



addressing public pension issues of today

...AND TOMORROW

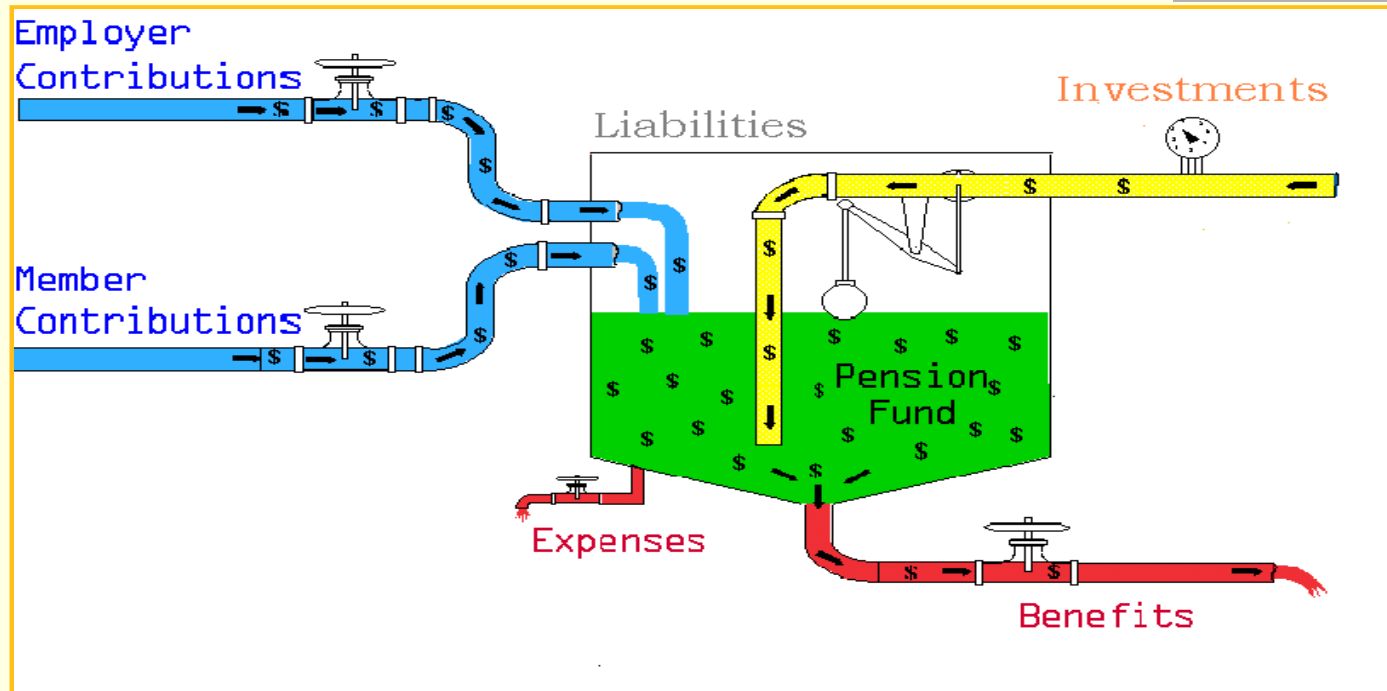
Projection & Stabilization of Employer Contributions

Trustee Education – General
Pension Education Day

3 Main Topics

- n Overview of liabilities (with respect to actuarial science)
- n Projections (Deterministic vs. Stochastic)
- n Approaches to stabilizing costs / contributions

Quick overview of liabilities / actuarial science...



Overview continued...

- n First, calculate **Present Value of Future Benefits (PVB)**
 - n \$1 of future pension payments for all current employees worth less than \$1 today for 2 reasons:
 1. Time value of money – put a dollar in the bank or stock market, hopefully have more than a dollar next year.
 2. Uncertainty – some won't receive expected benefits (bird in the hand...)
 - n Discount rate takes care of #1, expected decrements (Mortality, Retirement, Disability, etc.) take care of #2

Overview continued...

- n **PVB** is value today of all expected future benefit payments (after discounting for interest and uncertainty/departure)
- n Split **PVB** into 2 pieces: Future Normal Costs and Accrued Liability
 - n Normal Cost: portion of the PVB allocated to the current year
 - n Accrued Liability: portion of the PVB not covered by current and future normal costs. Alternatively, benefits that should have been covered by *past* normal costs.

Overview continued...

- n Unfunded Accrued Liability (**UAL**)
 - n Accrued Liability – Assets
 - n Past experience (investment, demographics, etc.) can lead to unfunded liability (or surplus), even if normal cost contributed every year
- n Contribution made up of two pieces:
 - n Normal Cost, plus
 - n Amortization of **UAL**

Projections

- n Annual actuarial valuation is a “snap-shot” of the financial status of the Plan at a specific moment in time
 - n Only includes liabilities for active & inactive (retirees, beneficiaries, etc) members as of the valuation date
 - n Does NOT include future new entrants
 - n Assets are market-related, i.e. must be at least partly related to the market value at time of valuation.

Projections

- n Annual actuarial valuation necessary for providing current funded status and current contribution amount.
- n However, doesn't say much about future contribution levels
 - n Can change due to unanticipated asset changes, demographic shifts, new benefit tiers, actuarial gains / losses, etc.
- n Projections are annual valuations, projected into the future.

Projections

- n Two main types of actuarial projections – deterministic vs. stochastic
 - n Deterministic – Valuations projected using fixed assumptions.
 - n Demographic assumptions met, Plan assets earn actuarial rate of return (or other given rate)
 - n Stochastic – Future experience of the Plan is *simulated*, rather than relying on fixed assumptions of what will happen
 - n Simulation can be confined to assets, but can simulate portions of liabilities as well.

Projections (Deterministic)

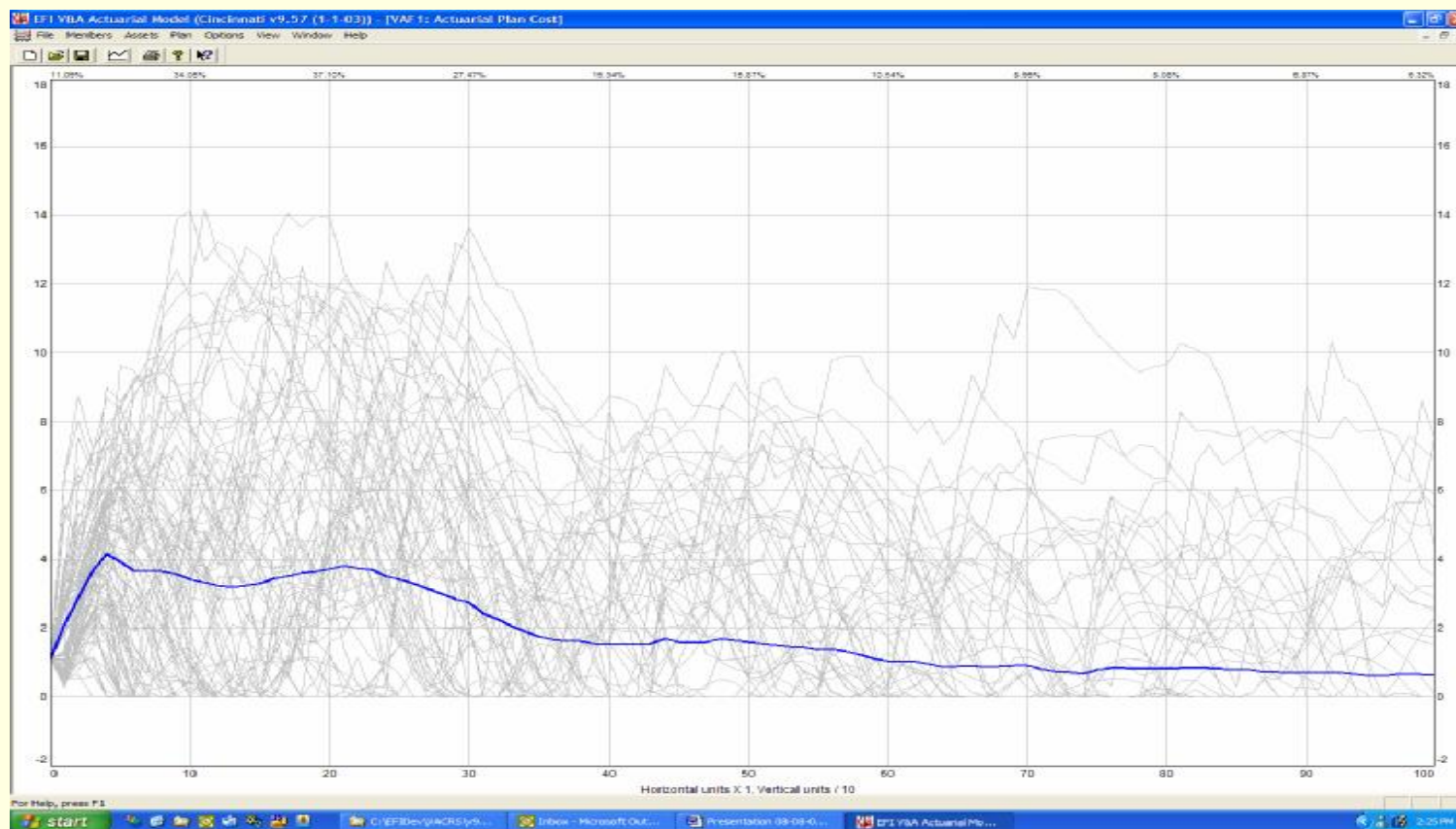
- n Steps in Deterministic Projection:
 - n Perform current valuation
 - n Move population forward by applying decrements (retirement, termination, mortality, etc.) and salary increases to current population
 - n Replace terminated actives with new entrants
 - n Apply projected cashflows (asset earnings, contributions, benefit payments, etc.) and calculate results of year 1 projected valuation.
 - n Repeat...

Projections (Stochastic)

- n Additional Steps Necessary For Stochastic Projection:
 - n Need probability distribution of assumptions to be simulated
 - n Expected (real) returns, variation & correlation of asset classes
 - § Expected returns based on weighted combination of past experience and future expectations
 - n Generally simulate inflation as well (asset returns are inflation + real rate of return)
 - § Inflation impacts liabilities through salary increases
 - n Multiple trials run using simulation model
 - n Liabilities and cashflow determined for each trial
 - n Results compiled / graphed

Projections (Stochastic)

n Results: what do they look like?



Projections

- n Deterministic vs. Stochastic
 - n Deterministic produces single result, Stochastic shows range of results (probability distribution)
 - n Stochastic process more complicated, time-consuming
 - n Uses for Deterministic:
 - n Budgeting future contribution levels
 - n Impact of changing methods / assumptions / benefit designs
 - n Analyze trends in cost

Projections

n Deterministic vs. Stochastic

n Uses for Stochastic:

- n Sensitivity analysis

- n Asset allocation (main use)

 - § Run simulations using different portfolios

 - § Must satisfy constraints

 - § Frequently restrict to “efficient” portfolios

 - § Requires measure of risk

 - § Many use variation (or standard deviation) of returns

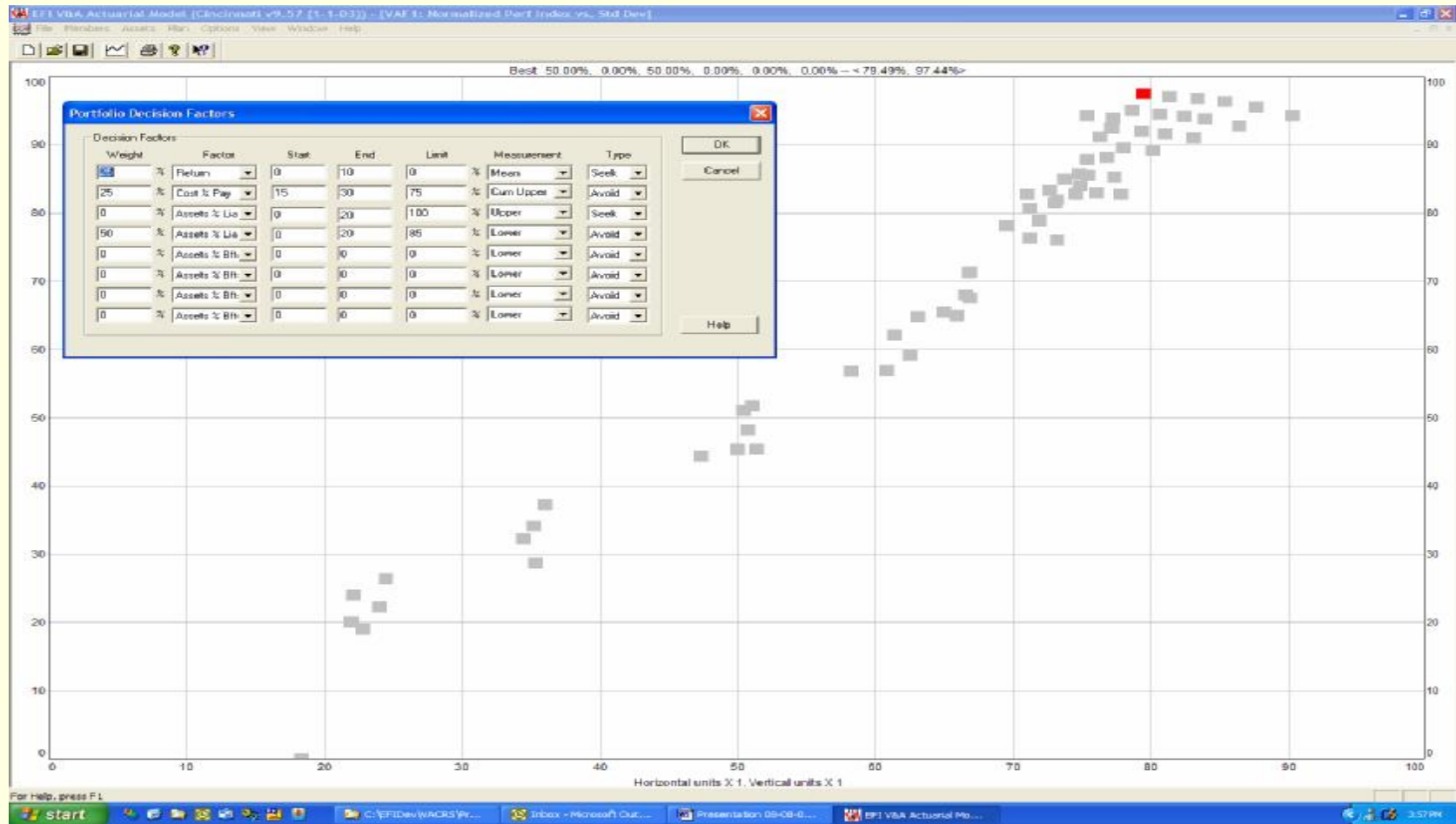
 - § EFI prefers weighted “decision factors”

Projections

n Decision Factors - CASSY

- n Quantify risk tolerance
 - n Example 1: Funded Status should be $\geq 100\%$ over next 10 years
 - n Example 2: Minimize employer contributions
 - n Example 3: Contributions will not exceed $xx\%$ of payroll
- n Score on decision factor reflects probability of success (or absolute value, in case such as Example 2)
- n Decision factors should be independent, not redundant
- n Board assigns weights to decision factors, indicating relative importance
- n Asset mixes ranked by weighted score on decision factors

Projections



Stabilization of Employer Contribution

- n Question for consideration:
 - n Do we really mean contribution rate stability?
 - n Or are we trying to limit contributions so that they don't exceed a certain % of payroll?
 - n Are low but unpredictable rates undesirable?
- n Assuming we really do mean stabilization, then three areas of focus:
 - n Assets / Liabilities (ALM)
 - n Benefits (i.e. Plan Design)
 - n Methods

Stabilization of Employer Contribution

n Assets / Liabilities

n Already discussed – asset allocation

- n Set highest weight to decision factor #3 (stabilize contributions)
- n Power of diversification...

n Cashflow matching

- n Purchase fixed income portfolio to match benefit payments
- n Stability, but at what cost? (giving up equity premium)
 - § More appropriate for terminating plan
- n Can also accomplish by matching duration

Stabilization of Employer Contribution

n Benefits / Plan Design

- n Tough to do much without major changes to Plan
- n Defined contribution
- n Hybrid plans (cash balance, PEP, etc)
- n Various groups (including EFI) working on other hybrid DB arrangements

Stabilization of Employer Contribution

n Methods

n Smoothing

n Actuarial value of assets

§ Currently using 5-year smoothing with corridor

§ CalPERS recently switched to 15-year smoothing

§ Tendency in private sector to move away from smoothing (mark to market)

n Smoothing gains / losses

§ Currently using 30-year open period (maximum allowed by GASB)

Stabilization of Employer Contribution

n Methods continued...

n Ramping and/or Corridor method

- n Under ramping, contribution rate moves to ultimate rate in steps
- n Corridor method similar; contribution rates set as long as funding level stays within corridor
- n Possible issues: can cause positive NPO (GASB issue), funding deficiencies (see San Diego)

n Contingency Reserves – “insurance” against contribution rate increases

n Funding method

- n Currently using Entry Age Normal (EAN) – considered to be stable method
- n Alternative method includes Projected Unit Credit (PUC) – only stable if average age of population stable

Stabilization of Employer Contribution

n Conclusions

- n Noteworthy quote from Vinson & Elkins report on what went wrong in San Diego:
 - n “Then, as now, California law recognizes the minimization of employer contributions as a legitimate objective for pension system fiduciaries. This objective, however, is clearly subordinate to their responsibility to protect the actuarial soundness of the systems they serve.”
- n Contributions can be stabilized, but generally at a cost.

Summary & Questions

n Topics

- n Liabilities and the exciting world of actuarial science
- n Projections: Deterministic vs. Stochastic
- n Stabilizing contributions

n Questions?