

# Overview

## CalPERS Value at Risk & Counterparty Risk Reporting

# Purpose and Objective

- Provide a high-level overview of two elements commonly included in CalPERS' performance and risk reporting:
  1. Value at Risk (VAR)
  2. Counterparty Risk

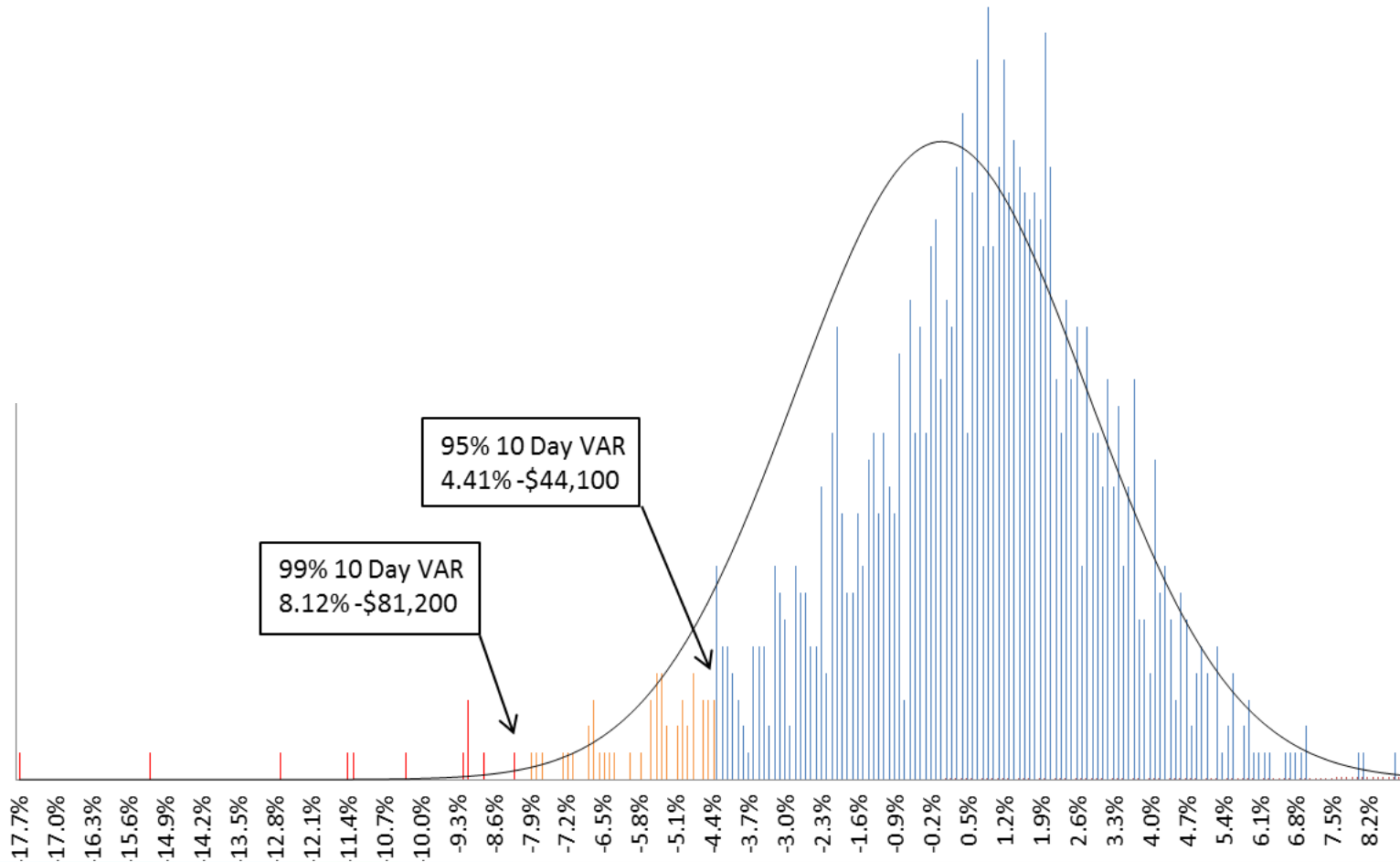
# What is Value at Risk & Why Use it?

- VAR is a measure of the potential expected loss, over a holding period at a given level of confidence
- It attempts to answer the question:
  - What is the probability that an investment can lose more than **X** (the Value at Risk) over specified time period?
- Implications for CalPERS

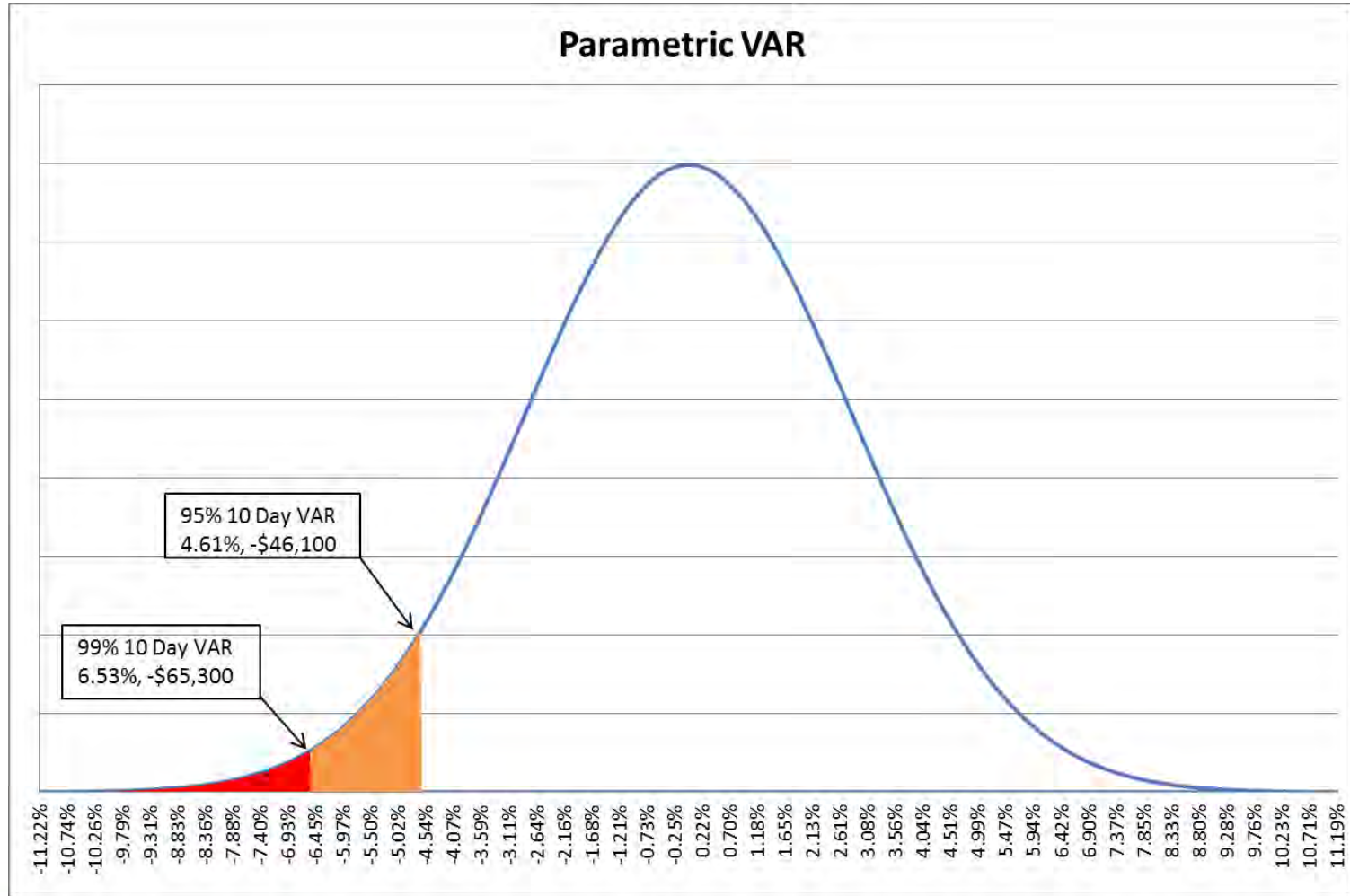
# Three Broad Approaches to VAR

| Approach                      | Strengths   | Limitations   |
|-------------------------------|---|---|
| <b>Historical</b>             | Captures actual historical performance  | The future may not look like the past                   |
| <b>Parametric</b>             | Applies statistical theory and is efficient for large portfolios and mathematically tractable | May not capture derivatives or complex instruments well |
| <b>Monte Carlo Simulation</b> | Forward looking simulations and can handle complex portfolios                                 | Computationally intensive                               |

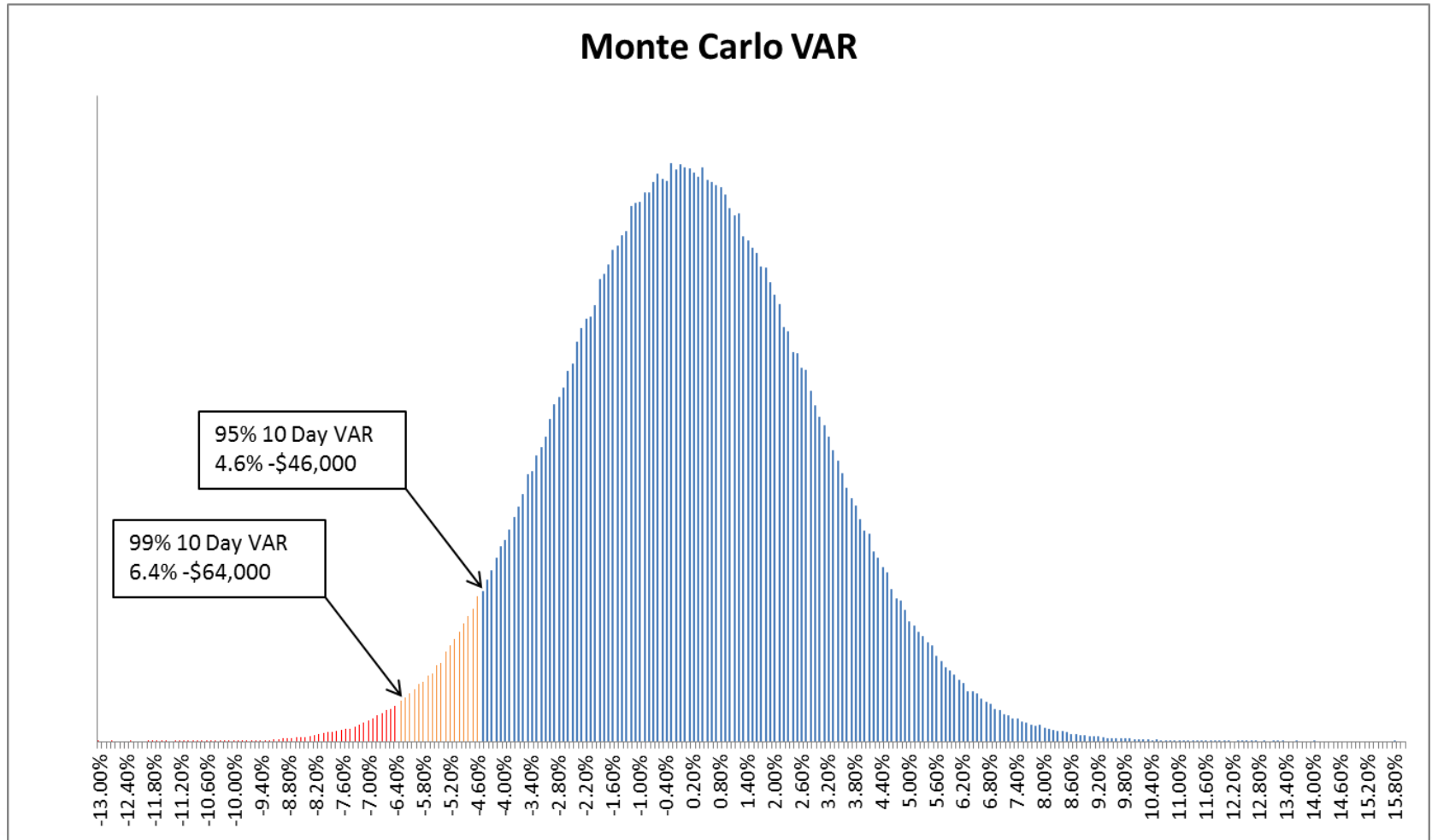
# Overview of Methods – Historical VAR



# Overview of Methods – Parametric VAR



# Overview of Methods – Monte Carlo VAR



# Example | Comparison of VAR Methodologies

PERF Fund VAR as of 11/30/14

| Methodology | 95%, 10 Day VAR (Billions) |
|-------------|----------------------------|
| Historical  | \$9.40                     |
| Parametric  | \$9.38                     |
| Monte Carlo | \$9.26                     |



# Considerations When Using VAR

- VAR measurements will increase with longer holding periods, (more time equals more possible outcomes)
- VAR measurements will decrease when the volatility of the portfolio decreases

# Limitations of VAR

- Historical information may or may not reflect potential risk
  - Example: Recent move in the Swiss Frank

Maximum loss estimated at 2.57%, vs. an actual loss of nearly 19%
- Tail Events

# Overview: Counterparty Risk Report

- The Counterparty Risk report reflects information on over the counter (OTC) derivative trades that are held in CalPERS' name.
  - It does not include trades held in commingled funds or Limited Partnerships.
- Positions, mark to market (MTM), and collateral movements are verified and agreed with Counterparties on a daily basis

# Highlights of the Counterparty Risk Report

- Columns summarize the open derivatives trade exposures with a Counterparty
  - Positive amounts in the Net Credit Exposure column reflect where CalPERS is owed money which is not secured by collateral

## OTC Derivative Counterparty Exposure Report\*

| <u>Counterparty</u> | <u>Net MTM FORWARDS</u><br>(\$) | <u>Net MTM OPTIONS</u><br>(\$) | <u>Net MTM SWAPS</u><br>(\$) | <u>CalPERS Exposure</u><br>(\$) | <u>Counter Party Exposure</u><br>(\$) | <u>Net MTM Total</u><br>(\$) | <u>Collateral Posted</u><br>(\$)* | <u>Net Credit Exposure</u><br>(\$) |
|---------------------|---------------------------------|--------------------------------|------------------------------|---------------------------------|---------------------------------------|------------------------------|-----------------------------------|------------------------------------|
| Counterparty 123    | 10,386,714                      | (84,745)                       | 11,735,283                   | 27,147,091                      | (5,109,839)                           | ✓ 22,037,252                 | (6,749,962)                       | 15,287,290                         |