



## **ASSET LIABILITY STUDY**

**Fresno County Employees' Retirement Association**

**April 2013**

WURTS  ASSOCIATES

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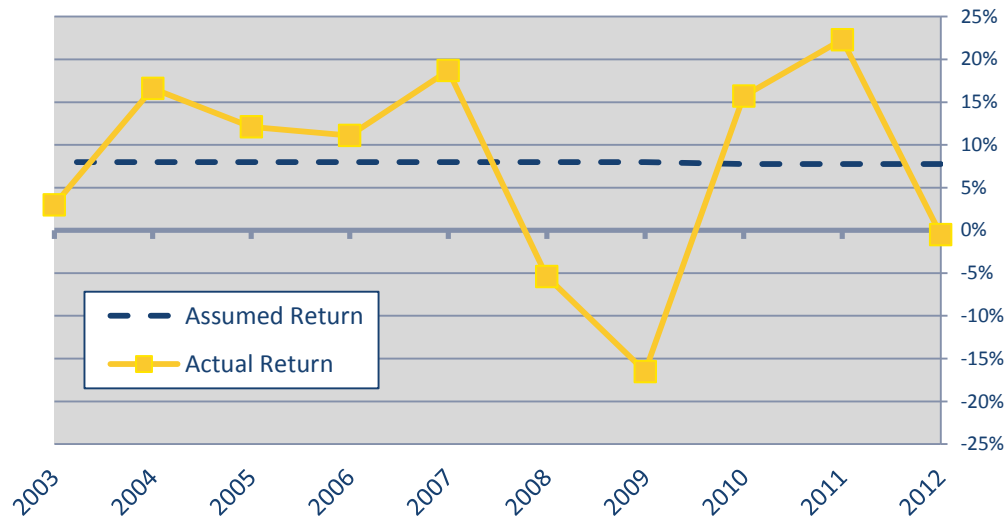
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# INTRODUCTION

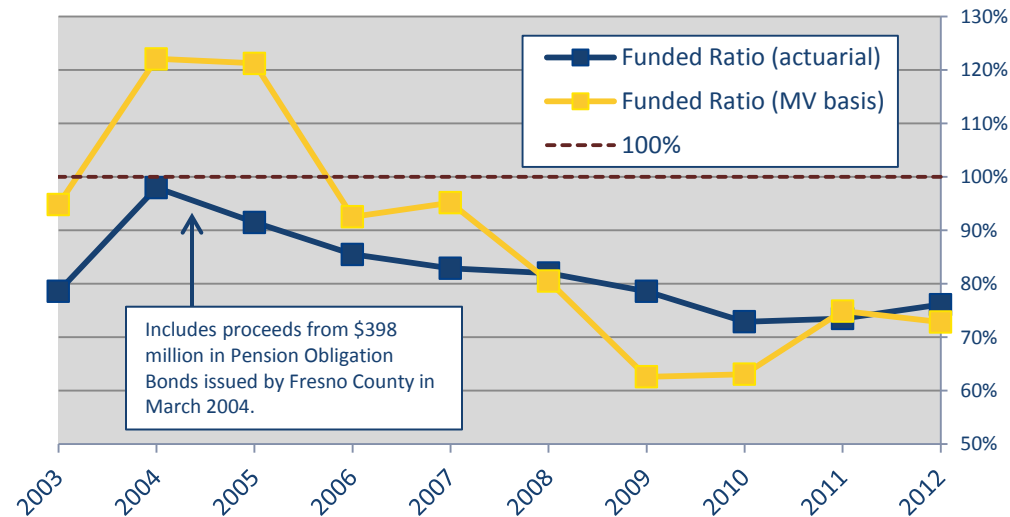
# HISTORICAL PERFORMANCE

## Assumed Vs. Actual Returns



- Fiscal year returns have been volatile. The Plan has outperformed the assumed rate in 6 of the last 10 years.
- Annualized return for the 10 years ended June 30, 2012 was 7.0% net of investment expenses, 75 bps below the current assumption.

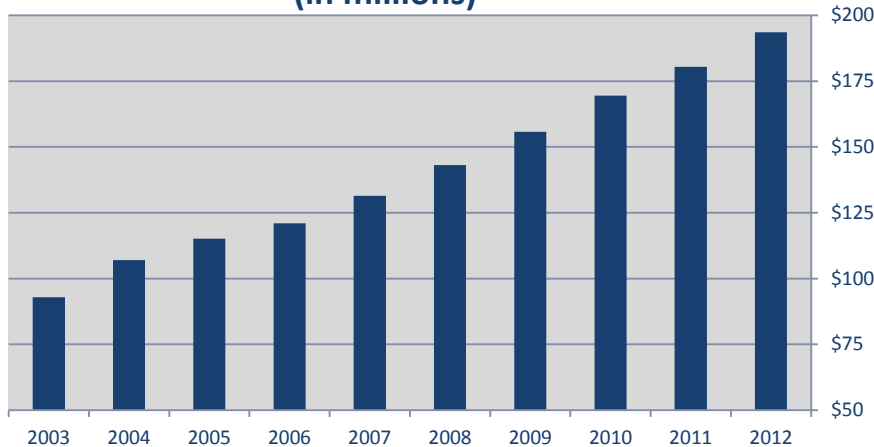
## Funded Ratio



- Actuarial funded status uses a smoothed market value, mitigating volatility of returns.
- Despite this, the amortization of large losses in 2002 and 2009 have caused the funded status to trend downward.

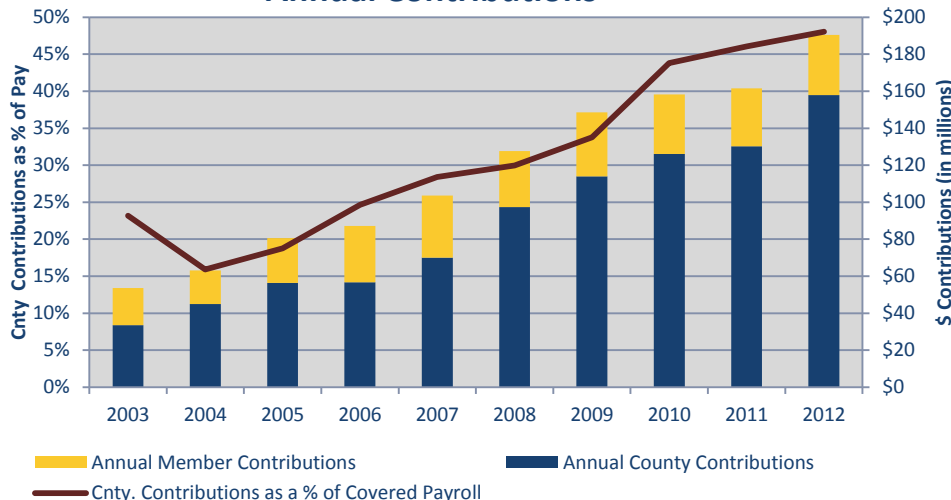
# HISTORICAL CASH FLOWS

**Total Benefits Paid  
(in millions)**



- Total benefits paid continue to increase each year, averaging an 8.5% annual growth rate over the last 10 years.

**Annual Contributions**



- This has been funded through increased County contributions (on an absolute basis as well as relative to payroll.)
- As of 6/30/2012, the County contributions as a percentage of payroll was 48%.

## Member Contributions:

The contribution rate is dependent on the membership tier, and calculated so that the accumulation of basic contributions will be sufficient to fund an annuity at retirement that is equal to a portion of average final compensation.

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## County Contributions:

### *Normal Cost:*

The annual contribution rate that, if paid annually from first year of membership to the year of retirement, would accumulate the amount necessary to fully fund the member's retirement benefits.



### *Contribution to the Unfunded Actuarial Accrued Liability:*

The annual contribution rate that if paid annually over the UAAL amortization period, would accumulate the amount necessary to fully fund the UAAL.

# BASELINE PROJECTIONS: IF EVERYTHING GOES TO PLAN...

Before examining different portfolios we want to set expectations for what the future holds.

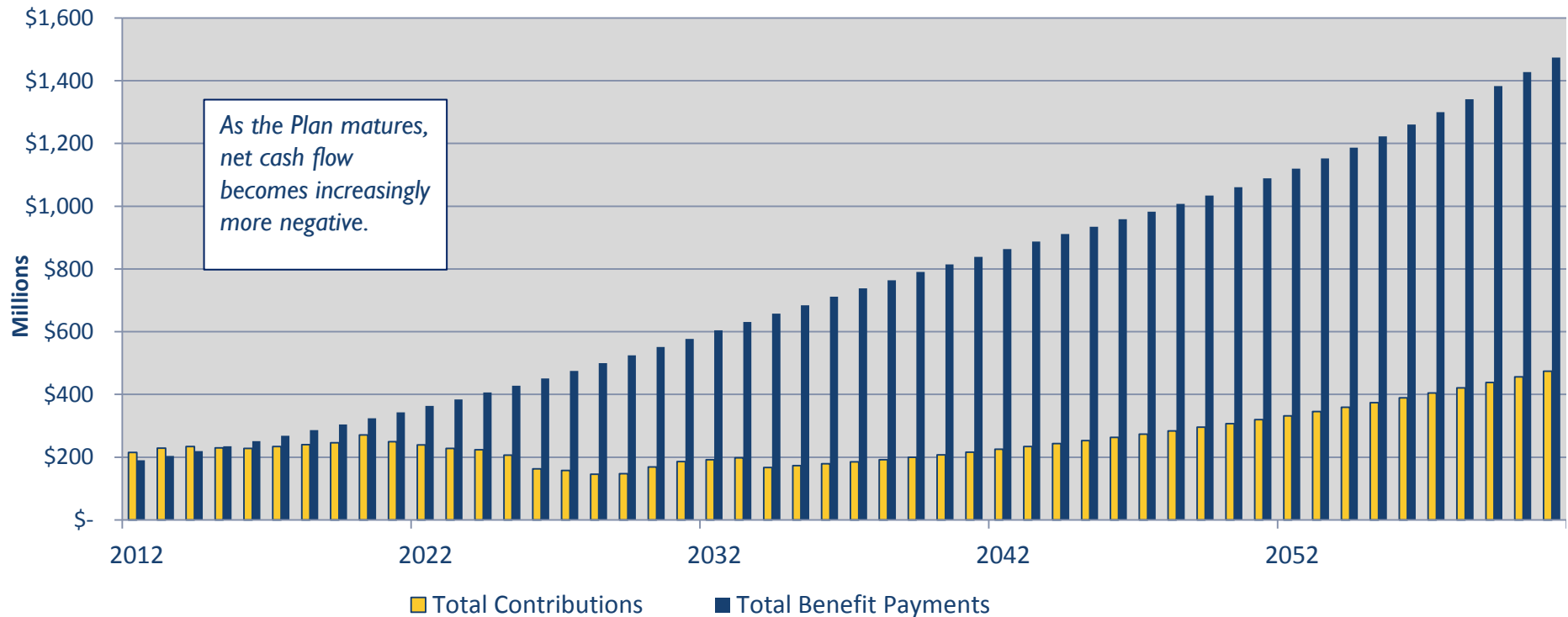
## Assume:

- The investments return meets the current assumed rate of 7.75%, net of fees and administrative costs, each year. (we will alter this assumption in later trials).
- Inflation is 3.5% per year.
- Actual contributions are in line with recommended contributions
- This projection includes the new tier 4 rates, effective for contributions for the 2012/2013 fiscal year and forward, using formulas as prescribed in Section 31676.1.

## What is the impact on:

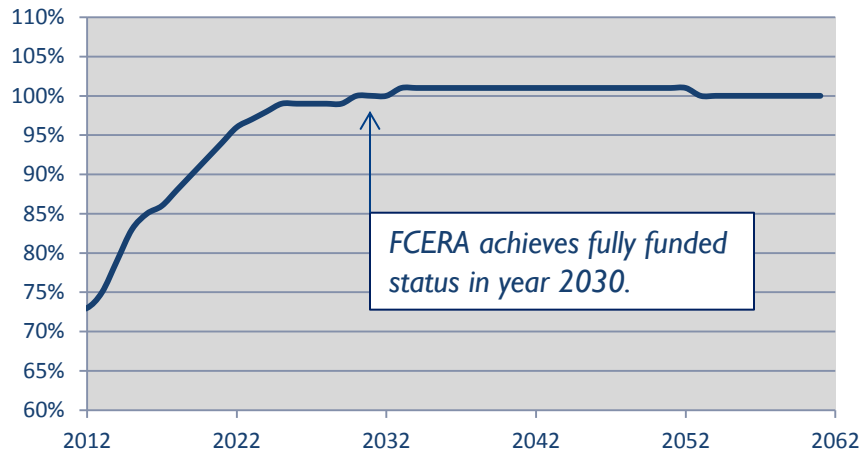
1. Future Funded Status?
2. Employer Contributions?
3. Contributions as a % of Pay?

### Benefits & Contributions



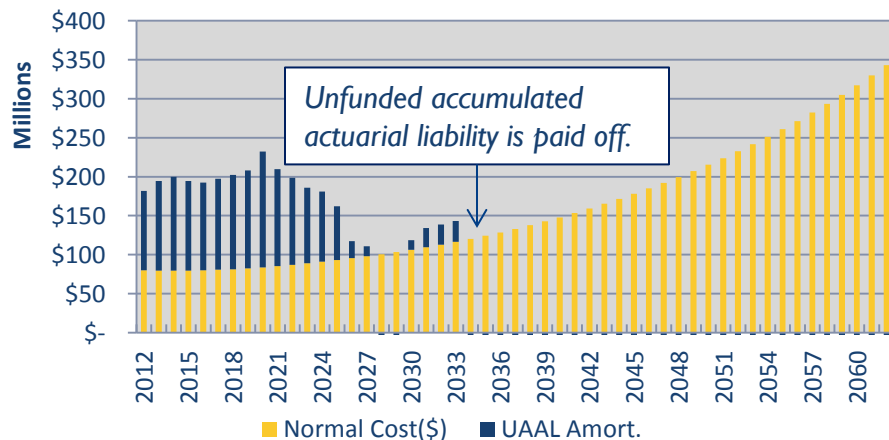
# BASELINE PROJECTIONS: IF EVERYTHING GOES TO PLAN...

## Market Value Funded Ratio



- Funded status is projected to increase from 71.8% to 100% in 18 years.<sup>1</sup>

## Breakdown of County Contribution

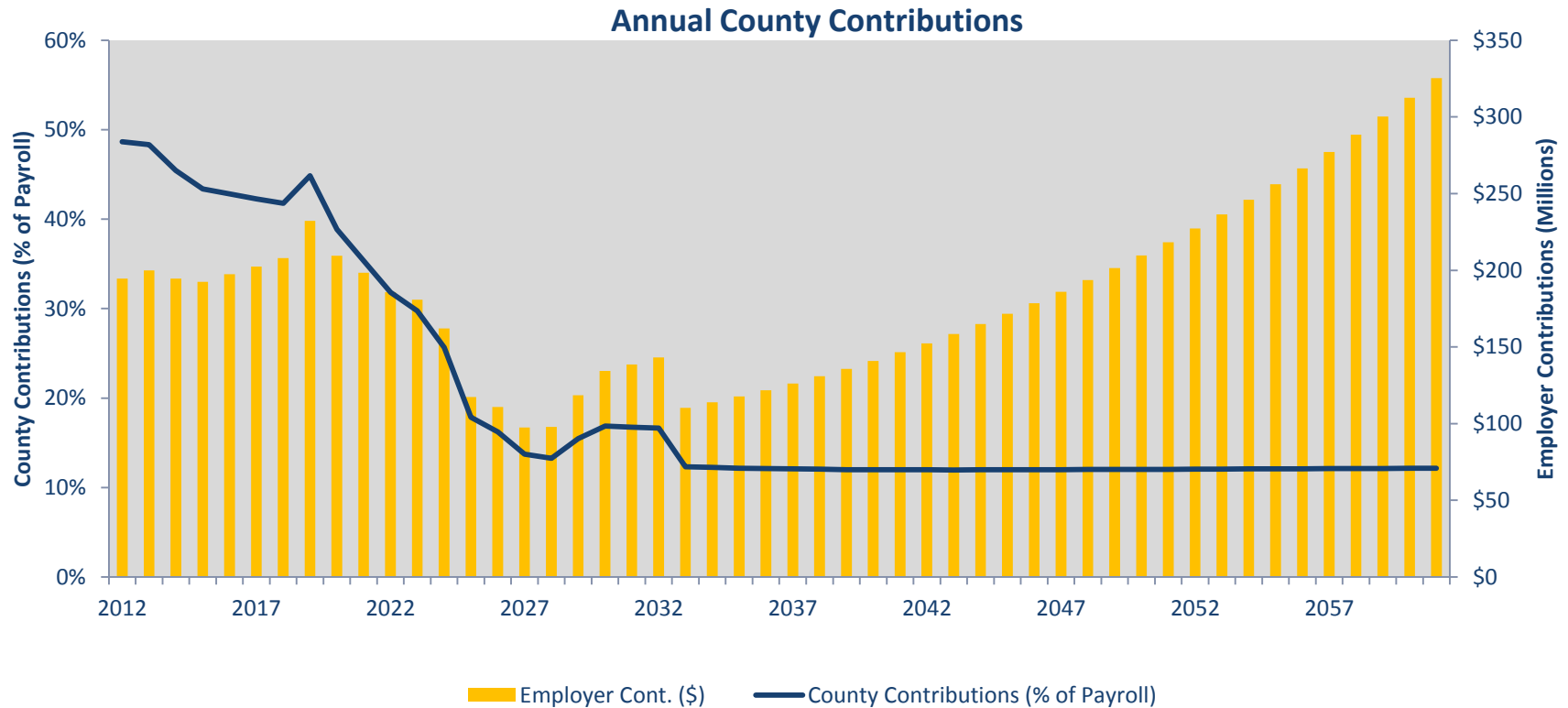


- Since we assume that in all future years, actual returns will equal assumed returns, there are no further accruals to the UAAL.
- The existing UAAL is fully amortized by 2033. After this, the County contributions only consist of the normal cost component.
- Normal cost increases with inflation and wage growth.

<sup>1</sup> As of 6.30.12. The funded status using the actuarial value of assets is 76.1%.



## BASELINE PROJECTIONS: IF EVERYTHING GOES TO PLAN...

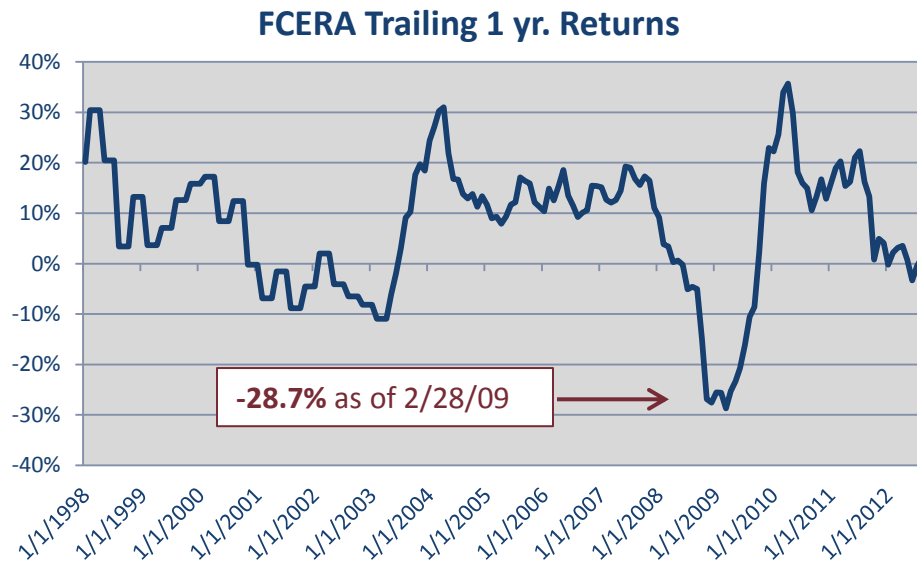


- While the dollar amount of contributions do go up, contributions relative to payroll trends down.
- This is due to projected payroll increasing approximately 4%/year.

## RISK & DRAWDOWNS

## HISTORICAL DRAWDOWNS

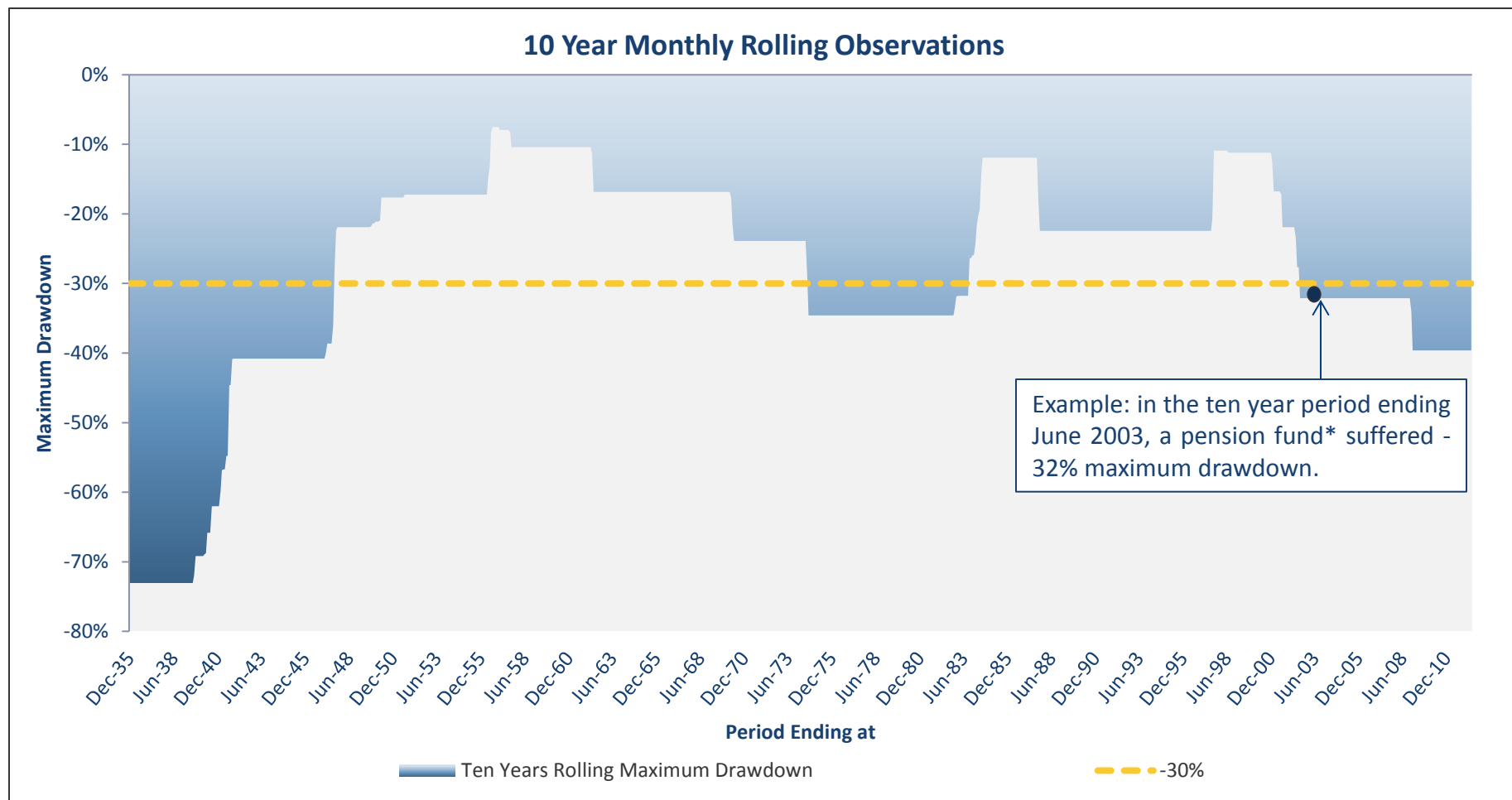
- While the baseline projection suggests that the health of the Plan will trend upwards, this is dependent on the Plan earning the assumed rate of return every year.
- In reality, we know that returns are very volatile, and driven by large swings in global equity markets:



- FCERA experienced a 28.7% drawdown for the 12 months ended February 2009.
- This drawdown was the primary factor contributing to the Plan not achieving the assumed return for the trailing ten years ending 6.30.12.
- To illustrate, if the plan earned 0% in the 2009 plan year, the 10 year trailing return would have been 9.1%, meaningfully higher than both the 7.75% assumption and the actual return of 7.0%.

*Was the 2008 drawdown really a “100 year storm” or can we expect it to happen again?*

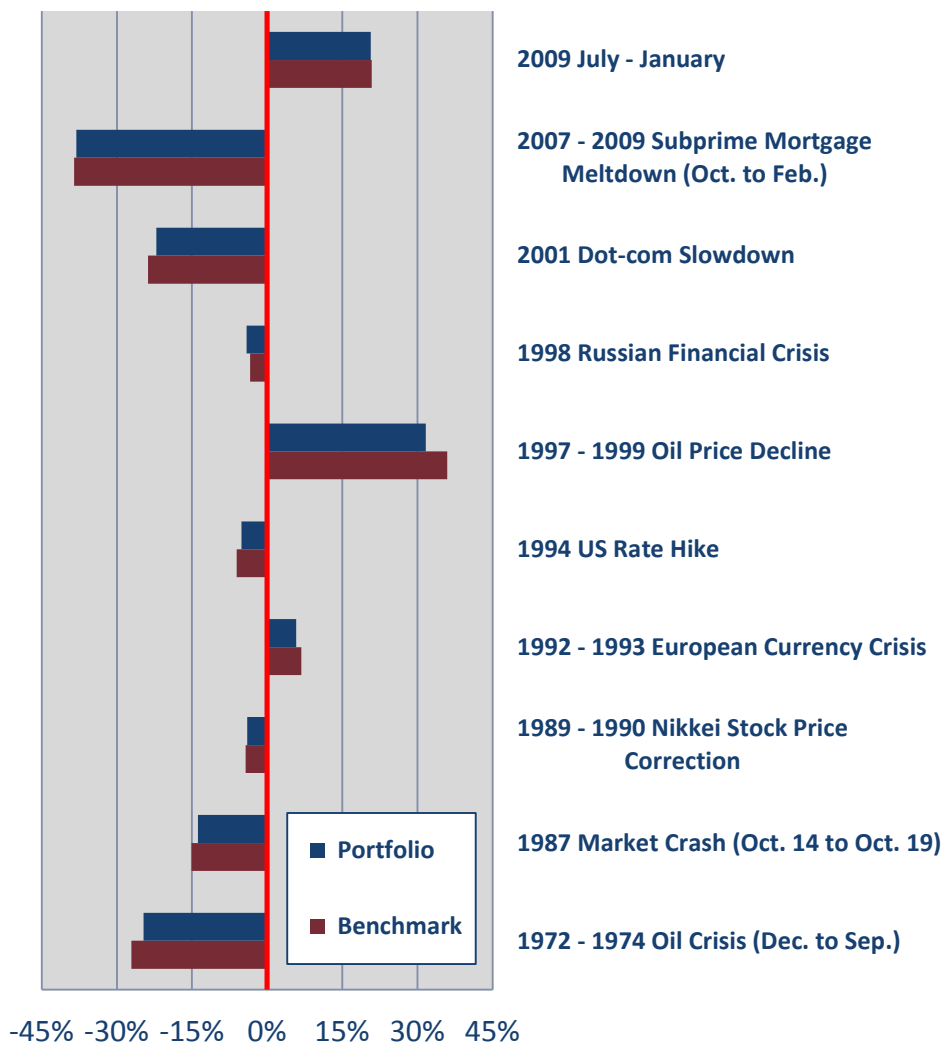
# DRAWDOWNS HAPPEN MORE OFTEN THAN YOU THINK



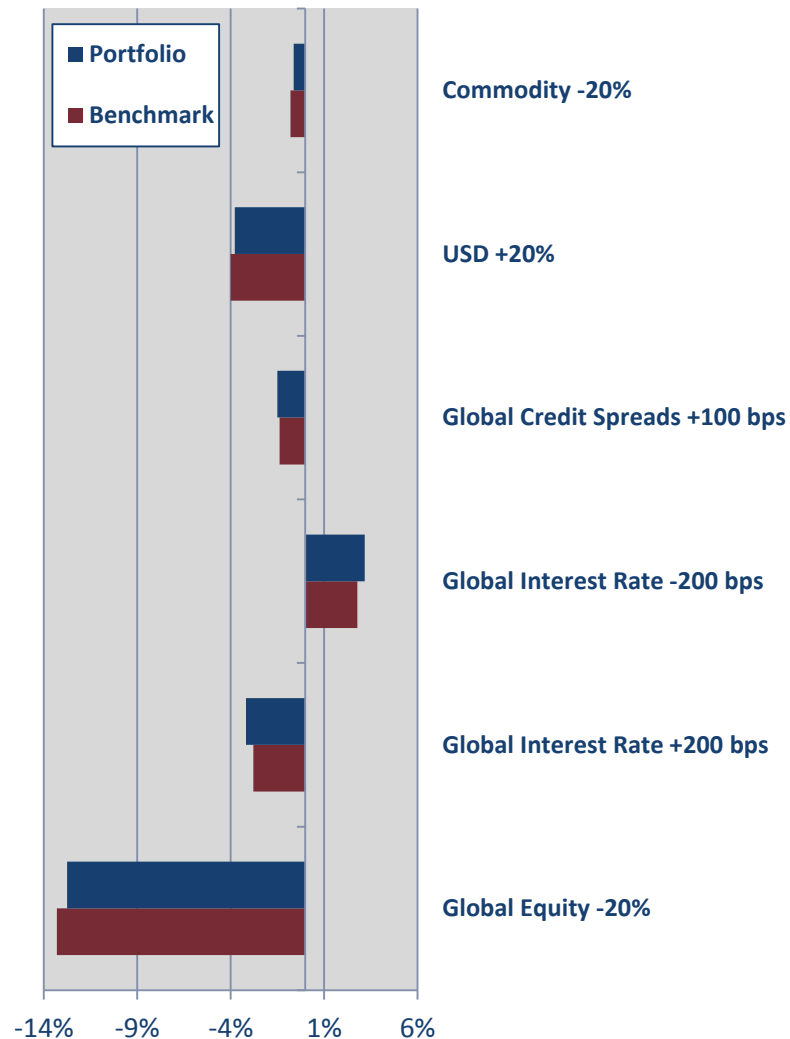
|  |      |
|--|------|
| Average Max Drawdown in a Ten Year Period                          | -23% |
| Probability of Suffering a Drawdown of -30% in Any Ten Year Period | 45%  |

# ESTIMATING FCERA TAIL RISK

## Tail Risk - Scenario Analysis

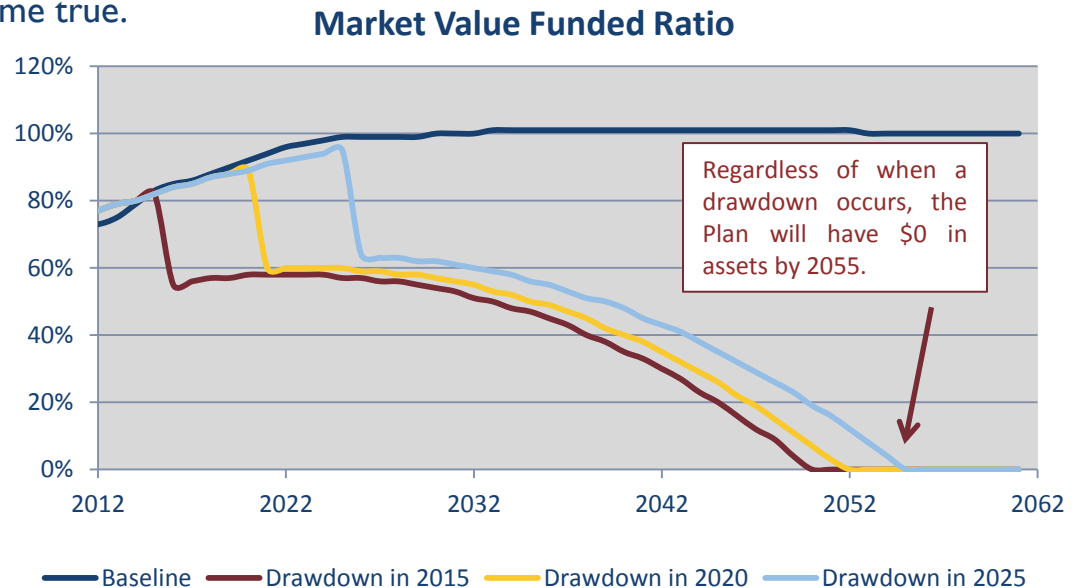


## Tail Risk - Stress Testing



## CAN FCERA AFFORD ANOTHER 2008?

- We can say with a reasonable degree of confidence that FCERA is likely to experience another large drawdown with the current allocation. But when?
  - 2015...Possibly?
  - 2020...Seems Reasonable?
  - 2025...Not that far-fetched?
- Assumptions:
  - County Contributions are capped at the current recommended amount (\$184 million/year<sup>1</sup>).
  - Investments earn the assumed rate of return of 7.75% every year except for one year with a 28% drawdown.
  - All other actuarial assumptions come true.
- Impact:
  - Future drawdowns severely impact funded status given the maturity of the Plan (negative cash flows – see page 7).



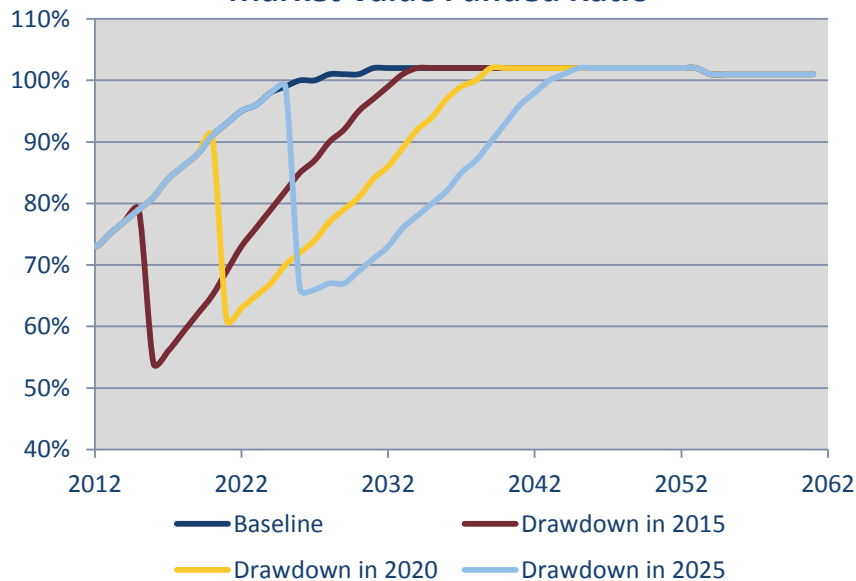
Note: Wurts & Associates is uncertain if the \$184 million contribution is in fact the maximum the County can contribute. We can update our analysis to reflect a higher maximum contribution rate if the Board prefers to alter this assumption.

<sup>1</sup> The recommended amount for the Plan year ending 6/30/2013, as determined in the 6/30/2011 actuarial valuation.

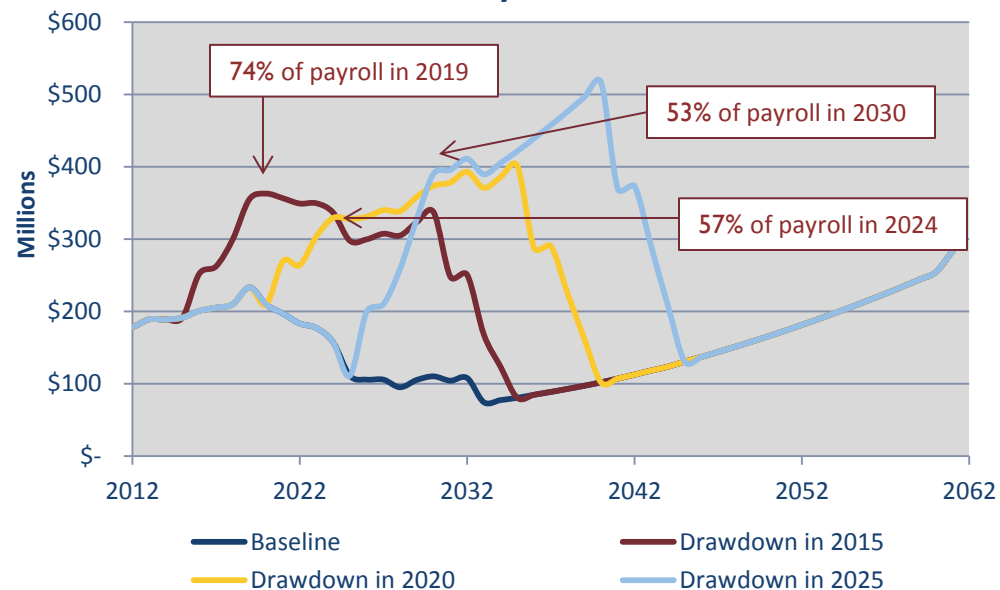
## SOLVENCY & DRAWDOWNS

- Assuming the County can meet all future recommended contributions, the Plan can still achieve fully funded status, albeit 10-20 years later.
- After all, any funded ratio can be repaired through higher capital contributions.
- Contributions are projected to reach as high as 70% of payroll in 2019 if the Plan experiences another 28% drawdown near or before 2015.
- The subsequent drawdowns all result in contributions as a percentage of payroll that are greater than the current level.

### Market Value Funded Ratio



### Annual County Contributions



## Compound Return

- 10 Years at 10% return produces an annualized return of **10%**

What would be the annualized return if on the 10<sup>th</sup> year the portfolio experiences a -30% return?

## The Importance of Limiting Drawdowns

- 9 years at 10% return plus a one year return of -30% produces an annualized return of **5.14%**



Its easy to focus on endpoints in terms of funded status/contributions, etc.

But there are other qualitative considerations to think about that can happen along the way:

1. To what extent does a near term event impact the County's ability to borrow in municipal markets?
2. To what extent do funding concerns impact the tax base or future growth prospects for the County?
3. To what extent does the health of the Pension impact employee recruitment, morale, and retention?

## SUMMARY: DRAWDOWNS

- We know that large drawdowns occur roughly once every ten years.
- When we encounter another drawdown event, FCERA can either:
  1. Increase County contributions (*may not be feasible*)
  2. Allow the Plan to eventually experience much higher contributions and much lower funded status (*may not be acceptable*)

*How can we structure the portfolio differently to mitigate large drawdowns?*

# PORTFOLIO CONSTRUCTION PROCESS

## PEER RISK: FRESNO VS. SACRS PLANS

- FCERA returns have been relatively similar to other SACRS Plans:

| U.S. Equity: 10 Years     |             |
|---------------------------|-------------|
| Median of SACRS Counties: | 5.8%        |
| Standard Deviation:       | 0.46%       |
| <b>FCERA:</b>             | <b>5.9%</b> |

| Domestic Fixed Income: 10 Years |             |
|---------------------------------|-------------|
| Median of SACRS Counties:       | 6.9%        |
| Standard Deviation:             | 0.86%       |
| <b>FCERA:</b>                   | <b>6.8%</b> |

| International Equity: 10 Years |             |
|--------------------------------|-------------|
| Median of SACRS Counties:      | 6.5%        |
| Standard Deviation:            | 0.69%       |
| <b>FCERA:</b>                  | <b>6.5%</b> |

| Total Fund: 10 Years      |             |
|---------------------------|-------------|
| Median of SACRS Counties: | 6.5%        |
| Standard Deviation:       | 0.76%       |
| <b>FCERA:</b>             | <b>7.3%</b> |



~68% of SACRS Counties had plan-level investment returns between 5.7% and 7.2%

- All Counties have employed the same method of portfolio construction, the same definition of diversification, and the same constrained minimum variance portfolio using an efficient frontier.
- The 0.76% standard deviation comprises differences in both asset allocation and manager selection.
- All of the time and energy spent managing managers, style tilts, administrative issues, etc., has resulted in remarkably little differentiation.

- Portfolios were constructed by optimizing asset classes to identify those mixes that maximized returns for a given level of risk, as defined by standard deviation.

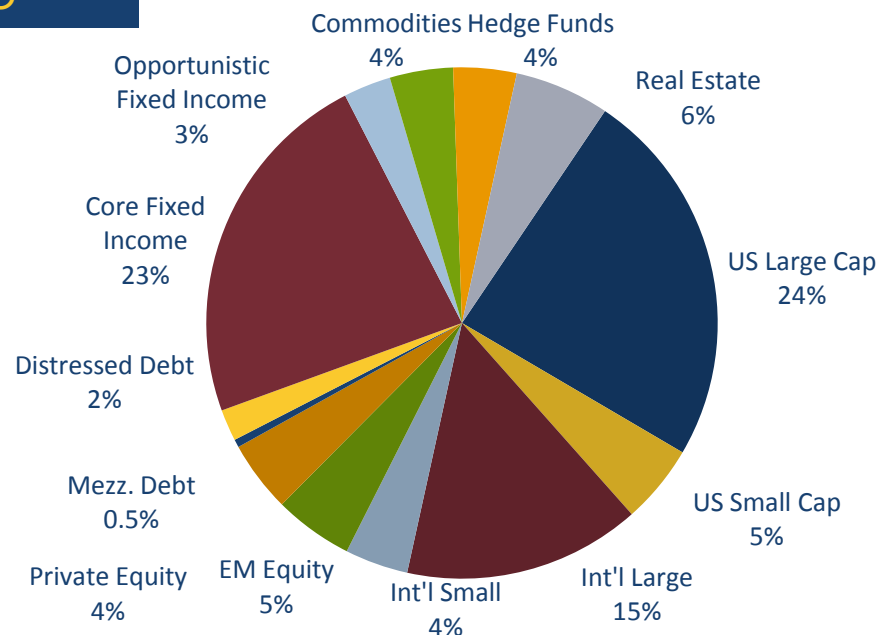
### Major inputs:

- Expected Return
  - Expected Standard Deviation
  - Expected Correlations
- 
- The underlying principles of Mean Variance Optimization (“MVO”) are sound... “Diversification is a free lunch.” However:
    - MVO requires an accurate prediction of expected returns, volatility (standard deviations), and correlations.
    - MVO assumes markets are normally distributed. (hint: they are not, more on this later)
    - MVO assumes correlations remain constant over time.

The result is that MVO is not an effective tool for modeling the devastating effects of drawdowns.

# FCERA CURRENT PORTFOLIO

|                                     | Current Policy <sub>1</sub> | CMA's (10 Yr)* |
|-------------------------------------|-----------------------------|----------------|
| Large Cap US Equity                 | 24                          | 6.3            |
| Small/Mid Cap US Equity             | 5                           | 6.9            |
| <b>Total Domestic Equity</b>        | <b>29</b>                   |                |
| International Large                 | 15                          | 8.0            |
| International Small                 | 4                           | 8.3            |
| Emerging Markets                    | 5                           | 9.6            |
| <b>Total Int'l Equity</b>           | <b>24</b>                   |                |
| <b>Total Equity</b>                 | <b>53</b>                   |                |
| US Core Fixed Income                | 19                          | 2.0            |
| Emerging Markets Debt - Local       | 3                           | 5.7            |
| TIPS                                | 4                           | 2.2            |
| <b>Total Fixed Income</b>           | <b>26</b>                   |                |
| Commodities                         | 4                           | 4.3            |
| Real Estate                         | 6                           | 5.6            |
| <b>Total Real Assets</b>            | <b>10</b>                   |                |
| Liquid Alts/HFoF                    | 4                           | 5.4            |
| Private Equity/VC                   | 7                           | 9.9            |
| <b>Total Non-Public Investments</b> | <b>11</b>                   |                |
| <b>Total Allocation</b>             | <b>100</b>                  |                |



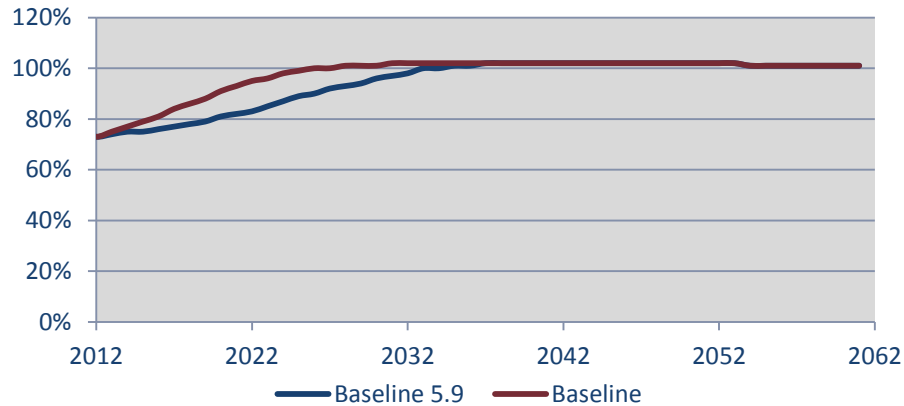
| Fresno County ERA                |      |
|----------------------------------|------|
| Expected 10 Year Return          |      |
|                                  |      |
| Mean Variance Optimizer Analysis |      |
| Forecast 10 Year Return          | 5.9  |
| Volatility (Standard Deviation)  | 10.8 |
| Sharpe Ratio                     | 0.30 |

\* See appendix for details regarding Wurts' Capital Market Assumptions.

- Wurts & Associates uses a 10 year time horizon, whereas the actuarial assumed rate covers the entire life of the Plan.
- Forecasting is difficult to begin with. However, we prefer a 10 year time frame because it is long enough for markets to correct themselves but short enough to use tangible data points.
- In Wurts' judgment it is reasonable to assume a lower rate of return for the next decade and a higher rate of return thereafter.
  - It is problematic to try and construct a portfolio that is projected to achieve 7.75% in the current low return environment. Doing so would require the Plan to assume an unacceptable level of risk.
  - It is Wurts' philosophy that FCERA should take less risk given the low return environment when risk-premia are less compensated (see Appendix for analysis of current valuation levels)

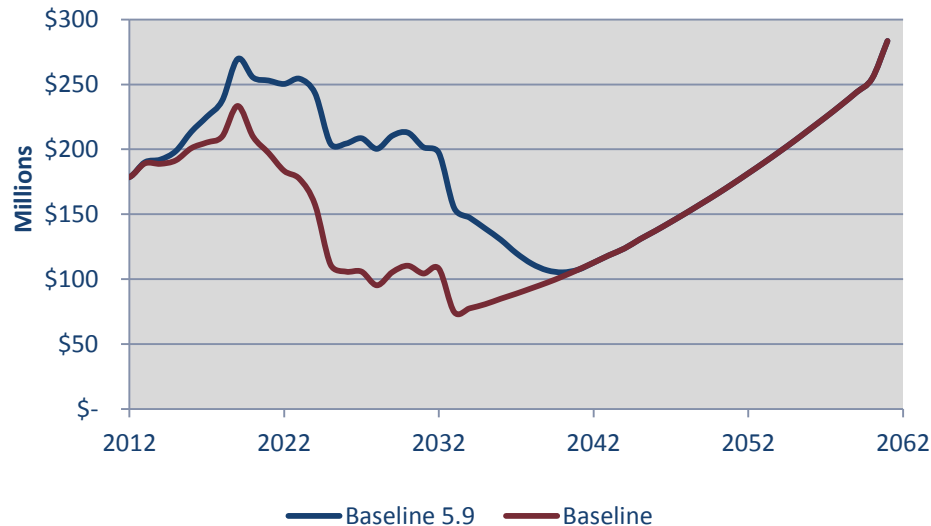
# IMPACT ON UNDERPERFORMING ASSUMED RATE

## Market Value Funded Ratio

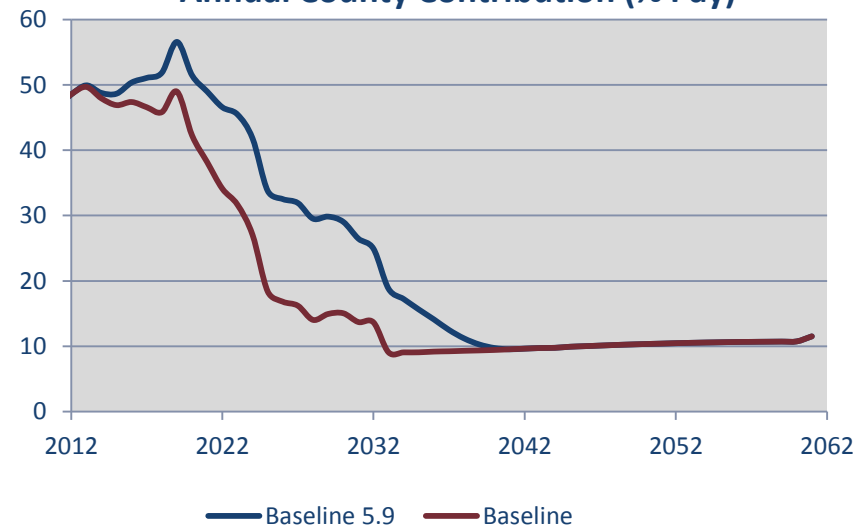


*Assumes the Plan's investments earn 5.9% for the next 10 years, and the actuarial assumed rate thereafter.*

## Annual County Contribution



## Annual County Contribution (% Pay)





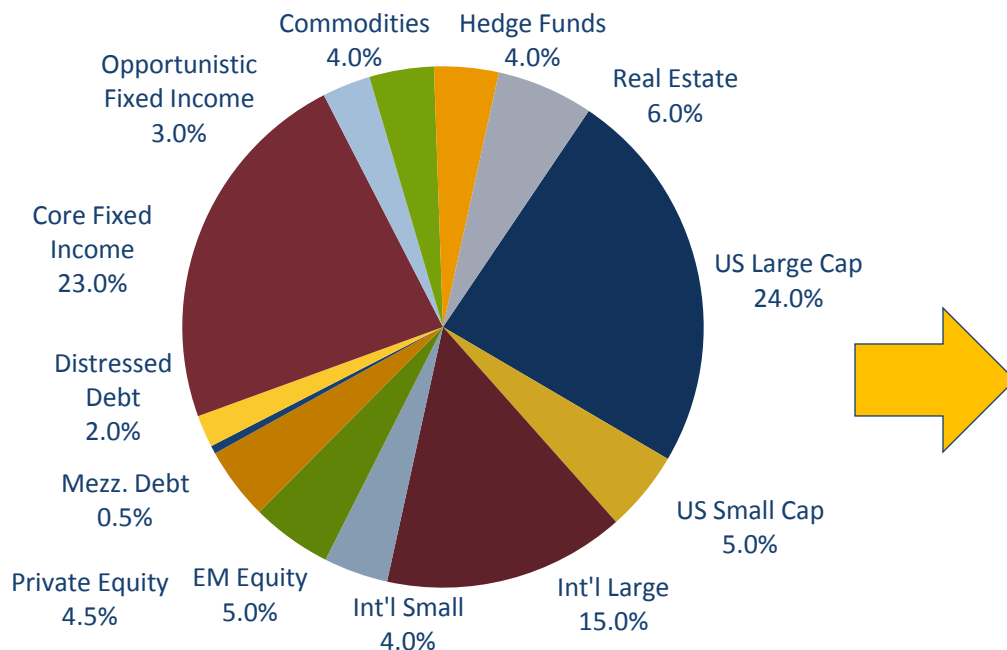
## S U M M A R Y

- I. The UAAL is the primary reason why County contributions are greater than 40% of payroll. The current UAAL is the result of the Plan's investments experiencing large drawdowns.
- II. The current portfolio was constructed using MVO, just like most other SACRS Plans.
- III. While MVO is a necessary tool in that it is a simple way of comparing different portfolios, it does not adequately address the risk of large drawdowns. Large drawdowns can threaten the financial viability of mature plans.
- IV. Inevitably, another tail event will occur in the future. When it does, the UAAL will be negatively affected, and the Plan will need to increase contributions to ensure sustainability. This risk needs to be factored into the asset liability review.

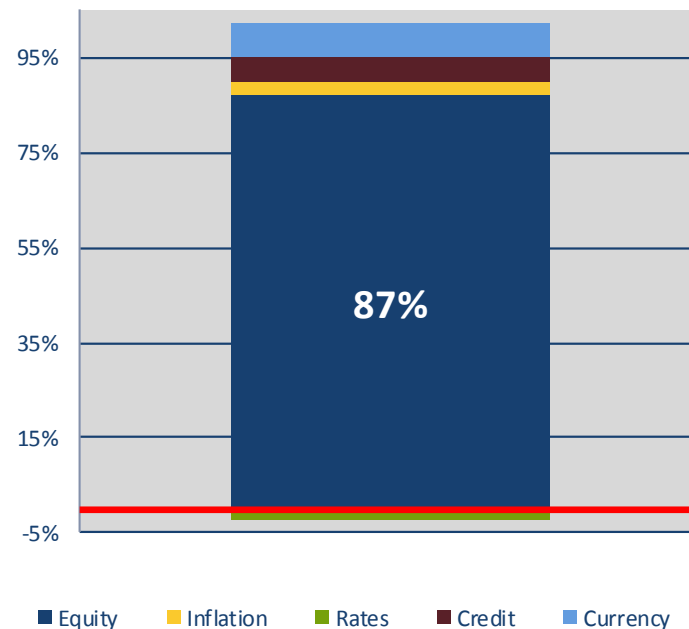
1. Understand the sources of risk.
2. “**Win by not losing**” – Mitigate large drawdowns.
3. Supplement MVO with other methods of forecasting portfolios:
  - Risk Decomposition
  - Economic Diversification
  - Stress-testing & Scenario Analysis
4. The alternative: **A Risk-Diversified Portfolio**

# DIVERSIFICATION OF RISKS

FCERA Existing Allocation



FCERA Risk Decomposition



Asset-diversified, but...

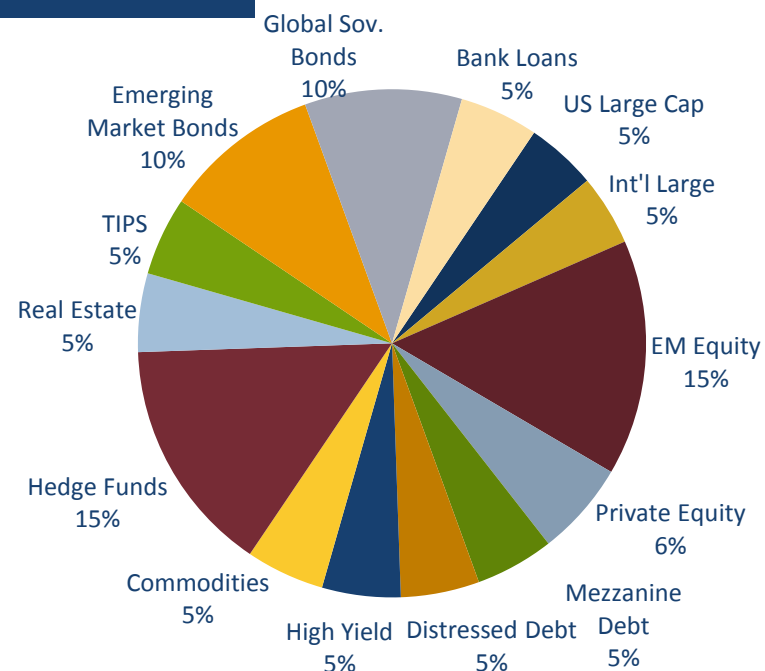
Risk diversified?

*Because many assets are inextricably tied to the risks embedded in global equity markets and that risk is greater than other type of risk, an MVO-constructed portfolio derives the majority of its risk from equities.*

- The MVO Portfolio was diversified by assets, but not risk factors.
- We propose a risk-diversified portfolio that is projected to achieve the same rate of return as the current portfolio.
- The key tenets of the risk-diversified approach:
  - Reduces the absolute level of expected volatility.
  - Diversified the sources of return (beta) to be more dependent on contractual cash flows, and less dependent on capital appreciation.
  - Effectively reduces equity risk.
  - This beta diversification makes the portfolio less susceptible to large drawdowns.

# THE RISK-DIVERSIFIED PORTFOLIO

|                                     | Risk-Diversified Portfolio | CMA's (10 Yr)* |
|-------------------------------------|----------------------------|----------------|
| Large Cap US Equity                 | 4.5                        | 6.3            |
| <b>Total Domestic Equity</b>        | <b>4.5</b>                 |                |
| International Large                 | 4.5                        | 8.0            |
| Emerging Markets                    | 15                         | 9.6            |
| <b>Total Int'l Equity</b>           | <b>19.5</b>                |                |
| <b>Total Equity</b>                 | <b>24</b>                  |                |
| High Yield Fixed Income             | 5                          | 4.9            |
| Bank Loans                          | 5                          | 4.1            |
| Global Bonds - Sovereign            | 10                         | 2.2            |
| Mezzanine Debt                      | 5                          | 5.9            |
| Distressed Debt                     | 5                          | 5.9            |
| Emerging Markets Debt - Local       | 10                         | 5.7            |
| TIPS                                | 5                          | 2.2            |
| <b>Total Fixed Income</b>           | <b>45</b>                  |                |
| Commodities                         | 5                          | 4.3            |
| Real Estate                         | 5                          | 5.6            |
| <b>Total Real Assets</b>            | <b>10</b>                  |                |
| Hedge Funds                         | 15                         | 5.4            |
| Private Equity/VC                   | 6                          | 9.9            |
| <b>Total Non-Public Investments</b> | <b>21</b>                  |                |
| <b>Total Allocation</b>             | <b>100</b>                 |                |



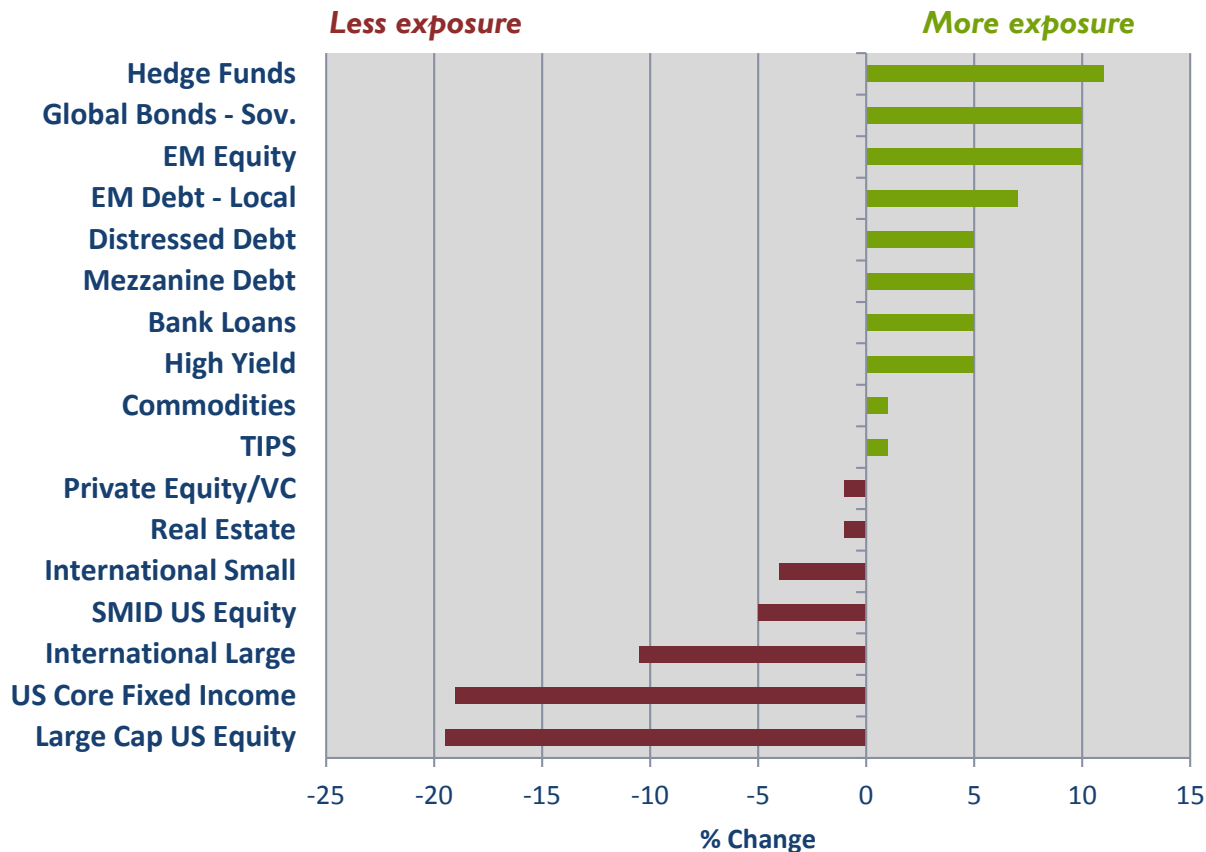
| Risk-Diversified Portfolio       |      |
|----------------------------------|------|
| Expected 10 Year Return          |      |
|                                  |      |
| Mean Variance Optimizer Analysis |      |
| Forecast 10 Year Return          | 5.9  |
| Standard Deviation               | 8.8  |
| Sharpe Ratio                     | 0.36 |

\* See appendix for details regarding Wurts' Capital Market Assumptions.

## A RELATIVE COMPARISON

- The new portfolio has the same expected return, but achieves a **19% reduction** in the expected volatility of returns.
- Some asset class exposures are eliminated completely. Likewise, the risk-diversified mix includes new asset classes.

### Relative to the current mix, the risk-diversified mix has:



#### New Asset Classes\*

- + Global Sovereign Bonds
- + High Yield
- + Bank Loans
- + Mezzanine Debt
- + Distressed Debt

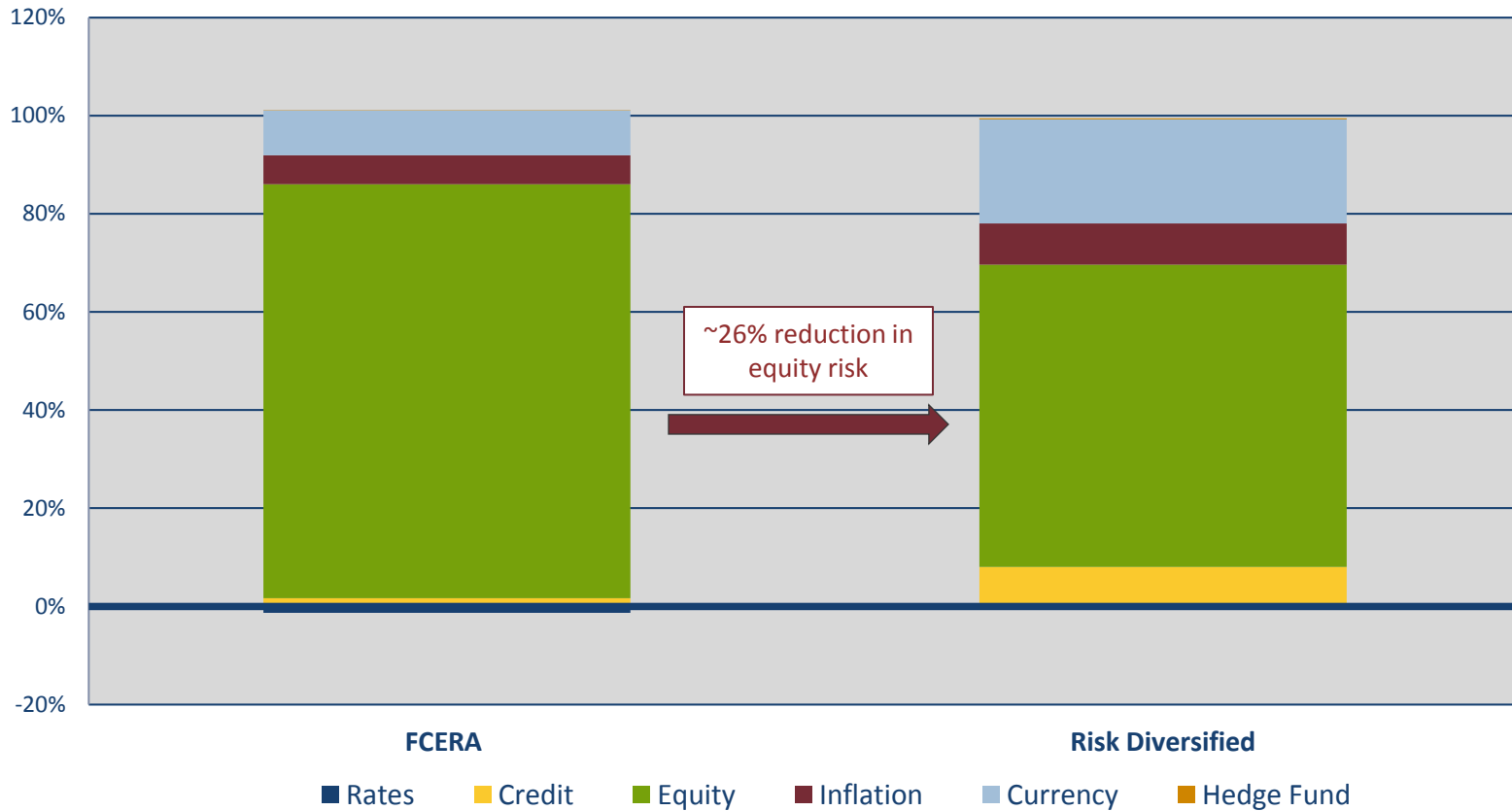
#### Eliminated Asset Classes

- U.S. Core Fixed Income
- SMID Equity
- International Small Cap

\* Note that this distinction applies to the policy allocation. FCERA has exposure to these asset classes, either as a subset of the private equity allocation, or as a result of the underlying tactical allocations made by investment managers.

# DIVERSIFICATION OF RISK FACTORS

Risk Contribution by Risk Factor



Because of the need to earn a reasonable return we still need a significant exposure to the equity risk factor. Still, the direct exposure to equities is meaningfully reduced.

## CAN WE FURTHER MITIGATE EQUITY RISK?

### Current Mix

- Asset-diversified but not risk-diversified.
- A good portfolio if economic prosperity continues indefinitely, but susceptible to large drawdowns because of high equity exposure.

### Risk-Diversified Mix

- Achieves greater diversification of risk factors.
- Should mitigate the extent of large drawdowns by reducing the equity risk.

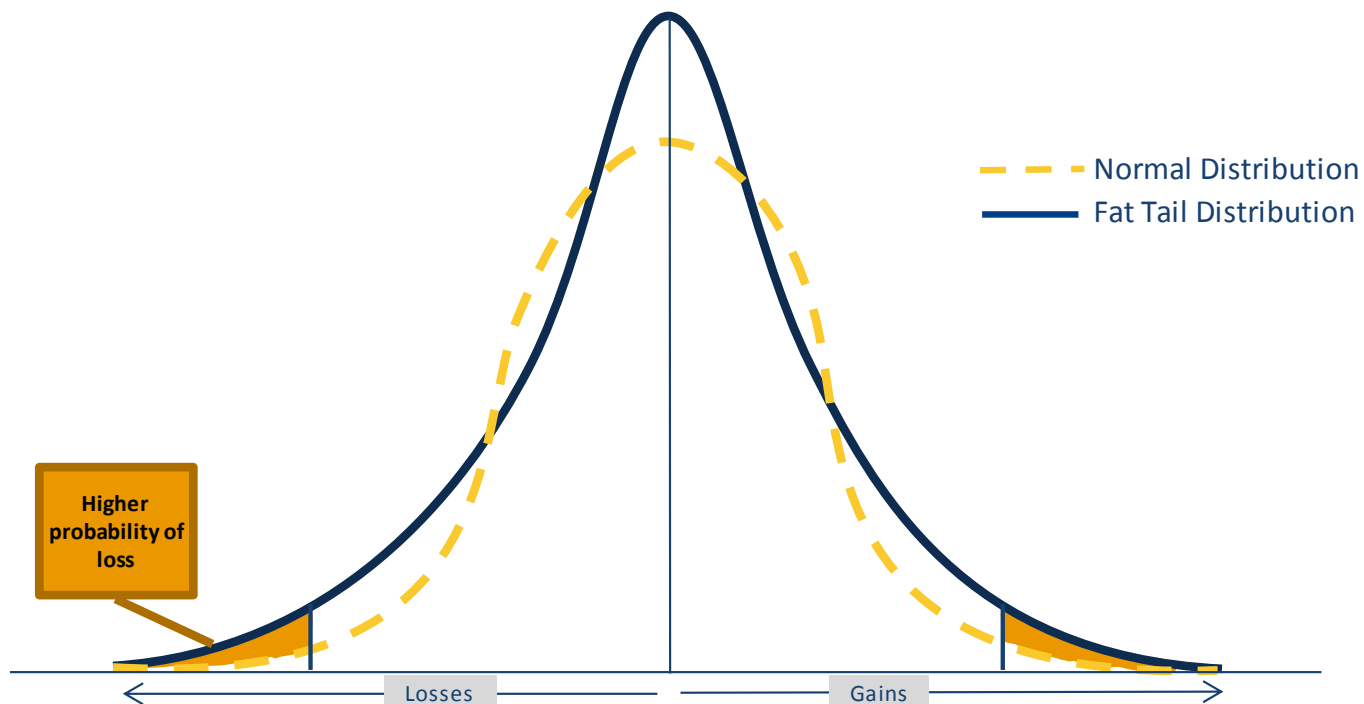
### Risk-Diversified + Tail Risk Hedge

- Overlay the risk-diversified mix with a dedicated tail risk hedging program.
- Further mitigates the negative effects of large drawdowns.



## WHAT IS TAIL-RISK?

Tail-risks are extreme events which translate into financial market moves of at least **three standard deviations** from their mean.



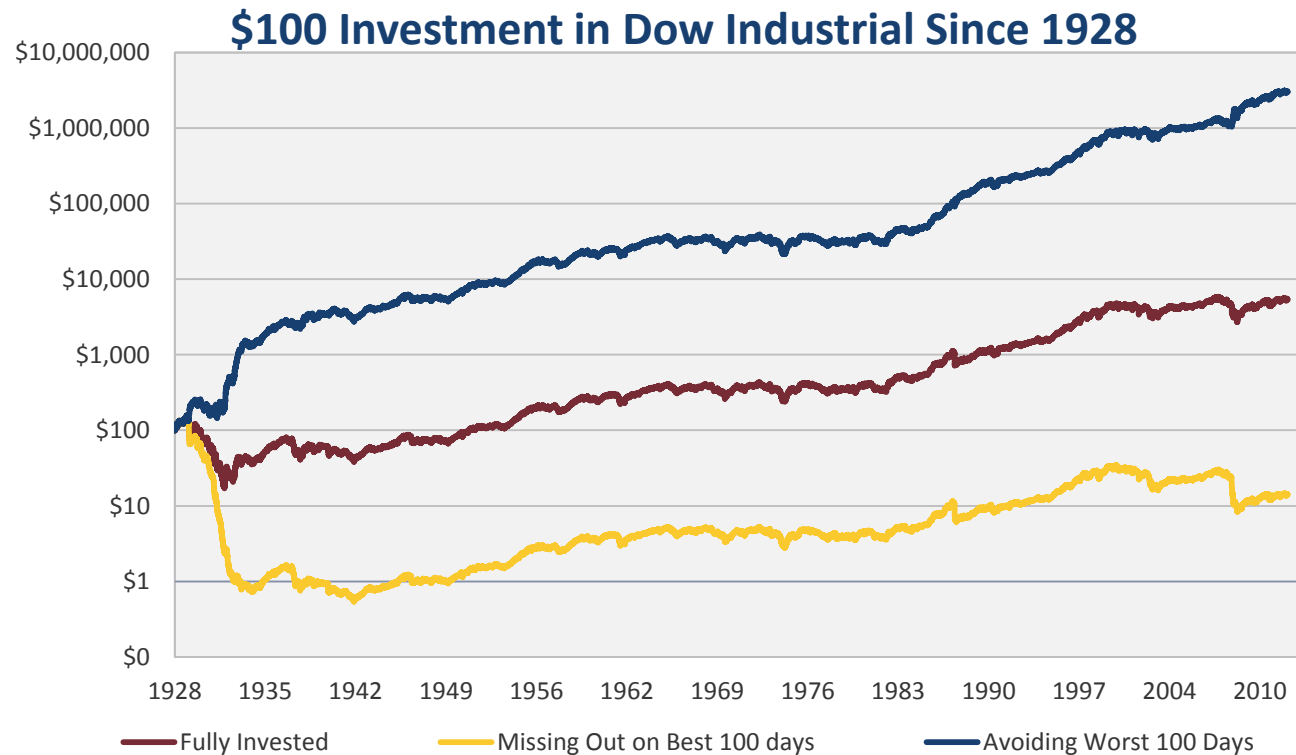
Dow Jones Industrial Average 1928 - 2012 (21,130 Trading Days)

| Daily Movement +/- | Implied Frequency of Occurrence | Actual Occurrence | Error Factor |
|--------------------|---------------------------------|-------------------|--------------|
| >3%                | 57 days                         | 1027 days         | 18 X         |
| >4%                | 1 day                           | 493 days          | 493 X        |
| >8%                | 1 in 1,003,561,397,831,590 yrs. | 48days            | Large        |

Source: Dow Jones, Bloomberg, Wurts

From 1928 – 2012, a \$100 investment in the Dow Jones Industrial would have:

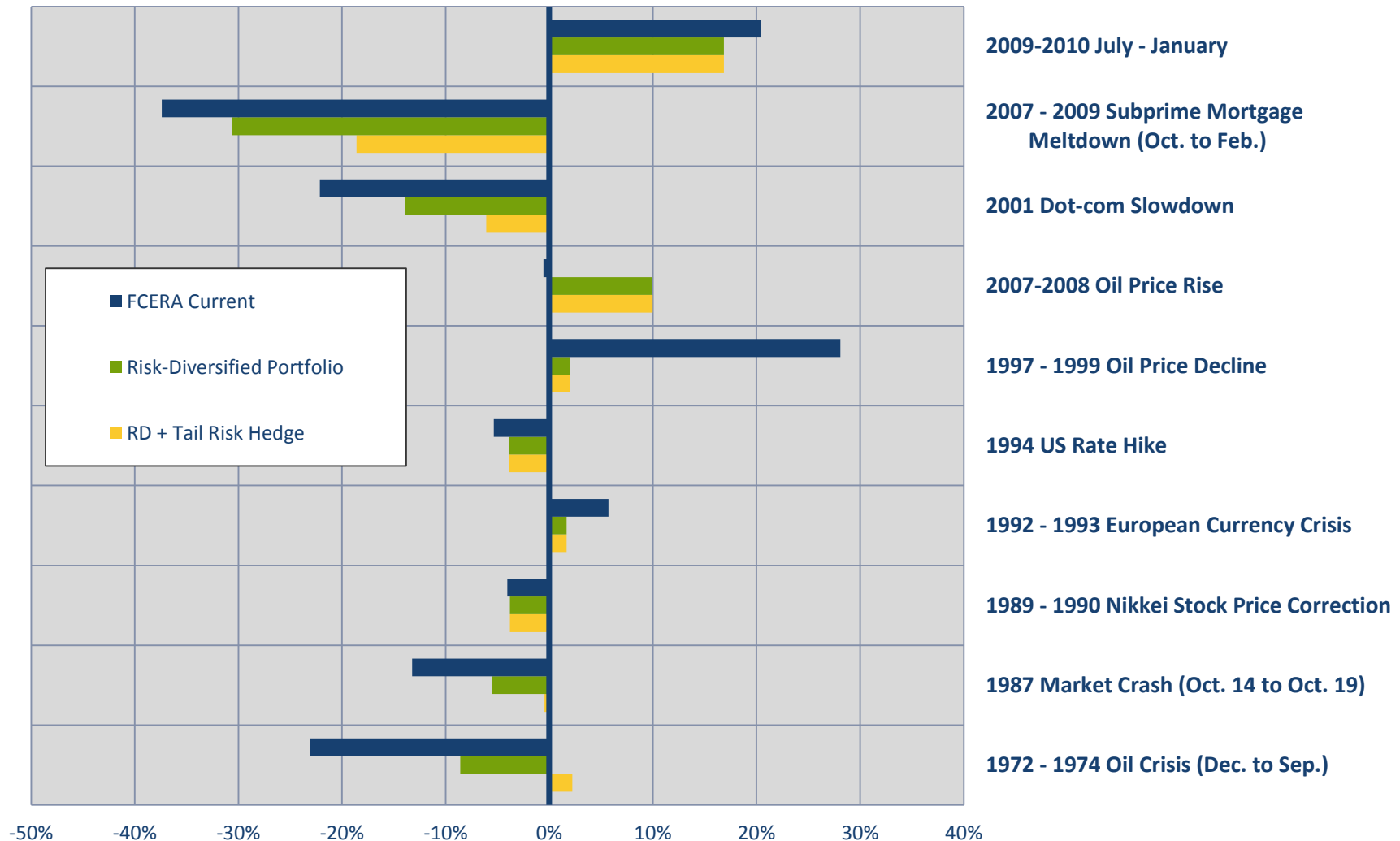
- Increased by 5,349% by staying full invested throughout
- Decreased by 99.9% by missing the best 100 days
- Increased by 14,218% by avoiding the 100 worst days



- Hedging is best thought of as insurance (reducing risk against a negative event)
  - Does not prevent the negative event, but reduces the event's impact
  - Occurs both in everyday life and in investment portfolios
    - Housing insurance
    - Car insurance
    - Life insurance
    - Tail-risk hedging
- Investment hedging is more complicated:
  - When to hedge (the premium is constantly changing)
  - Which instruments to use (asset class correlations changing)
  - What type of hedge
- Tail-risk hedging requires an experienced specialist to manage
  - Amount of information can be overwhelming
  - Experience is necessary to know when to enter and exit a hedge
  - Knowledge of what instruments and types of hedges to execute

# TAIL-RISK: SCENARIO ANALYSIS

## Tail Risk - Scenario Analysis


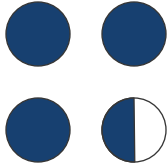
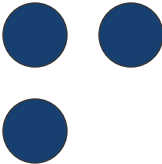
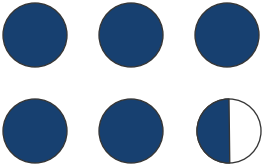


# TAIL-RISK: STRESS TESTS




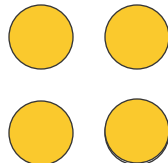
Tail Risk - Stress Tests



## FCERA Portfolio

|  |   |
|--|---|
| <i>Falling Growth</i><br><i>Rising Inflation</i><br>  | <i>Rising Growth</i><br><i>Rising Inflation</i><br>  |
| <i>Falling Growth</i><br><i>Falling Inflation</i><br> | <i>Rising Growth</i><br><i>Falling Inflation</i><br> |

## Diversified Risk Portfolio

|  |   |
|--|---|
| <i>Falling Growth</i><br><i>Rising Inflation</i><br>  | <i>Rising Growth</i><br><i>Rising Inflation</i><br>  |
| <i>Falling Growth</i><br><i>Falling Inflation</i><br> | <i>Rising Growth</i><br><i>Falling Inflation</i><br> |

By holistically examining how different assets behave in different economic regimes, we can build a portfolio that relies less on economic growth and prosperity for success.

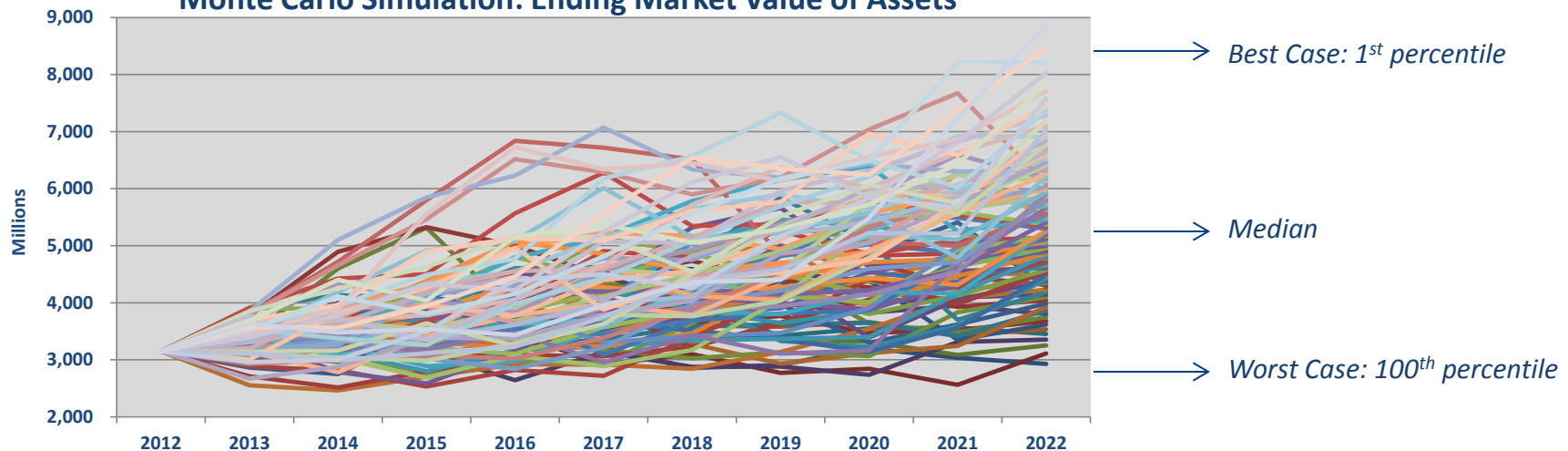
This is achieved not only through a focus on cash-flows, but also through greater geographic diversification. The portfolio is less directly impacted by the ebbs & flows of the U.S. economy.

# STOCHASTIC MODELING

# AN INTRODUCTION TO STOCHASTIC MODELING

- Wurts & Associates partnered with Winklevoss Technologies to generate forecasts of FCERA's key metrics.
- The model incorporates:
  - Wurts & Associates' 2013 capital market assumptions
  - Liabilities as calculated by Segal.
  - FCERA's contribution & benefits policies
- By compiling the results, we can compare the 1<sup>st</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, & 100<sup>th</sup> percentile outcome for each year, for each of the three strategies under consideration, with 5,000 independent trials.
- **An important caveat:** *Each trial is a simulated random outcome; the randomness is determined by a normal distribution curve. As we have previously discussed, while this may help us determine a “most likely outcome”, it understates the magnitude or probability of tail risk.*

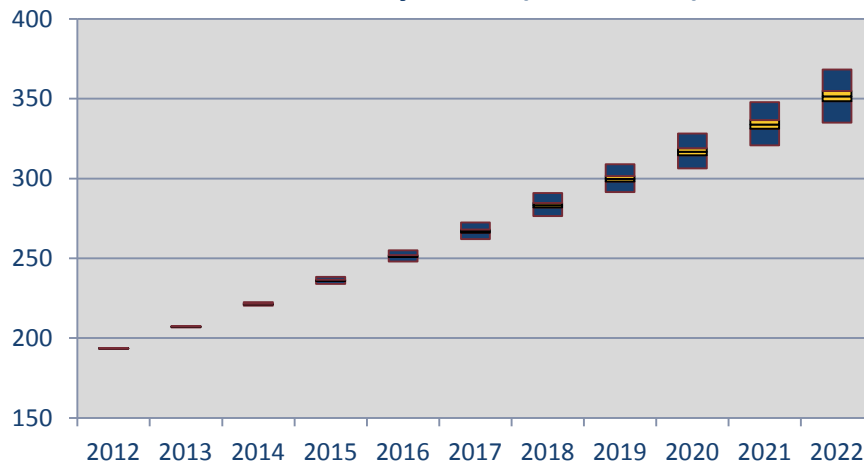
**Monte Carlo Simulation: Ending Market Value of Assets**



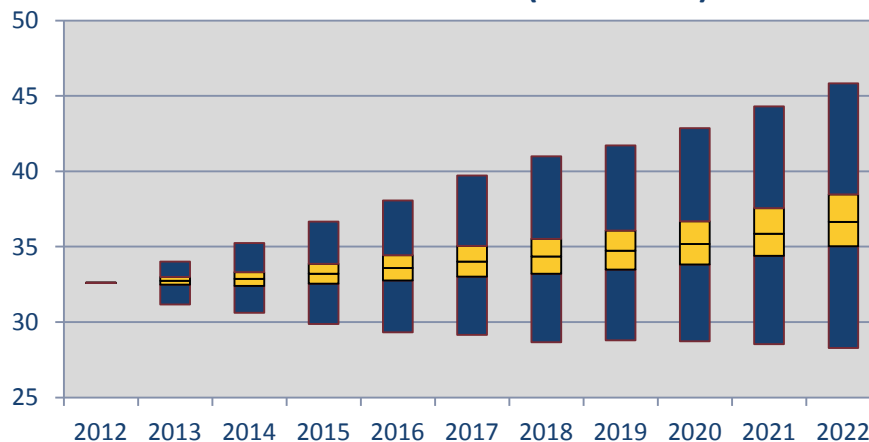


# STOCHASTIC MODELING

Benefit Payments (in millions)



Member Contributions (in millions)



- Regardless of the asset allocation, benefit payments are expected to increase.
- Benefit payments were \$193.5 million for the 2012 plan year, \$13.5 million more than the prior year.
- Depending on inflation and demographics, benefits are expected to be between \$341 & \$373 million in 2021 (roughly double the current levels).
- Member contributions are also independent of the asset allocation.
- Member contributions were \$32.6 million for the 2012 Plan year and \$32.3 million for the 2011 Plan year.
- The potential variance in member contributions is driven by future annuity costs as well as final year compensation (refer to slide 7 for the contribution policy).



# STOCHASTIC MODELING: RESULTS

| 5 Year Forecast (2017)      |            | FCERA Current Portfolio | Risk-Diversified Mix | Difference (\$) | Difference (%) | Risk-Diversified + Tail Risk Hedge | Difference (\$) | Difference (%) |
|-----------------------------|------------|-------------------------|----------------------|-----------------|----------------|------------------------------------|-----------------|----------------|
| Annual County Contributions | Median     | \$216                   | \$216                | \$0             | 0%             | \$216                              | \$0             | 0%             |
|                             | Best Case  | \$0                     | \$0                  | \$0             | 0%             | \$0                                | \$0             | 0%             |
|                             | Worst Case | \$429                   | \$375                | (\$54)          | -13%           | \$336                              | (\$93)          | -22%           |
| Actuarial Funded Status     | Median     | 80%                     | 80%                  | n/a             | 0%             | 80%                                | n/a             | 0%             |
|                             | Best Case  | 141%                    | 133%                 |                 | -8%            | 132%                               |                 | -9%            |
|                             | Worst Case | 39%                     | 49%                  |                 | 10%            | 57%                                |                 | 18%            |

| 10 Year Forecast (2022)                                 |            | FCERA Current Portfolio | Risk-Diversified Mix | Difference (\$) | Difference (%) | Risk-Diversified + Tail Risk Hedge | Difference (\$) | Difference (%) |
|---|------------|-------------------------|----------------------|-----------------|----------------|------------------------------------|-----------------|----------------|
| Annual County Contributions                             | Median     | \$236                   | \$232                | (\$4)           | -2%            | \$230                              | (\$6)           | -3%            |
|   | Best Case  | \$0                     | \$0                  | \$0             | 0%             | \$0                                | \$0             | 0%             |
|   | Worst Case | \$594                   | \$536                | (\$58)          | -10%           | \$498                              | (\$96)          | -16%           |
| Actuarial Funded Status                                 | Median     | 85%                     | 86%                  | n/a             | 1%             | 86%                                | n/a             | 1%             |
|   | Best Case  | 245%                    | 189%                 |                 | -56%           | 184%                               |                 | -61%           |
|   | Worst Case | 43%                     | 49%                  |                 | 6%             | 53%                                |                 | 10%            |
| Present Value of Future County Contributions (10 years) | Median     | \$1,676                 | \$1,676              | \$0             | 0%             | \$1,675                            | (\$1)           | 0%             |
|   | Best Case  | \$627                   | \$658                | \$31            | 0%             | \$662                              | \$35            | 0%             |
|   | Worst Case | \$2,694                 | \$2,513              | (\$181)         | -7%            | \$2,412                            | (\$282)         | -10%           |

## County Contributions:

- The median outcomes are relatively consistent across all three portfolios.
- The worst-case scenarios are vastly improved, reducing the maximum potential contribution by 10-20%.

## Funded Status:

While the actuarial funded status forecasting does differ under different investment portfolios, there are two reasons why it does not illustrate the range of outcomes effectively:

- A poor investment return is amortized through actuarial smoothing policies.
- A poor investment return is subsidized through higher contributions.

Still, we do observe some differences in the range of outcomes under each scenario.

- Under worst-case scenarios, funded status improves anywhere from 8-17%.
- The median outcome under the different portfolios is relatively homogeneous.
- Because the risk-diversified portfolios benefit less from very large equity rallies, we do sacrifice some upside.

## CONCLUSION & NEXT STEPS

## PROS & CONS

| Issue                         | FCERA Current Portfolio  | Risk-Diversified Portfolio   | Risk-Diversified Portfolio with Tail-Risk Hedge  |
|-------------------------------|--|--|--|
| Expected return               | 5.9%   | 5.9%   | 6.4% (8.5% increase likely offset by hedging costs)  |
| Standard deviation of returns | 10.83%   | 8.77% (19% reduction)  | 8.15% (25% reduction)  |
| Diversification               | Asset-diversified  | Risk-Diversified. Reduction in equity-risk, focus on cash-flow investments, and greater geographic diversification                         | Risk-Diversified. Reduction in equity-risk, focus on cash-flow investments, and greater geographic diversification                         |
| Up-Market Capture             | Strong performance in bull markets.                                    | The portfolio should perform well, but not to the extent of the current portfolio.   | The portfolio should perform well, but not to the extent of the current portfolio.   |
| Down-Market Capture           | Large drawdowns in bear markets.                                       | Underperform by less than current portfolio.   | The portfolio may experience some underperformance but the magnitude of drawdowns will be materially reduced.                              |
| Employer Contributions        | Very volatile  | Range of potential outcomes is reduced. The worst-case contribution level is reduced by 15% in 5 years and 11% in 10 years.                | Range of potential outcomes is reduced. The worst-case contribution level is reduced by 20% in 5 years and 19% in 10 years.                |
| Peer Risk                     | Minimal. Portfolio is relatively consistent with other SACRS counties. | Significant. Board may be uncomfortable with a new approach, which is materially different from peers. Risk of "failing unconventionally." | Significant. Board may be uncomfortable with a new approach, which is materially different from peers. Risk of "failing unconventionally." |
| Funded Status                 | Very volatile  | The worst-case funded status expected to improve by 12% in 5 years and 8% in 10 years.   | The worst-case funded status is expected to improve by 17% in 5 years and 15% in 10 years.   |

## NEXT STEPS

June 2013 Meeting

Late 2013?

Continue with an  
MVO Portfolio

Asset Allocation Review

*Revisit the current portfolio relative to 2013 assumptions and efficient frontier. Likely to result in modest changes in allocations and potentially new asset classes.*

- Revised Investment Policy
- Potential Manager Searches for new asset classes.
- Rebalancing as needed.

Shift from an  
MVO  
portfolio to a  
risk-based  
approach?

*Do the benefits  
outweigh the risk of  
being materially  
different from peers?*

June – September 2013

Move towards a Risk-  
Diversified Portfolio

Further  
Education on  
Risk-Diversified  
Portfolio & Tail  
Risk Hedging

*Wurts & Associates would propose further education regarding how a risk-diversified approach works, with particular emphasis on various tail risk hedging programs.*

Asset  
Allocation  
Review

*Modest adjustments to the risk-diversified mix to incorporate liquidity analysis.*

- Revise Investment Policy
- Manager searches for new asset classes.
- Rebalancing as needed.

# APPENDIX