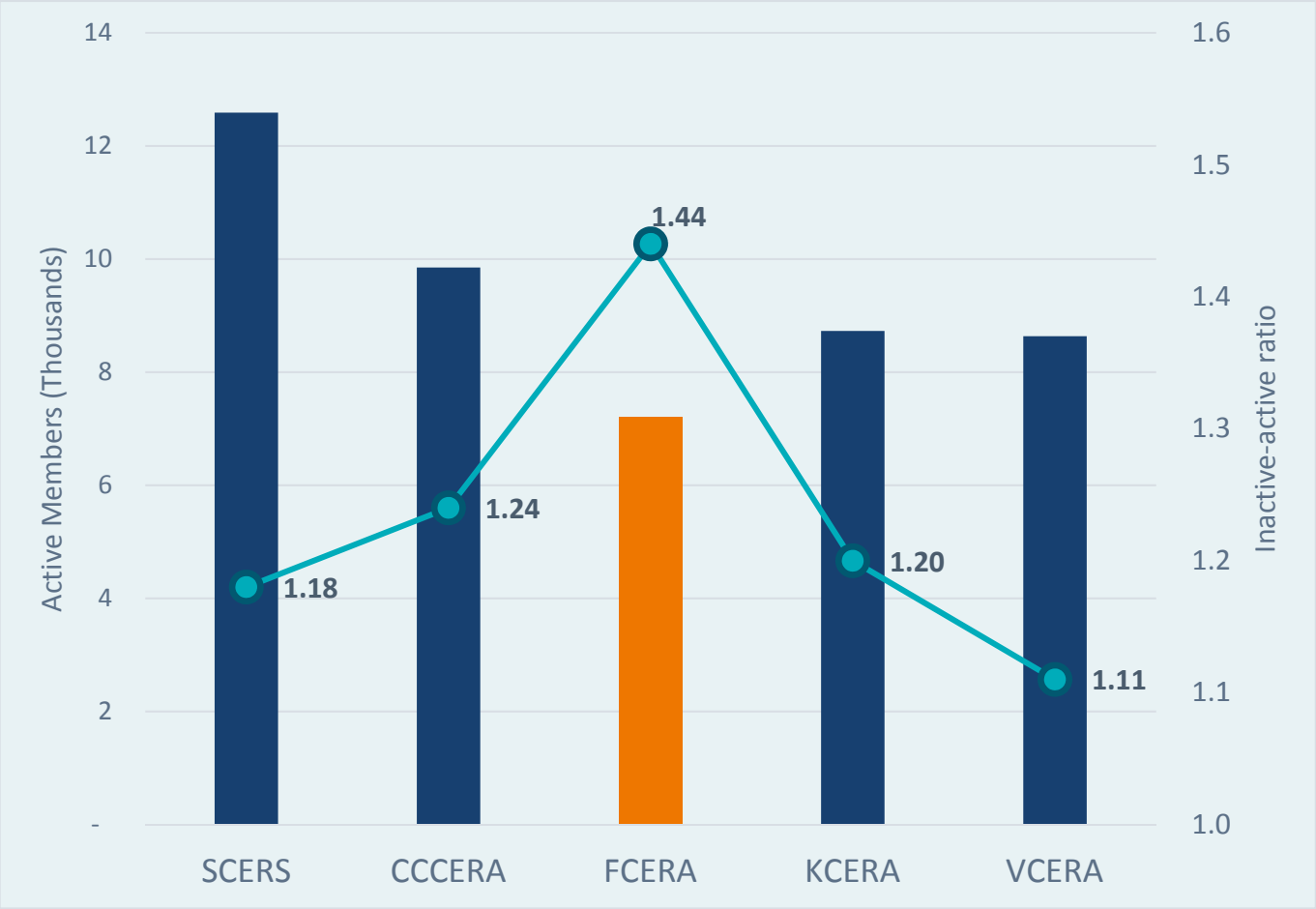
MARKET VALUE FUNDED STATUS



Contribution rates are the aggregate recommended rates as of most recent valuation and include the impact of any phase-in of assumption changes.

Member population

ACTIVE MEMBER POPULATION BY PLAN



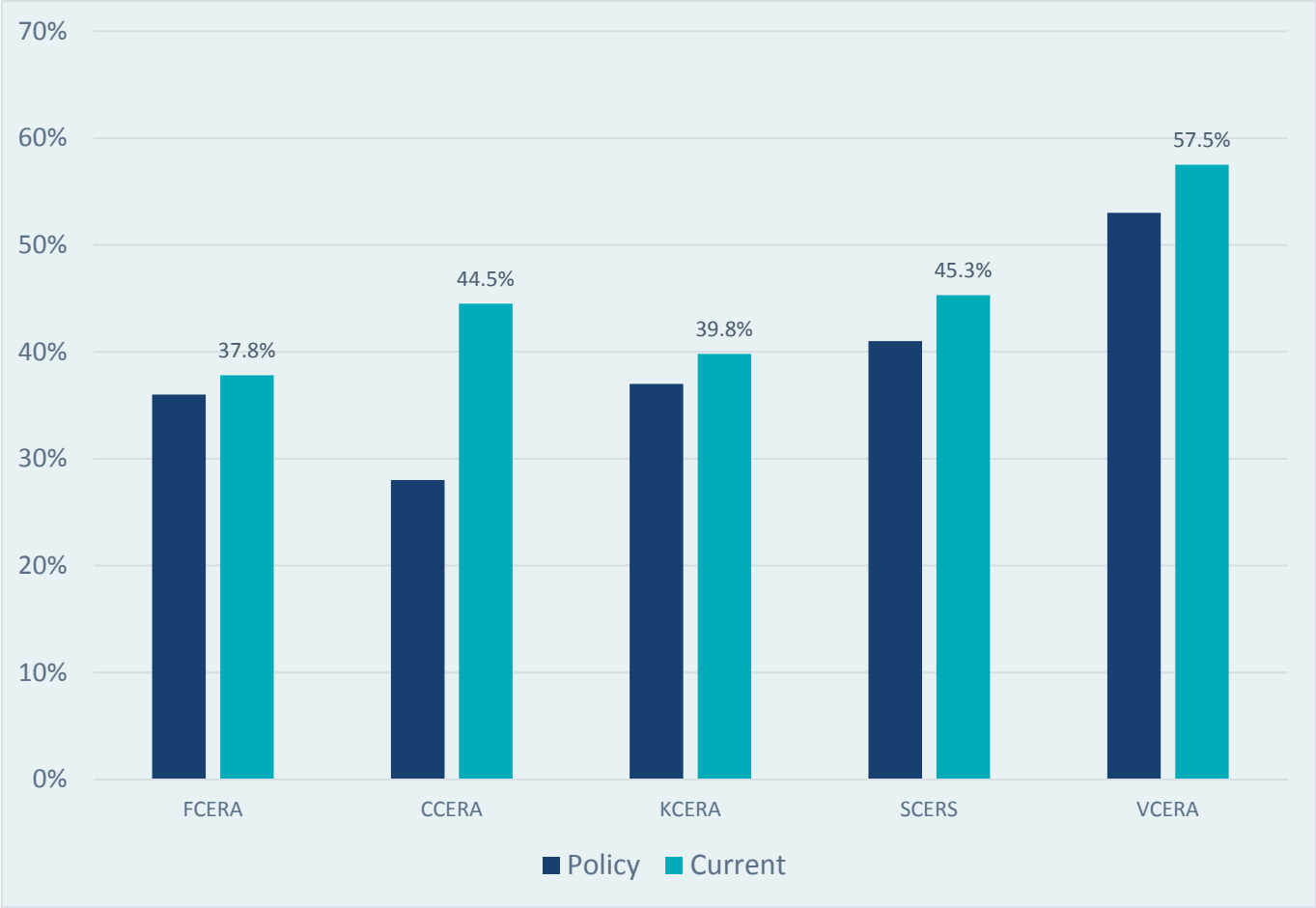
FCERA has significantly more in-actives & retirees relative to active members.

Since contributions are driven by the active population, this suggests a lower risk tolerance relative to peers.

Peer review: asset allocation

Equity allocation vs. peers

GLOBAL PUBLIC EQUITY: POLICY & CURRENT



FCERA's public equity is lower than the peers previously identified.

Source; IPS & Performance Reports. All as of 9/30 except VCERA, 12/31/16. Large overweight at CCERA a result of PE dry powder.

FCERA vs. peers

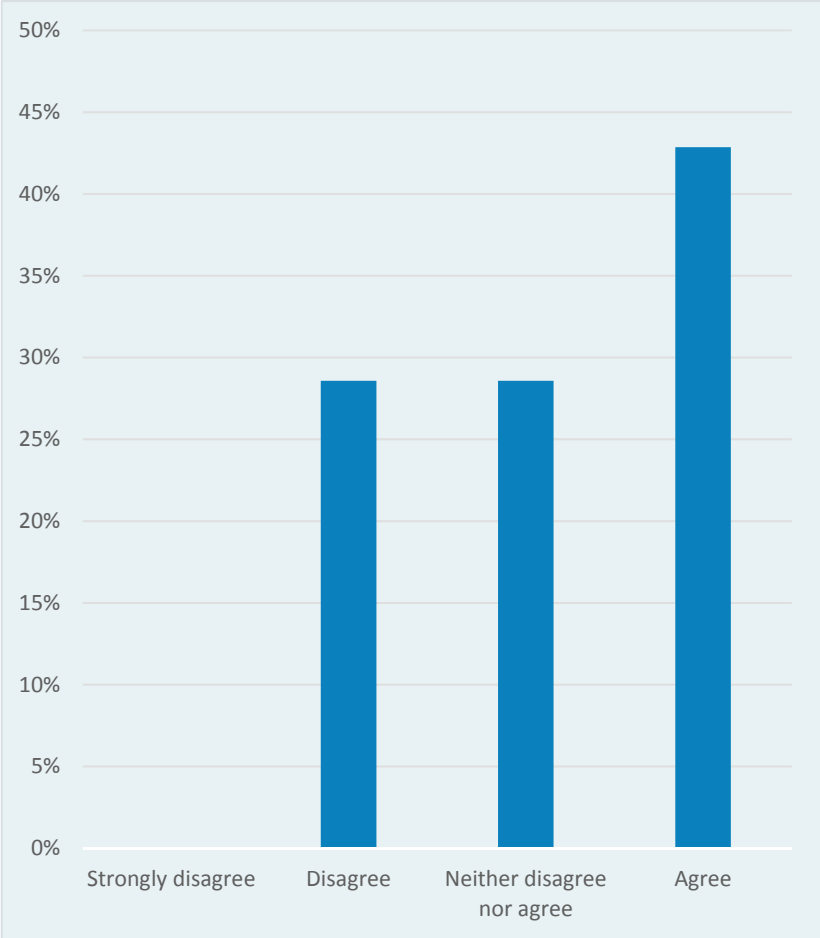
			Median Allocations	
	FCERA Policy	FCERA Current	SACRS Peers	RVK Survey - All Funds
US Equity	17.0%	17.5%	26.0%	27.1%
International Equity	12.0%	12.9%	17.0%	15.8%
Emerging Markets Equity	7.0%	7.4%	4.4%	3.4%
Global Equity	0.0%	0.0%	2.3%	4.0%
Total Public Equity	**36.0%**	**37.8%**	**49.6%**	**50.3%**
US Fixed Income	19.0%	21.3%	20.2%	21.4%
International Fixed Income	5.0%	5.0%	1.9%	1.1%
Global Fixed Income	7.0%	6.7%	1.1%	1.3%
Total Fixed Income	**31.0%**	**33.0%**	**23.1%**	**23.7%**
Real Estate	5.0%	4.6%	8.2%	7.8%
Alternatives	28.0%	17.8%	13.6%	13.0%
Cash	0.0%	4.3%	1.4%	1.9%
Other	0.0%	2.5%	4.0%	3.3%
Total Alternatives	**33.0%**	**29.2%**	**27.2%**	**26.0%**

Source: RV Kuhns Study

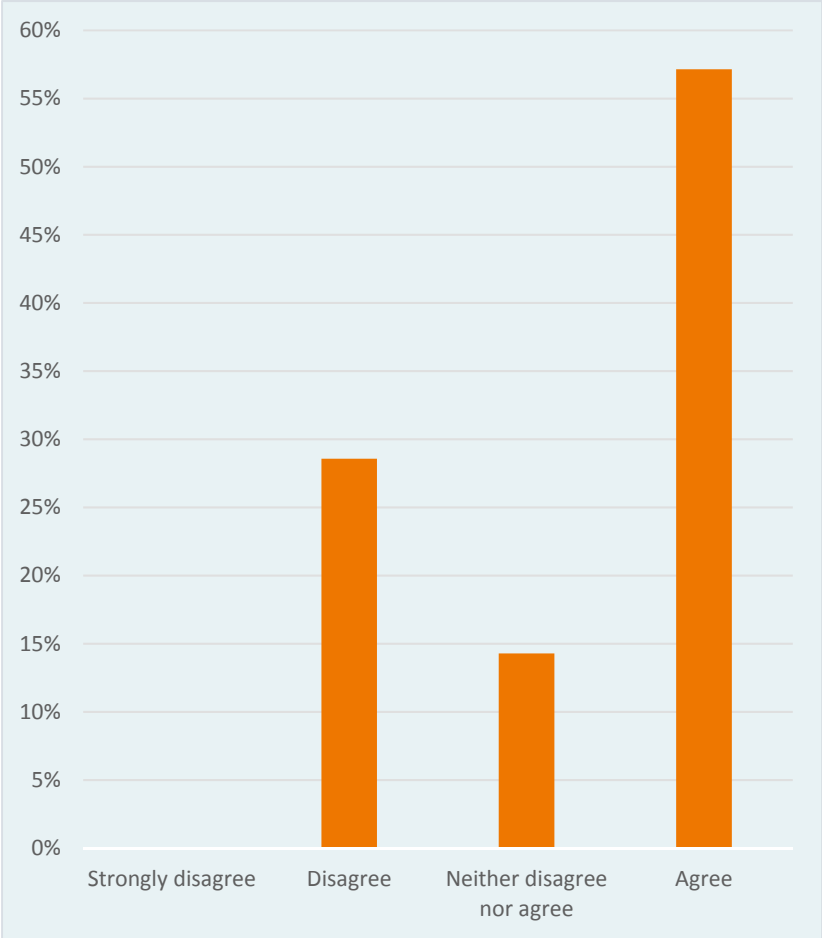
Trustee risk tolerance

Current policies

EFFECTIVELY GRANT AUTHORITIES, DELEGATE RESPONSIBILITIES, AND ENSURE ACCOUNTABILITY



KEEP THE BOARD EFFECTIVELY FOCUSED ON RELEVANT ISSUES



There appears to be some concern among Board members over the efficiency and effectiveness of the current governance policies

Current investment philosophy vs. beliefs

THE CURRENT INVESTMENT PHILOSOPHY SECTION OF THE IPS:

V. INVESTMENT PHILOSOPHY

1) The Board understands the responsibility to balance the objective of protecting the corpus of the Fund and protecting the purchasing power of assets against erosion by inflation, while at the same time incurring the risk necessary to earn adequate returns required to satisfy the ongoing financial obligations of the Fund. This requires a careful understanding of risk and return trade-offs in an always uncertain investment environment.

2) The Board recognizes the potentially severe consequences associated with a large loss of the Fund corpus and considers this risk when determining how much overall risk in the Fund's holdings is appropriate at any given time. The Board believes its paramount objective is to satisfy the financial obligations of the Fund and not to be overly influenced by peers, transitory investment theories, or outside interests. These beliefs, coupled with long-term nature of the Fund's liabilities, provide the overall framework from which the Board sets policy and directs the investment of the assets.

— Does the current Investment Philosophy section of the IPS conform to your current beliefs?

- "Yes, absolutely."
- "Yes."
- "Yes."
- "Yes."
- "Yes, but I feel the fund should be more aggressive."
- "Peer performance is important and we need to compare ourselves against our peers. If FCERA's returns, over a 3-5 year period, perform lower than the mean average of our peers then the board is not doing its job and our investment strategy needs to be re-evaluated!
- "Our current [risk] is too high with the return being very low. We need get of out the risky investments and stay with traditional equities and fixed income."

What is the primary objective of the plan?

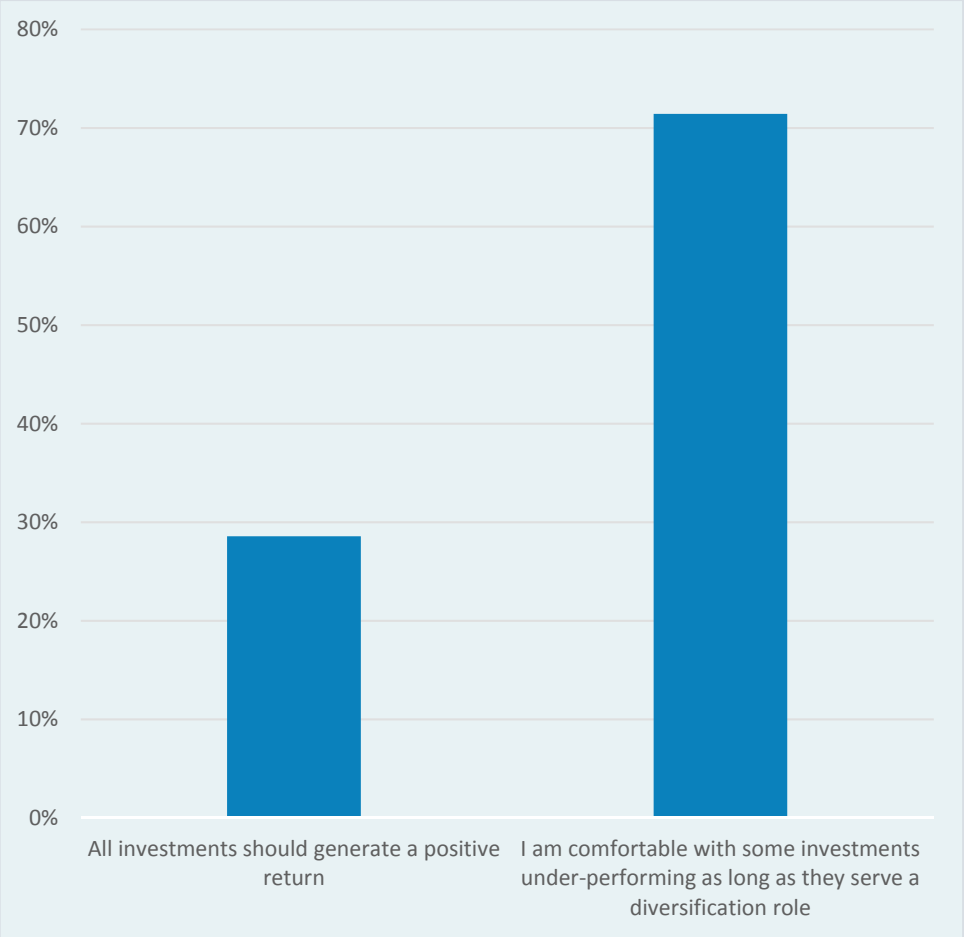
- “Provide required retirement benefits to members with a reasonable investment.”
- “Protect; Grow the investment at or above the discount rate.”
- “Long-term stable income and investment appreciation!”
- “Durability of the corpus to fund benefits.”
- “To protect and ensure funds are there to fulfill FCERA's obligations.”
- “To earn as much yield as possible with FCERA assets.”
- “Long-term investment growth using "total return" investing (growth plus income) sufficient to meet the 7% return objective, while being aware of the affects of significant drawdowns on the employers contribution rate.”

Concerns with the current asset allocation

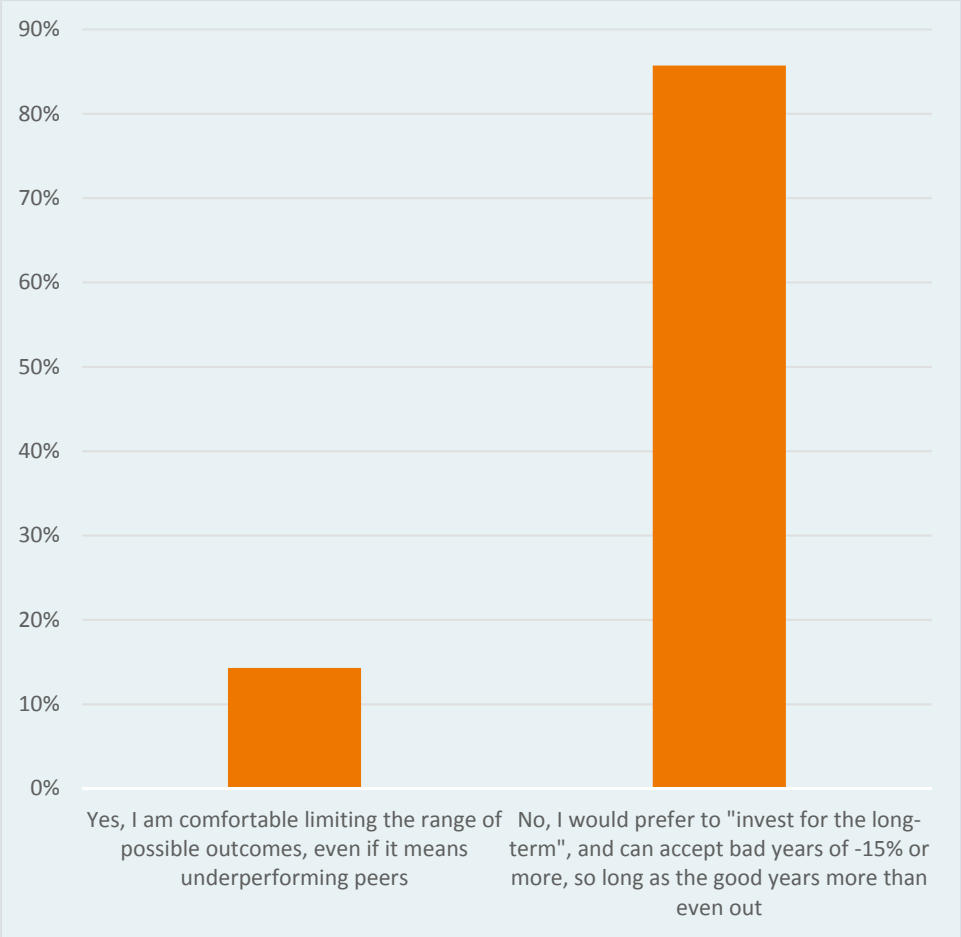
- "Need to be more aggressive and quicker to unload under performing investment managers."
- "We should be more invested in equities and less invested in fixed income."
- "I would carefully move monies out of the commodities account into other more positive performing accounts."
- "Short analytical duration of the current allocation/correlation."
- "I feel we could be taking a little more risk."
- "Too many investments in non traditional very risky markets like private equity and private debt. We should focus more on a high traditional equity index funds and some lower fixed income investment[s]. This is a long term investment."
- "Fear the board taking on more risk at a time when financial markets are not rewarding investors to do so."

Plan performance

INVESTMENT PERFORMANCE OVER A 3 YEAR TIME HORIZON

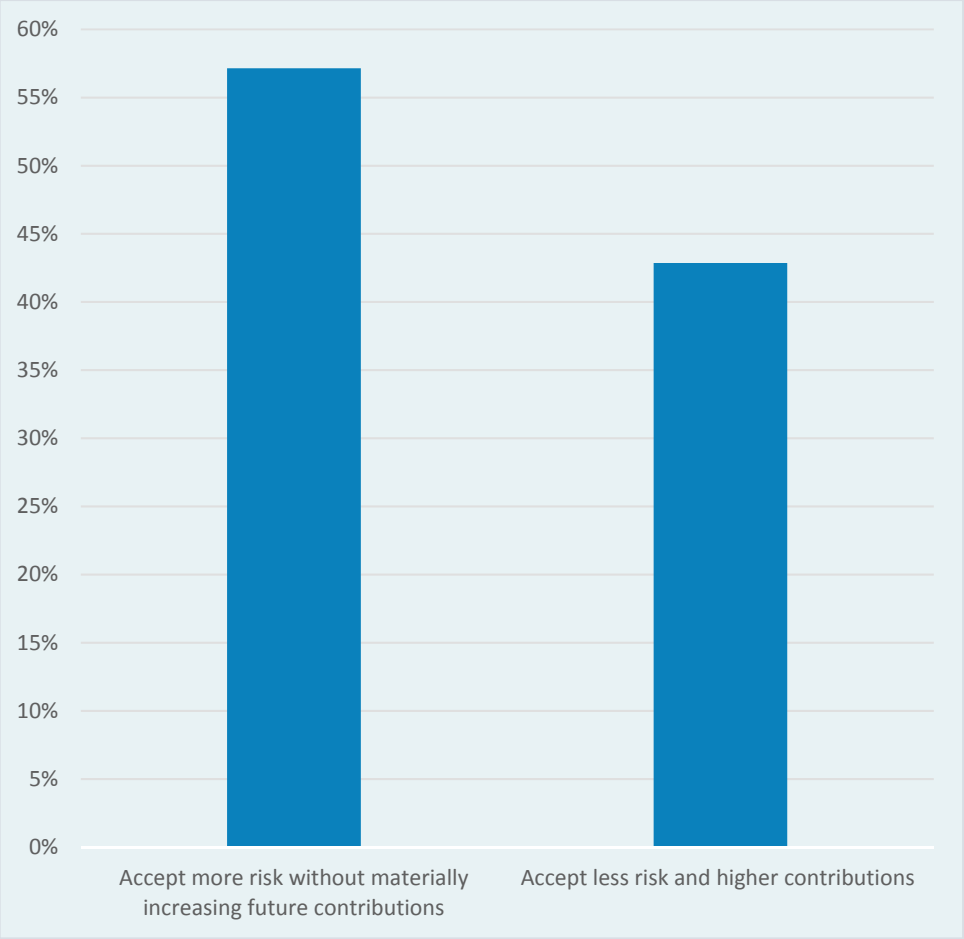


FOREGOING THE ABILITY TO EARN OUT-SIZED RETURNS TO LIMIT THE DOWNSIDE

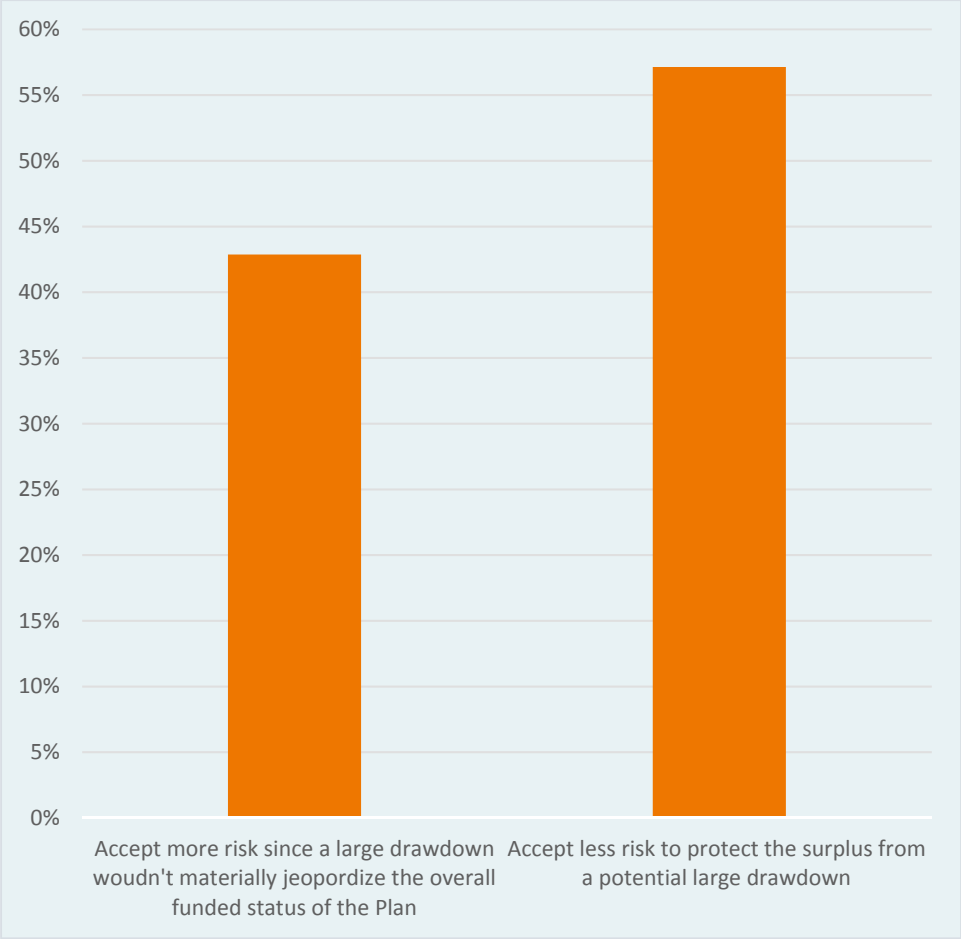


Impact of funded status

INVESTMENT APPROACH IF THE PLAN WAS 25-30% UNDERFUNDED

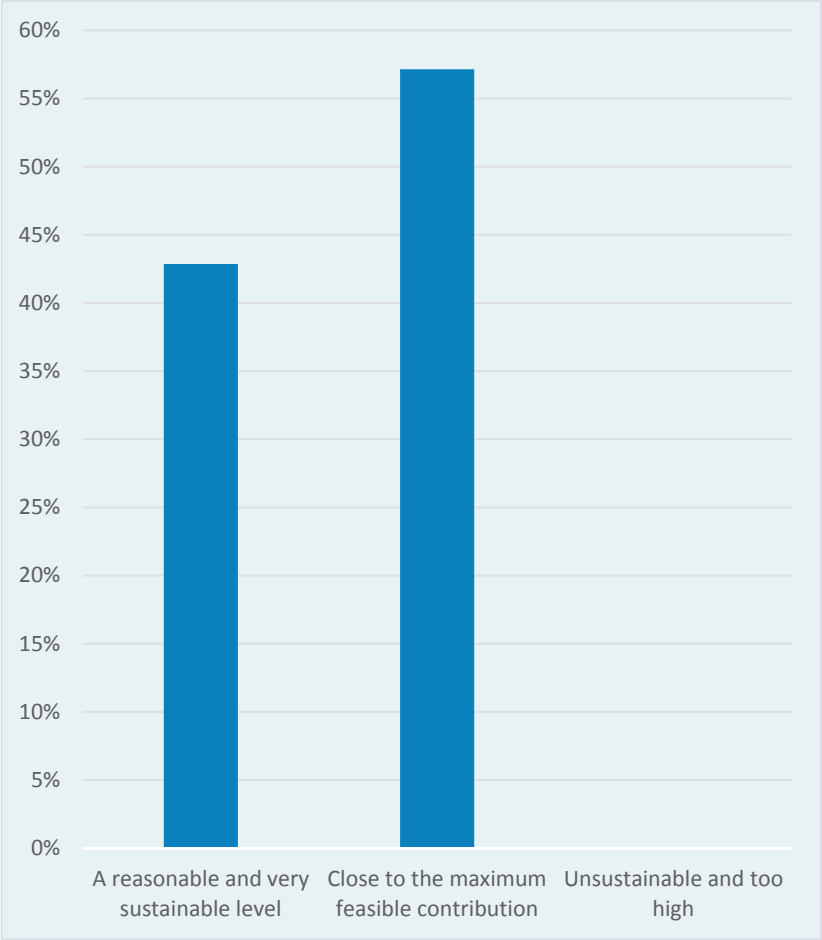


INVESTMENT APPROACH IF THE PLAN WAS 25-30% OVERFUNDED

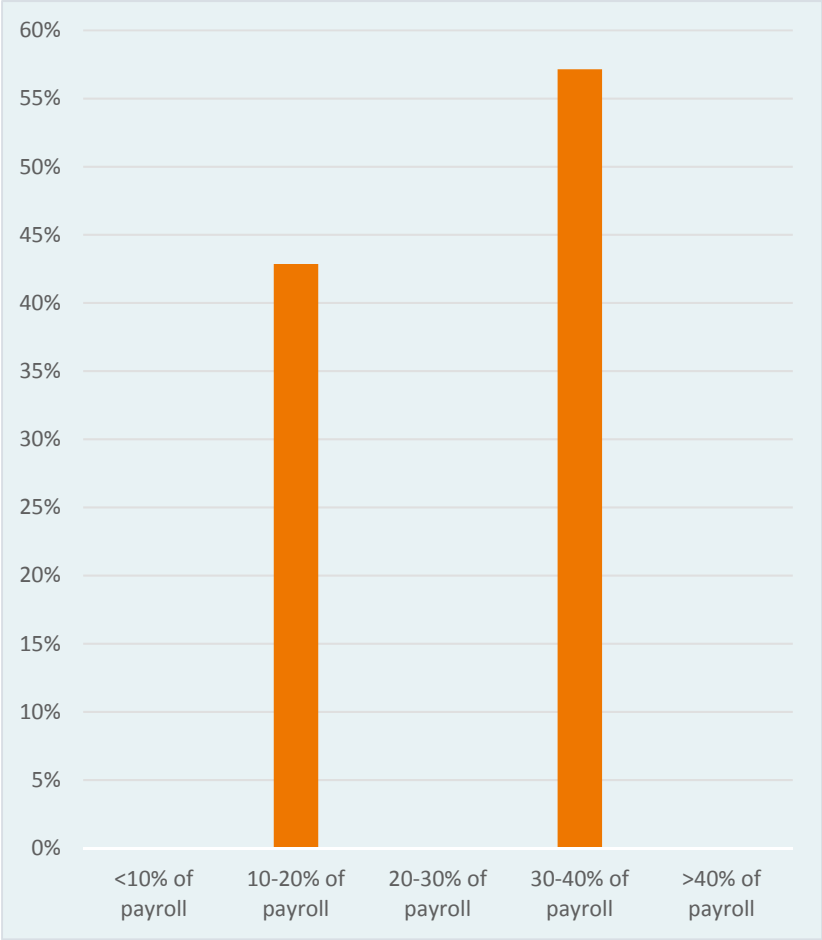


Plan contributions

CURRENT LEVEL OF ANNUAL CONTRIBUTIONS



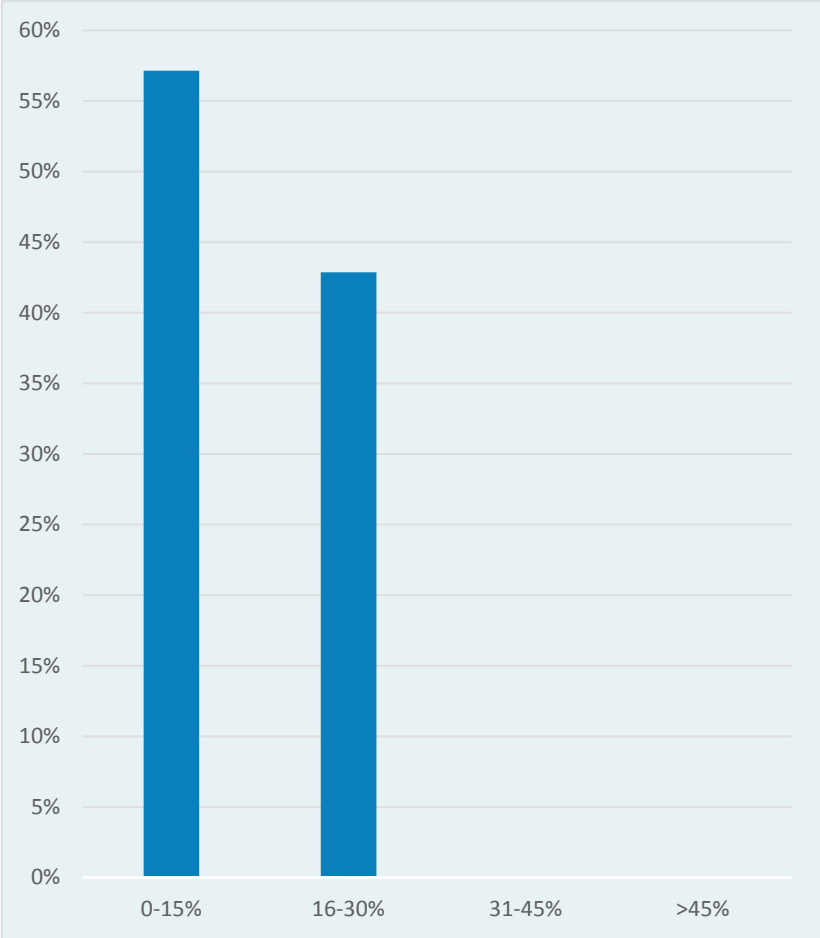
MAXIMUM SUSTAINABLE CONTRIBUTION AMOUNT EXPRESSED AS A PERCENT OF PAYROLL



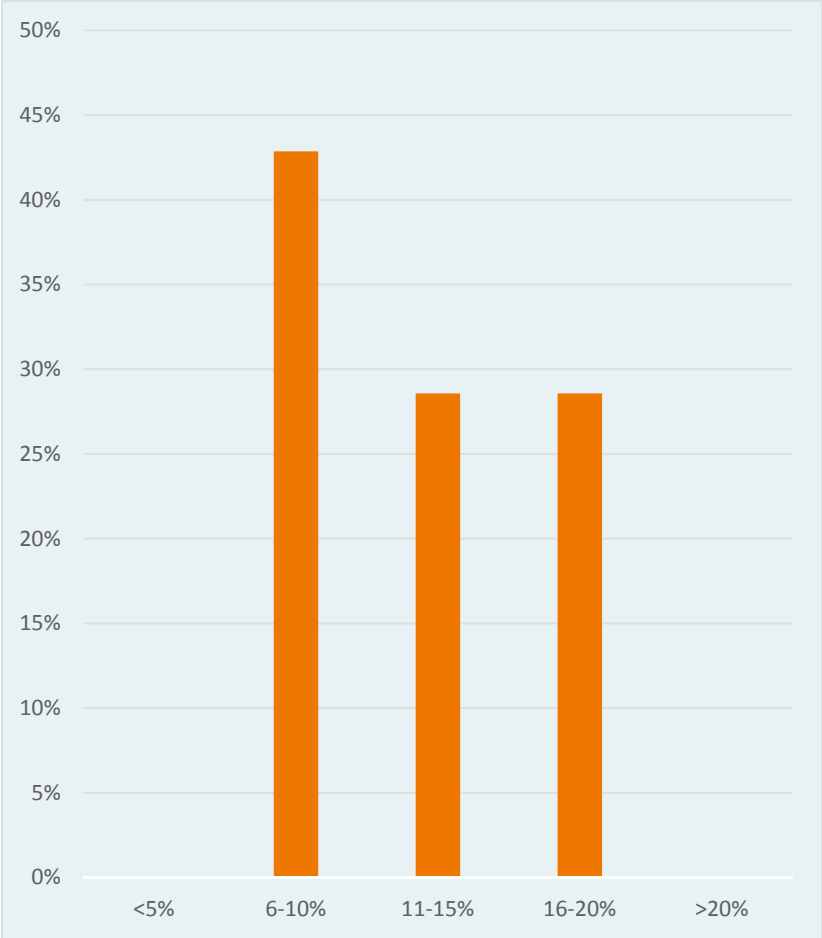
The aggregate recommended employer contribution rate of 54.1% for fiscal year 2018 is greater than the amount deemed sustainable

Plan risk

GREATEST DRAWDOWN (LOSS) THE PLAN COULD ACCEPT OVER THE NEXT 12 MONTHS



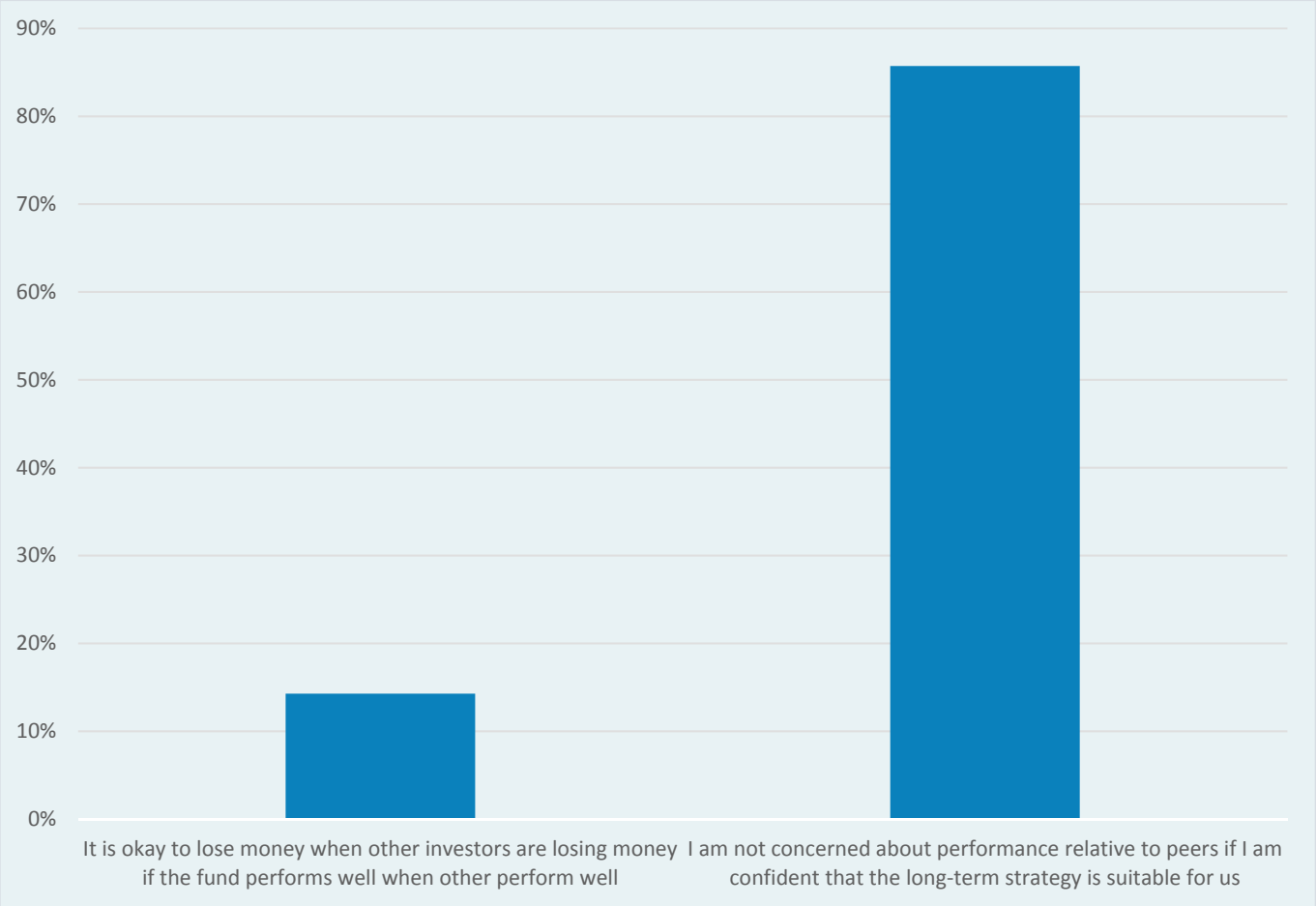
LEVEL OF ANNUALIZED VOLATILITY (AS MEASURED BY STANDARD DEVIATION) THAT IS ACCEPTABLE FOR THE PLAN



Annualized volatility greater than 15% could lead to drawdowns larger than what has been labeled as acceptable

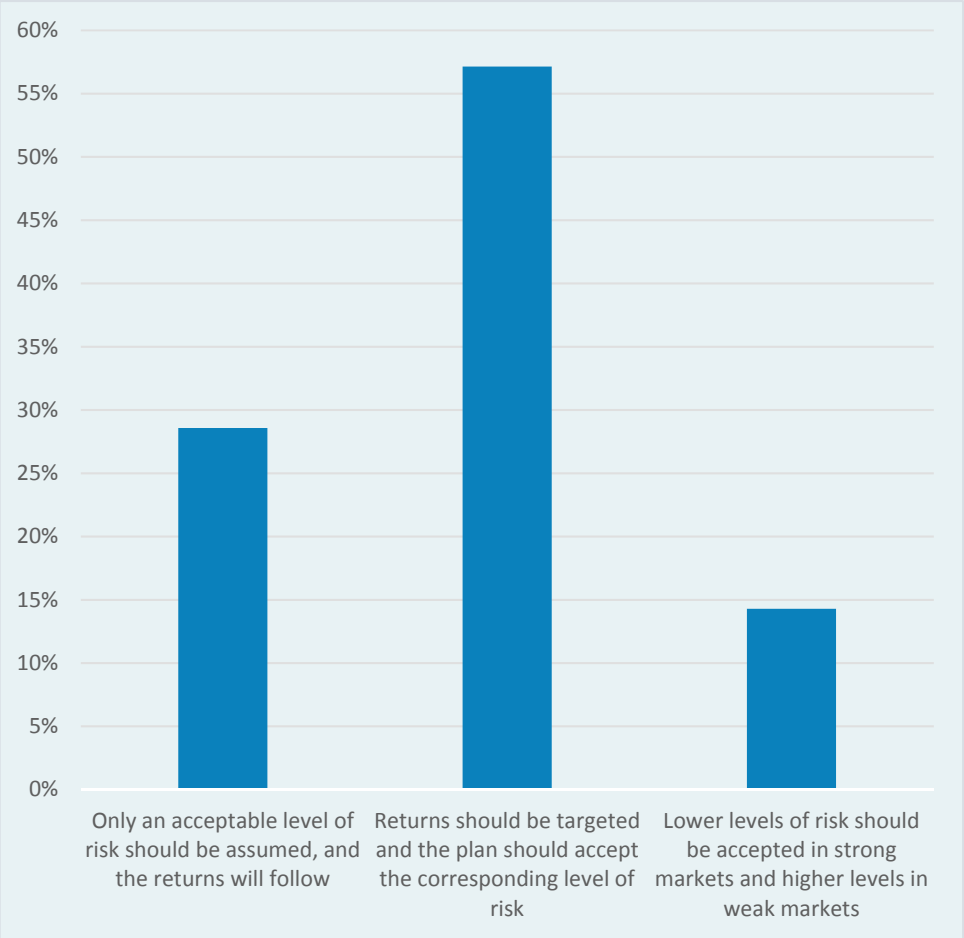
Peer risk

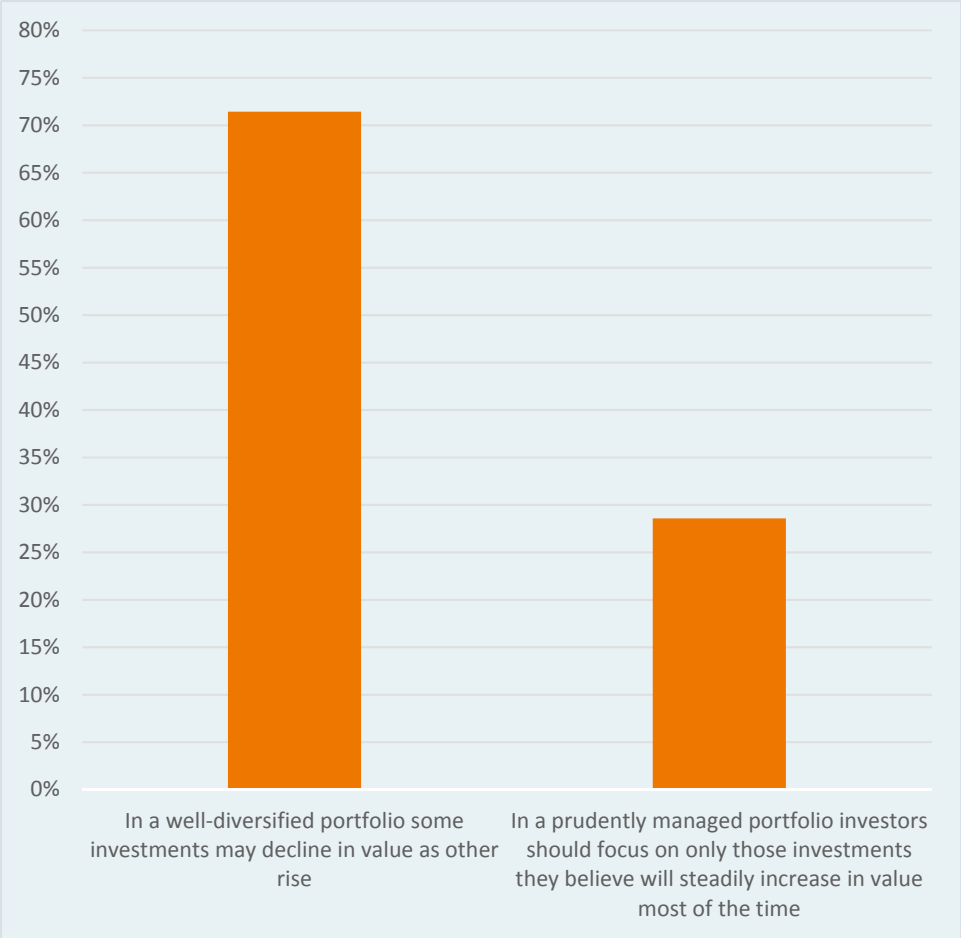
PERFORMANCE RELATIVE TO PEERS



The majority of Board members are more concerned about determining an appropriate investment strategy for FCERA than peer risk

Risk and return





Conclusions

Observations

Risk tolerance is a function of two things:

Ability

- The member population is aging, with less active employees relative to the overall population. This is contributing to higher contribution rates.
- Relative to assets, liabilities, revenues, or population, Fresno County's pension liability is larger than 3 of 4 counties compared.
- Current contribution rates and contributions relative to revenues are the highest of the peer group.
- A large portion of Fresno County's outstanding debt is POBs.

Willingness

- In general, there are varying degrees of comfort with the current, relatively conservative allocation.
- Mixed opinions about primary objective as well as importance of comparisons to peers.
- Varying degrees of comfort with principles of diversification.
- Consensus that contribution rates are already very high.
- Some disconnect between acceptable volatility level and acceptable drawdown.

The objective will be to further synthesize these competing concepts through scenario based asset-liability modeling using potentially more aggressive asset allocations.

2018 Asset-liability study timeline

Timeframe	Action	Description
December 6, 2017 Board Meeting	Board Meeting	Segal to review the finalized 6.30.17 actuarial valuation with the Board. Verus to review risk tolerance survey results.
December 15, 2017	Verus receives raw data from Segal	Segal to provide Verus with data used in 2017 actuarial valuation
+ 6 weeks	Liability Model Development	Verus partners with an outside firm in order to build a replication valuation using the information provided by Segal. The purpose of this is so that we can integrate the liability characteristics with asset characteristics.
+ 3 weeks	Verification of Liability Model accuracy	Once Verus receives replication valuation from outside vendor we verify the baseline forecasts align with Segal's valuation and projections.
January 30, 2017	Verus finalizes 2018 Capital Market Assumptions	Verus' strategic research team finalizes the asset-level projections using market data as of 12/31/17.
February 7, 2018 Board Meeting	Phase 1 of ALS	Review of Enterprise Risk Tolerance. Review of FCERA AA relative to current SACRS universe. Review fiscal health of sponsor
+ 3 weeks	Comparison Portfolio Development	Verus to develop comparison portfolios used for discussion purposes. These portfolios will have significant overall risk and allocation differences and will serve as the "goal posts" of the ALS.

2018 Asset-liability study timeline cont'd

Timeframe	Action	Description
March 7, 2018 Board Meeting	Phase 2 of ALS	Verus to review the current portfolio relative to the comparison portfolios and generate asset-only modeling for each portfolio, focused on risk, return, scenario analysis, shock analyses, and risk decomposition
+ 3 weeks	Asset-Liability Integration	Verus to load comparison portfolios into liability model framework, prepare deterministic and stochastic modeling.
April 4, 2018 Board Meeting	Phase 3 of ALS	Verus to review results of asset-liability modeling using the comparison portfolios. **Milestone #1: Narrow down which comparison portfolio offers the most attractive set of trade-offs relative to liabilities.*
+ 3 weeks	Further refinement of selected comparison portfolio	Once the Board gains comfort with the broad set of risk/return characteristics of a comparison portfolio, Verus to conduct further asset-only modeling to determine several similar alternatives
May 2, 2018 Board Meeting	Phase 4 of ALS	Verus will review the similar alternatives relative to the comparison portfolio that was selected for further consideration at April meeting. **Milestone #2: Identify the new asset allocation mix to be implemented.*
June 6, 2018 Board Meeting	Phase 5 of ALS	Verus will review next steps for implementing the new asset allocation. Revise IPS, manager searches, transitions, etc.

Appendix I

Moody's Credit Ratings

Aaa	Obligations rated Aaa are judged to be of the highest quality, with minimal credit risk.
Aa	Obligations rated Aa are judged to be of high quality and are subject to very low credit risk.
A	Obligations rated A are considered upper-medium grade and are subject to low credit risk.
Baa	Obligations rated Baa are subject to moderate credit risk. They are considered medium-grade and as such may possess certain speculative characteristics.
Ba	Obligations rated Ba are judged to have speculative elements and are subject to substantial credit risk.
B	Obligations rated B are considered speculative and are subject to high credit risk.
Caa	Obligations rated Caa are judged to be of poor standing and are subject to very high credit risk.
Ca	Obligations rated Ca are highly speculative and are likely in, or very near, default, with some prospect of recovery of principal and interest.
C	Obligations rated C are the lowest rated class of bonds and are typically in default, with little prospect for recovery of principal or interest.

Note: *Moody's appends numerical modifiers 1, 2, and 3 to each generic rating classification from Aa through Caa. The modifier 1 indicates that the obligation ranks in the higher end of its generic rating category; the modifier 2 indicates a mid-range ranking; and the modifier 3 indicates a ranking in the lower end of that generic rating category.*

Source: Moody's rating Symbols & Definitions

S&P Credit Rating Definitions

Long-Term Issuer Credit Ratings*	
Category	Definition
AAA	An obligor rated 'AAA' has extremely strong capacity to meet its financial commitments. 'AAA' is the highest issuer credit rating assigned by Standard & Poor's.
AA	An obligor rated 'AA' has very strong capacity to meet its financial commitments. It differs from the highest-rated obligors only to a small degree.
A	An obligor rated 'A' has strong capacity to meet its financial commitments but is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligors in higher-rated categories.
BBB	An obligor rated 'BBB' has adequate capacity to meet its financial commitments. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its financial commitments.
BB; B; CCC; and CC	Obligors rated 'BB', 'B', 'CCC', and 'CC' are regarded as having significant speculative characteristics. 'BB' indicates the least degree of speculation and 'CC' the highest. While such obligors will likely have some quality and protective characteristics, these may be outweighed by large uncertainties or major exposures to adverse conditions.
BB	An obligor rated 'BB' is less vulnerable in the near term than other lower-rated obligors. However, it faces major ongoing uncertainties and exposure to adverse business, financial, or economic conditions which could lead to the obligor's inadequate capacity to meet its financial commitments.
B	An obligor rated 'B' is more vulnerable than the obligors rated 'BB', but the obligor currently has the capacity to meet its financial commitments. Adverse business, financial, or economic conditions will likely impair the obligor's capacity or willingness to meet its financial commitments.
CCC	An obligor rated 'CCC' is currently vulnerable, and is dependent upon favorable business, financial, and economic conditions to meet its financial commitments.
CC	An obligor rated 'CC' is currently highly vulnerable. The 'CC' rating is used when a default has not yet occurred, but Standard & Poor's expects default to be a virtual certainty, regardless of the anticipated time to default.
R	An obligor rated 'R' is under regulatory supervision owing to its financial condition. During the pendency of the regulatory supervision the regulators may have the power to favor one class of obligations over others or pay some obligations and not others.
SD and D	An obligor rated 'SD' (selective default) or 'D' is in default on one or more of its financial obligations including rated and unrated financial obligations but excluding hybrid instruments classified as regulatory capital or in non-payment according to terms. An obligor is considered in default unless Standard & Poor's believes that such payments will be made within five business days of the due date in the absence of a stated grace period,or within the earlier of the stated grace period or 30 calendar days. A 'D' rating is assigned when Standard & Poor's believes that the default will be a general default and that the obligor will fail to pay all or substantially all of its obligations as they come due. An 'SD' rating is assigned when Standard & Poor's believes that the obligor has selectively defaulted on a specific issue or class of obligations but it will continue to meet its payment obligations on other issues or classes of obligations in a timely manner. An obligor's rating is lowered to 'D' or 'SD' if it is conducting a distressed exchange offer.
NR	An issuer designated 'NR' is not rated.

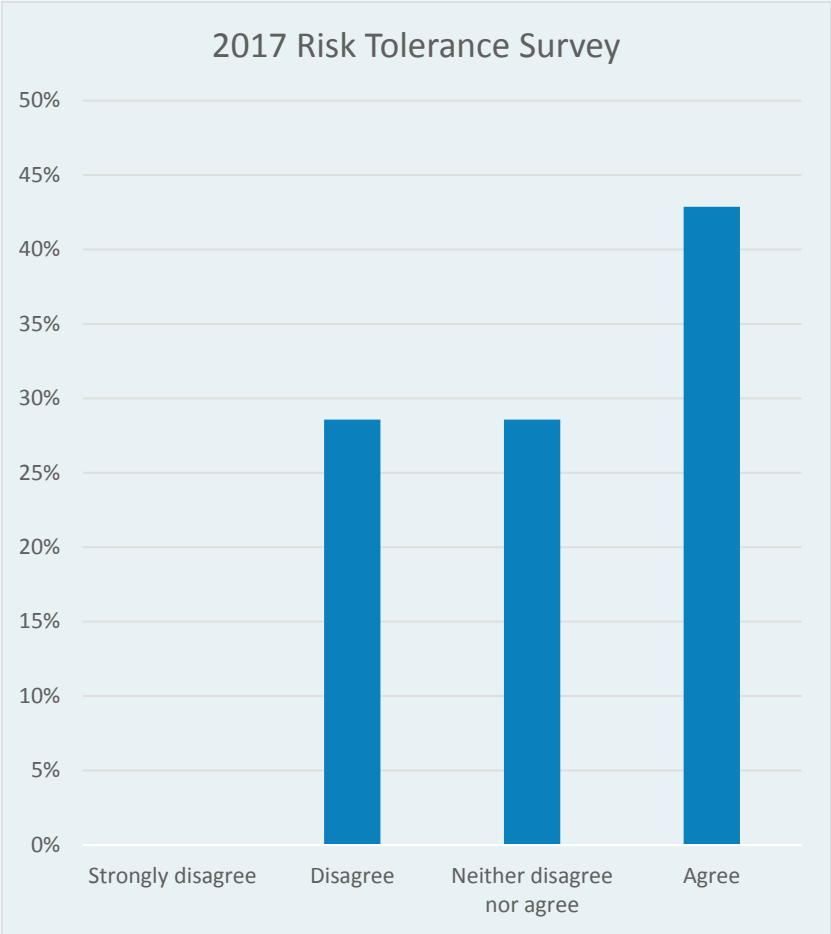
*The ratings from 'AA' to 'CCC' may be modified by the addition of a plus (+) or minus (-) sign to show relative standing within the major rating categories.

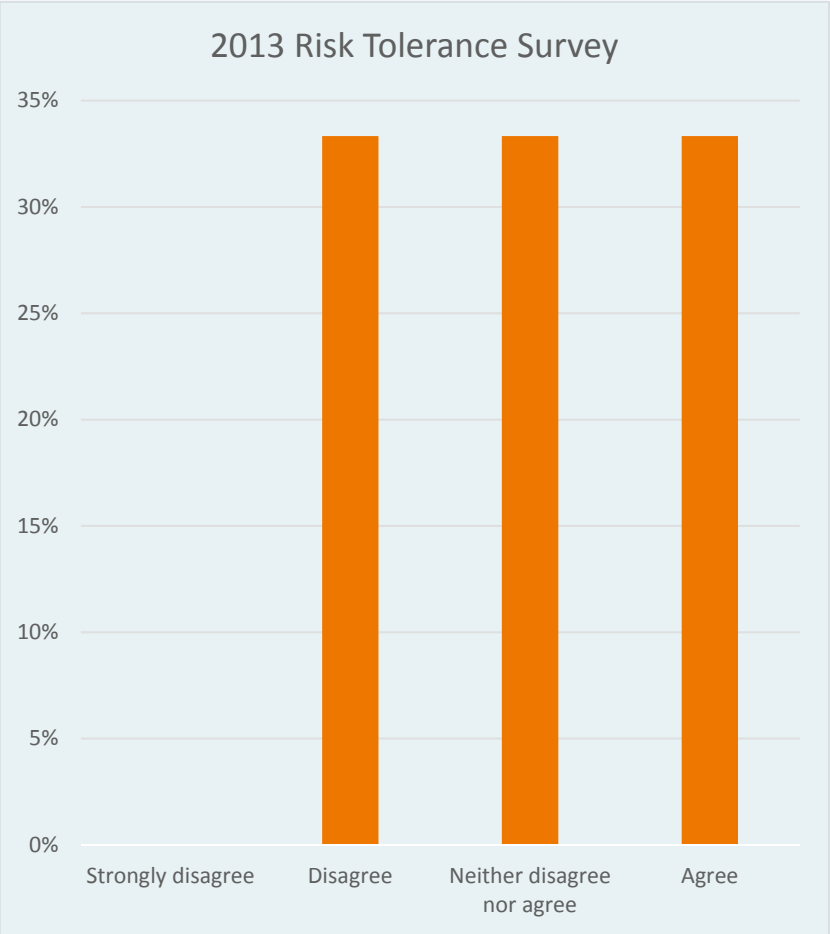
Source: Standard and Poor's Ratings Definitions. http://www.standardandpoors.com/en_US/web/guest/article/-/view/sourceId/504352

Appendix II: 2013 comparisons of risk tolerance survey

Current policies

Effectively grant authorities, delegate responsibilities, and ensure accountability





What is the primary objective of the plan?

2017 Risk Tolerance Survey:

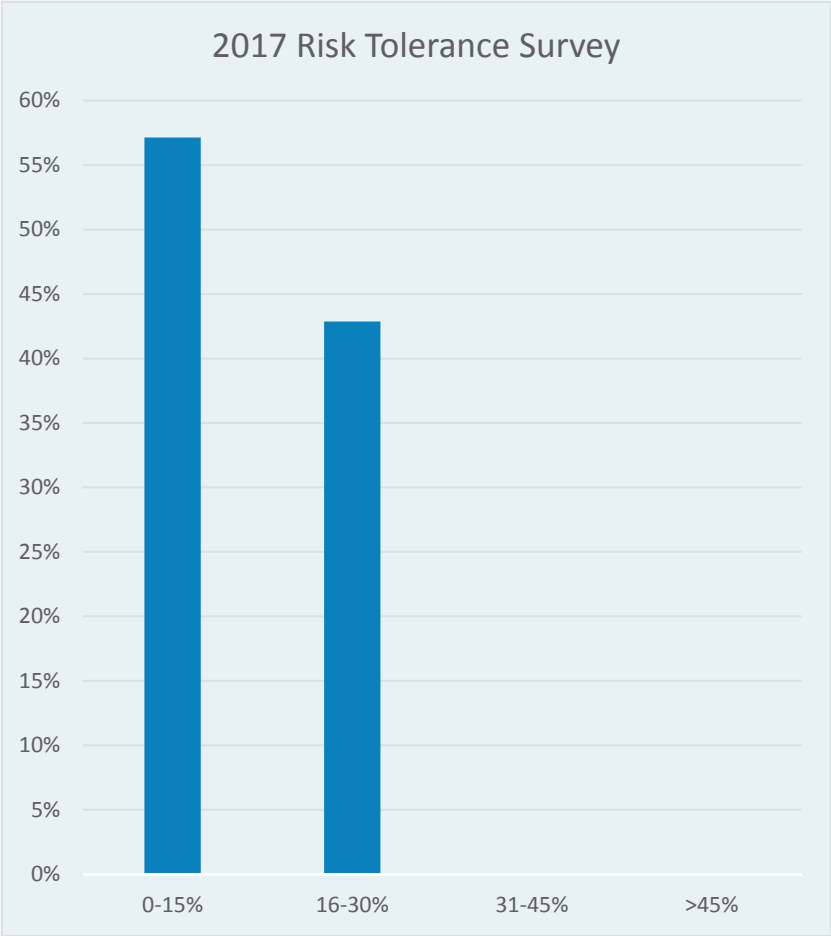
- "Provide required retirement benefits to members with a reasonable investment."
- "Protect; Grow the investment at or above the discount rate."
- "Long-term stable income and investment appreciation!"
- "Durability of the corpus to fund benefits."
- "To protect and ensure funds are there to fulfill FCERA's obligations."
- "To earn as much yield as possible with FCERA assets."
- "Long-term investment growth using "total return" investing (growth plus income) sufficient to meet the 7% return objective, while being aware of the affects of significant drawdowns on the employers contribution rate."

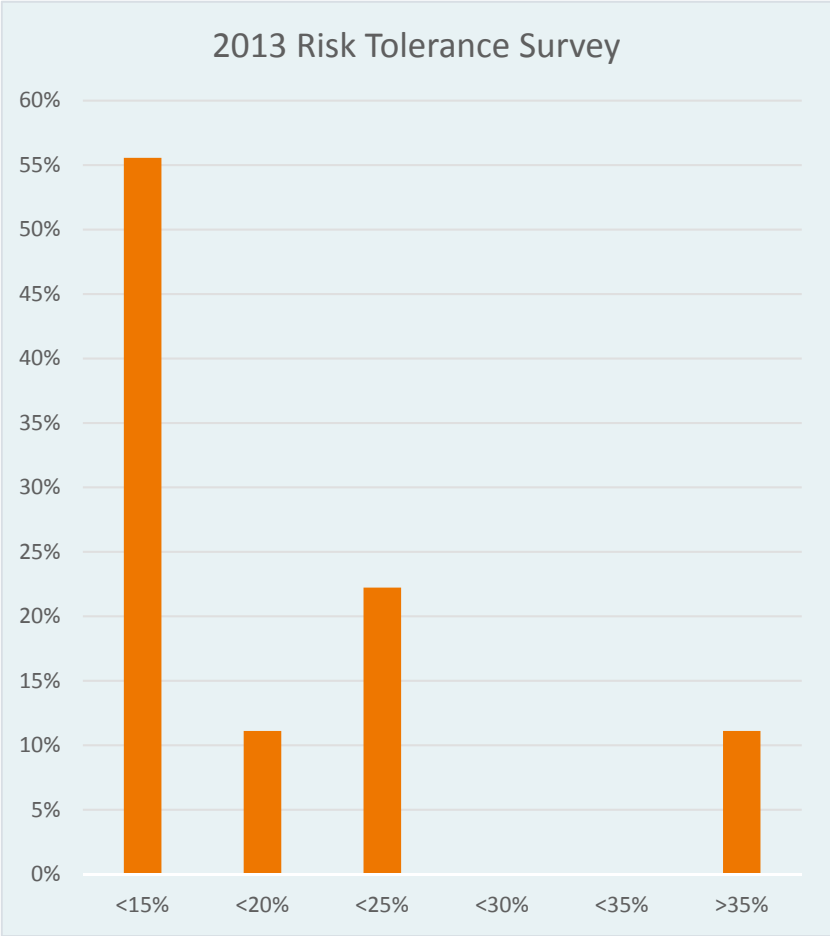
2013 Risk Tolerance Survey:

- "To ensure the Pension Plan is able to meet its obligations to its members."
- "Provide retirement benefits from investments in an appropriate risk/return portfolio."
- "To ensure the promised benefit is paid to members."
- "To ensure that our plan can pay out promised benefits."
- "Provide earned pension benefits with prudent investment and minimized cost."
- "Provide a pension for retired members."
- "Generate enough capital to fund both current and future retirees."
- "Provide benefits promised to employees & collecting contributions."
- "Receive funds, invest wisely, evaluate disability claims, pay benefits."

Plan risk

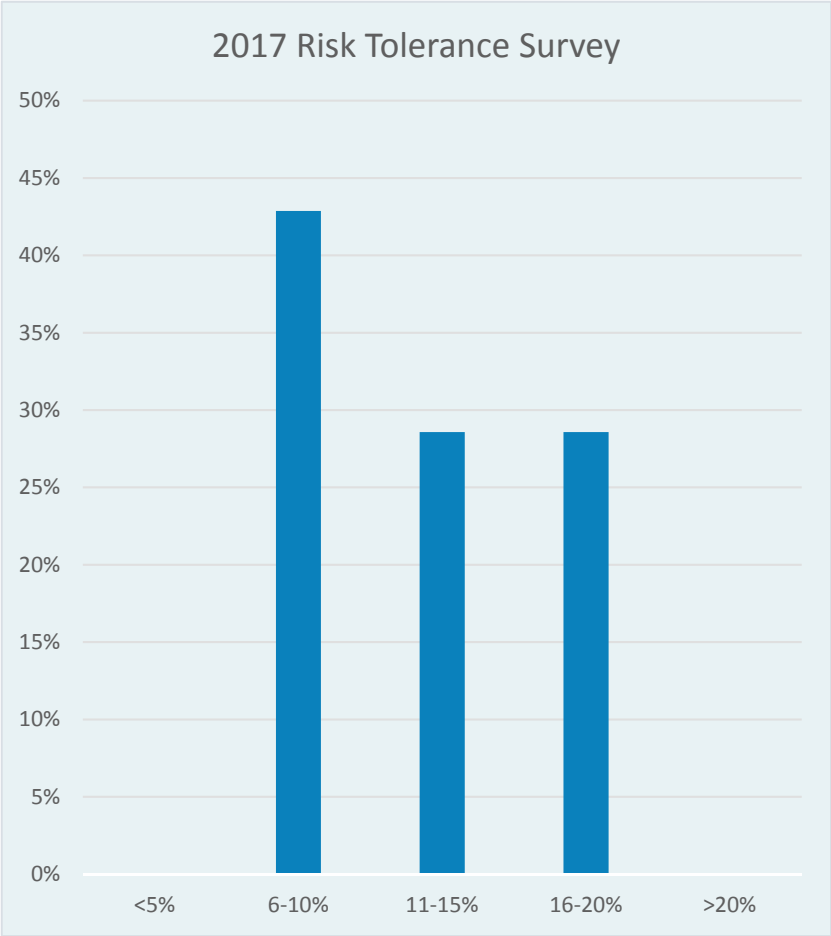
Greatest drawdown (loss) the Plan could accept over the next 12 months

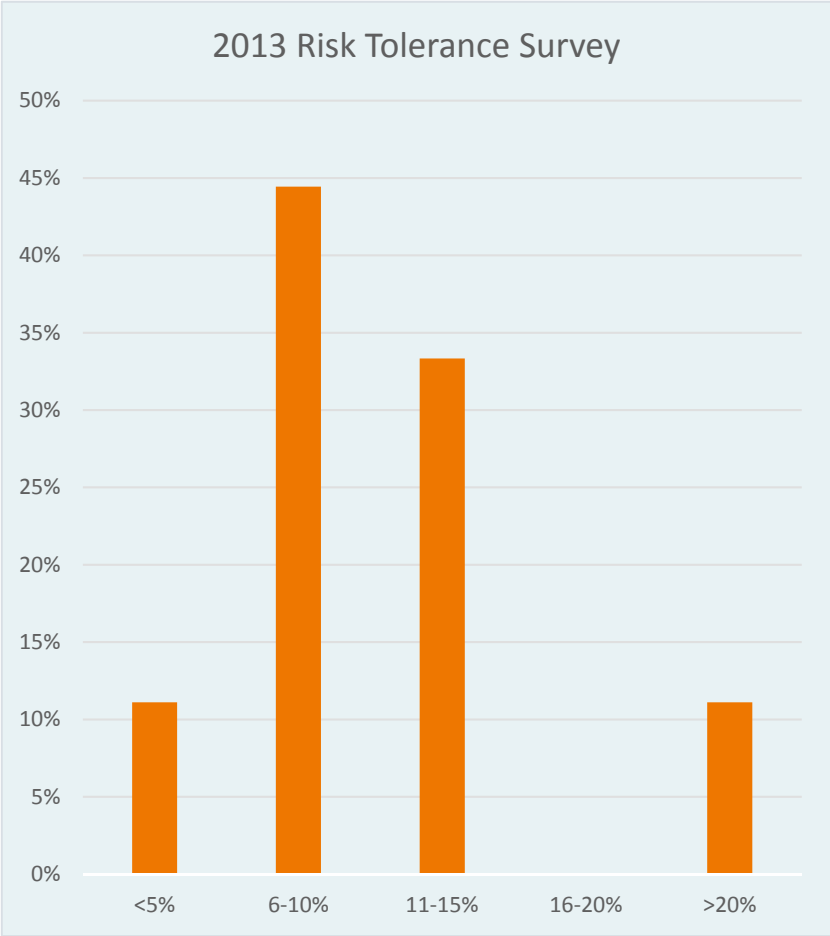




Plan risk (cont.)

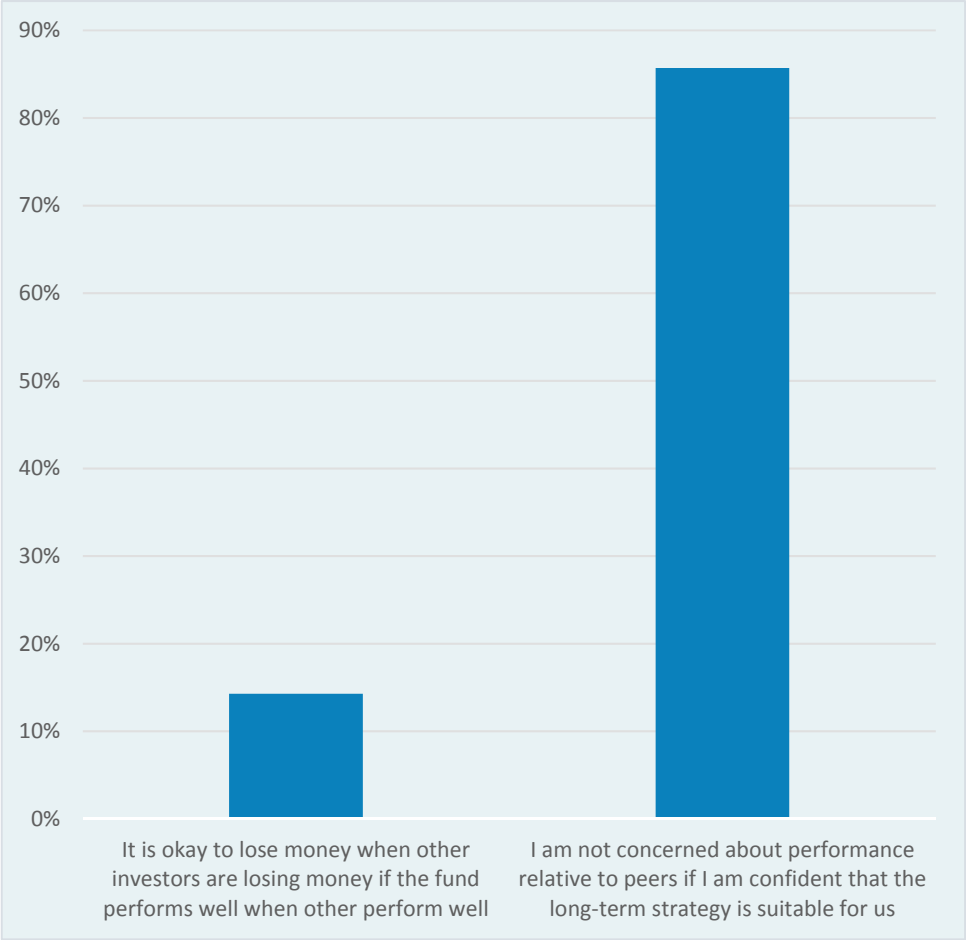
Level of annualized volatility (as measured by standard deviation) that is acceptable for the Plan



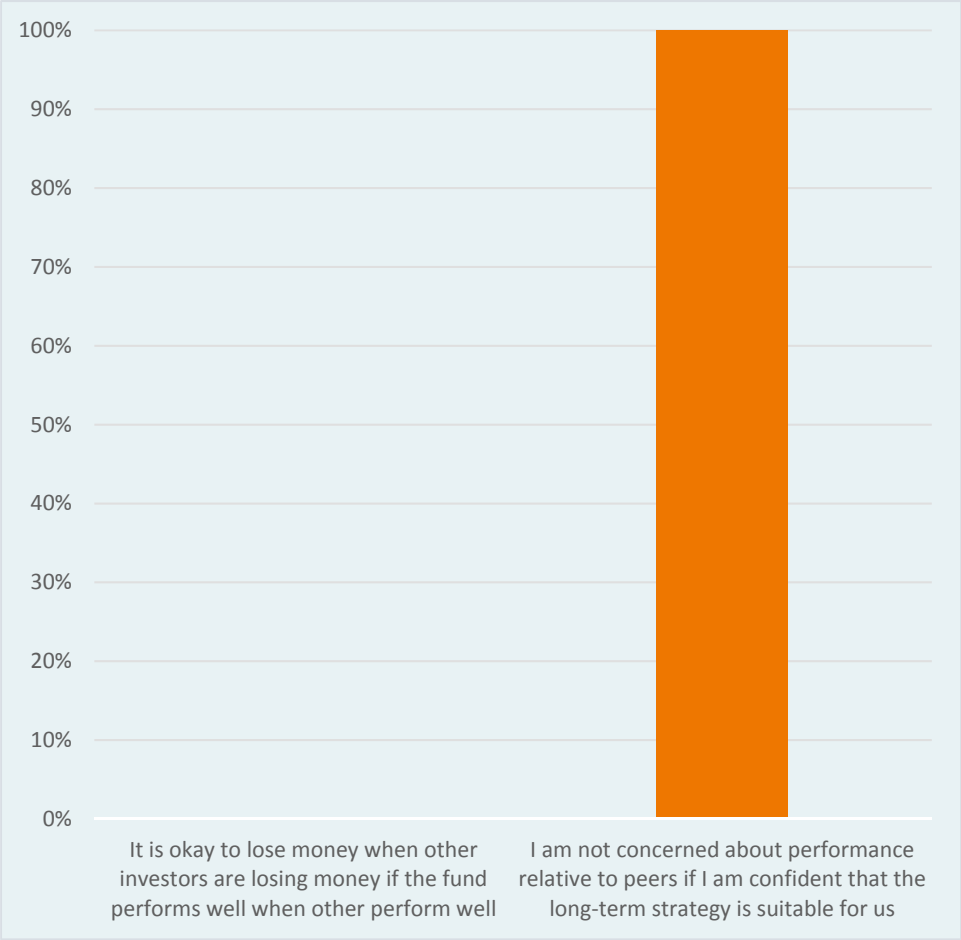


Peer risk

2017 RISK TOLERANCE SURVEY

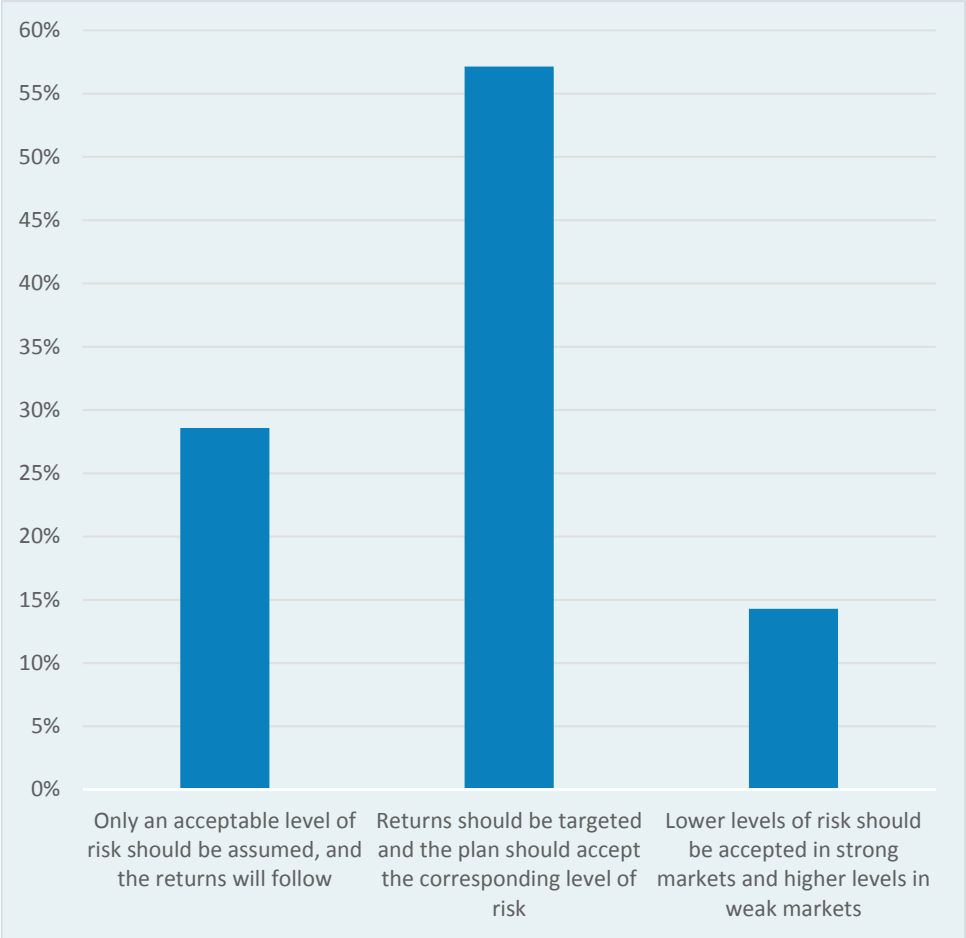


2013 RISK TOLERANCE SURVEY



Risk and return

2017 RISK TOLERANCE SURVEY



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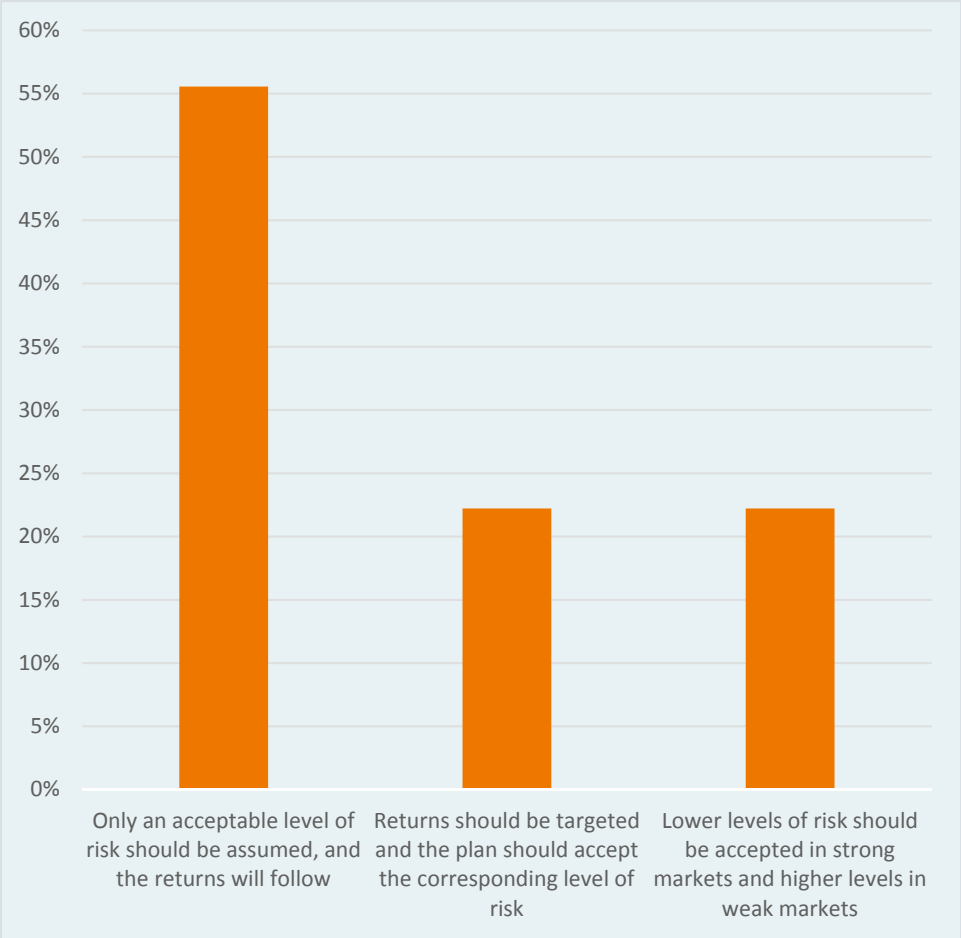
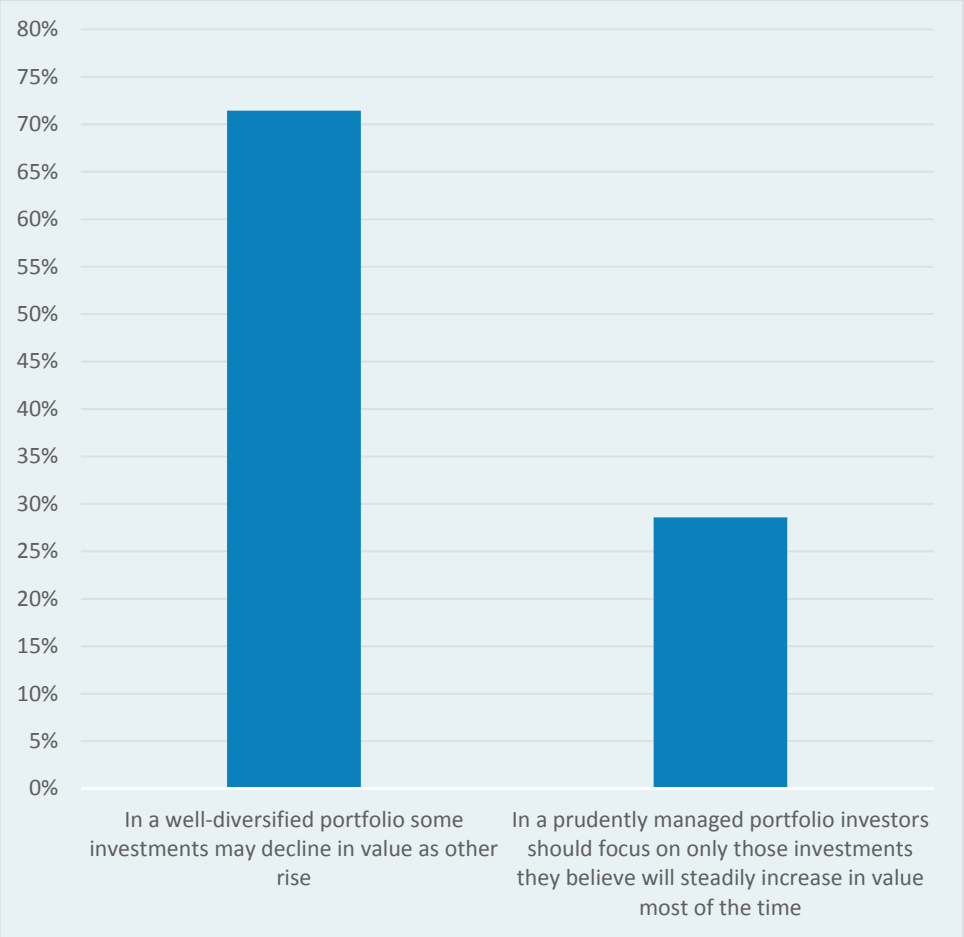
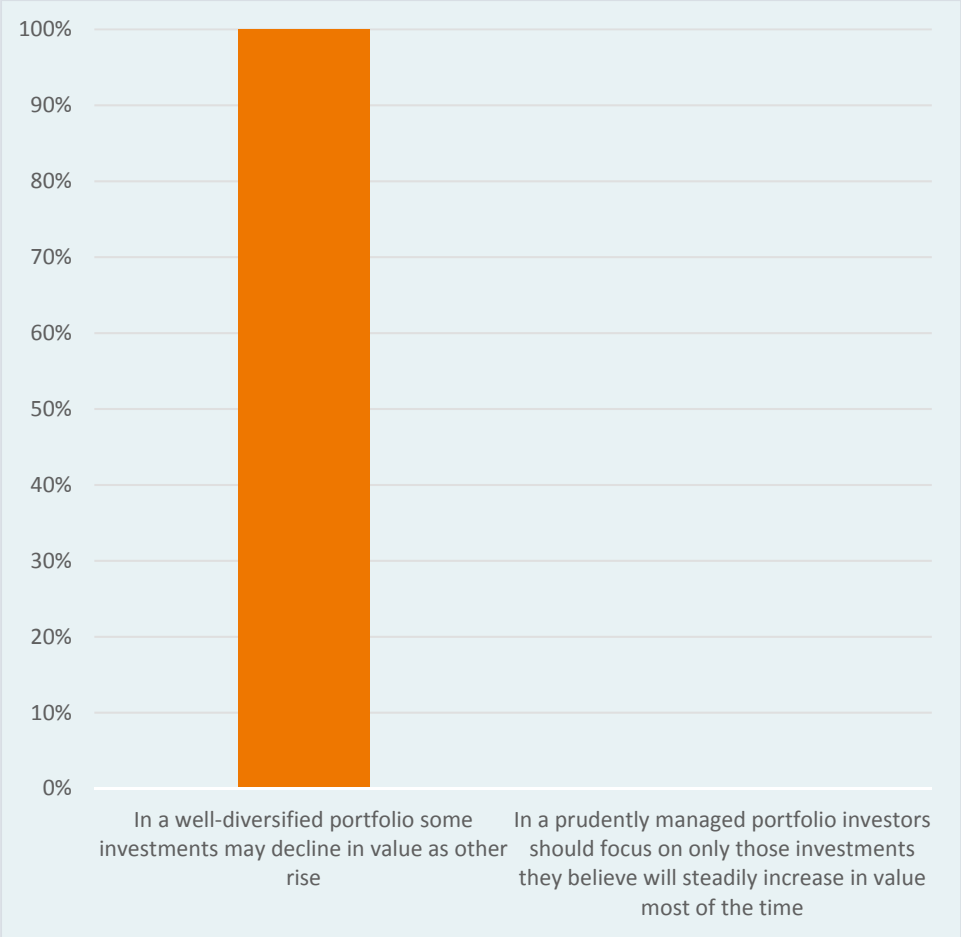


Risk and return (cont.)

2017 RISK TOLERANCE SURVEY



2013 RISK TOLERANCE SURVEY



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