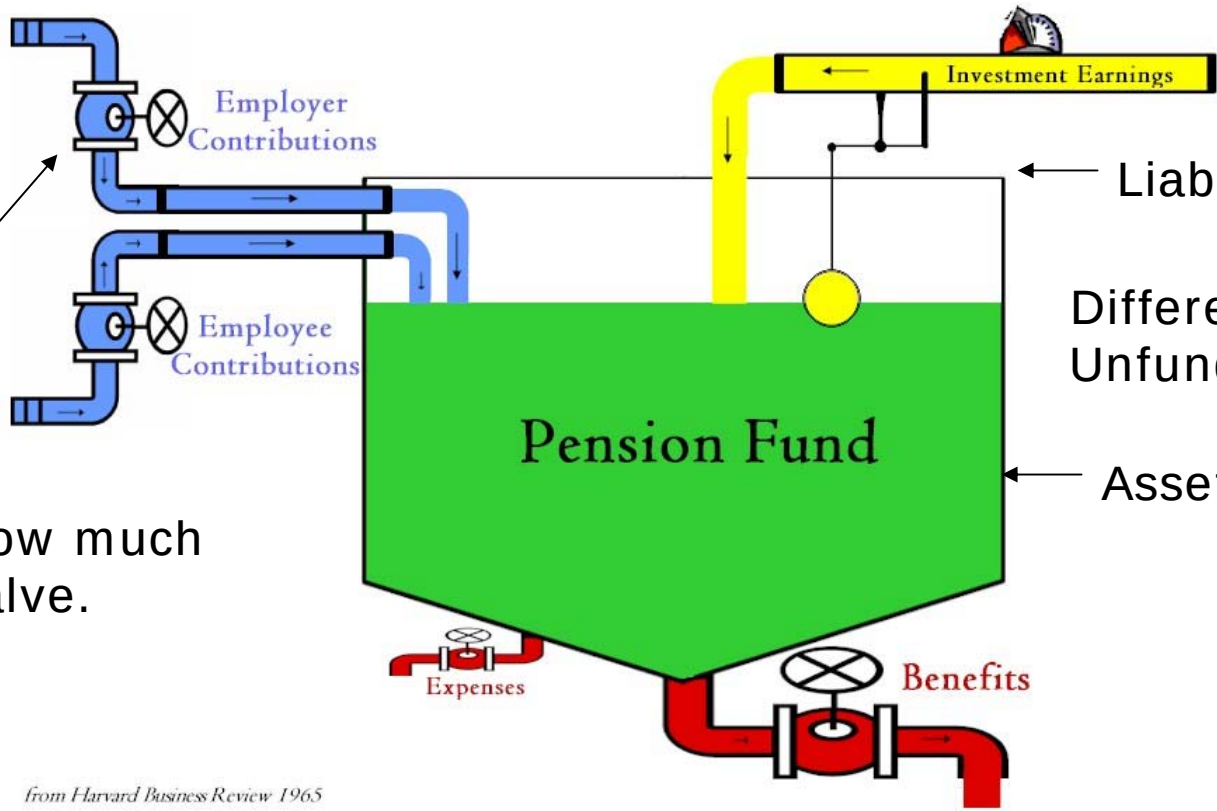
Actuary 101

Introduction to Actuarial Concepts

January 17, 2007

Pension Fund Dynamics



Valuation:

Determines how much to turn this valve.

Pension Actuary Tasks

- Analyze trends
- Develop assumptions for the future
  - Population behavior (turnover, mortality, etc.)
  - Financial and economic (investments, payroll, inflation, etc.)
- Measure obligations (liabilities)
- Develop a funding plan
- Stress test the future
- Monitor the progress of the plan and make periodic adjustments as needed.

Analyze Trends

- Census data and past reporting – experience studies
- Financial historical returns
- National and regional statistics
- Benefit structures
- Regulatory environment
- Other?

Develop Assumptions for the Future

- The Actuary does not have a crystal ball
- Balance past experience of the plan with on-going national trends
- Judgment, experience, and risk assessment play important roles in the final determination.
- Once set, one can be sure that from year to year actual experience will vary.

Measuring Obligations

- Collect Data
  - Age, Service, Salary, etc.
- Determine Benefits
  - According to City's Municipal Code
  - Amount, Eligibility
- Apply Assumptions
  - Economic
    - Investment Return, Payroll growth, COLAs
  - Demographic
    - Withdrawal, Retirement, Mortality, Disability

Measuring Obligations (continued)

- For each person, we calculate the benefit payable for each decrement at each age

	Withdrawal	Early (reduced) Retirement	Normal (unreduced) Retirement	Service Connected Death	Non-Service Death	Service Connected Disability	Ordinary Disability
Age 25	$0	NA	NA	$750	NA	$9,000	NA
Age 26	ROC	NA	NA	$775	NA	$9,250	NA
Age 27	ROC	NA	NA	$800	$400	$9,500	$480
:							
Age 50	NA	$12,000	NA	$23,000	$11,500	$32,000	$23,000
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Age 55	NA	NA	$25,000	$25,000	$12,500	$35,000	$25,000
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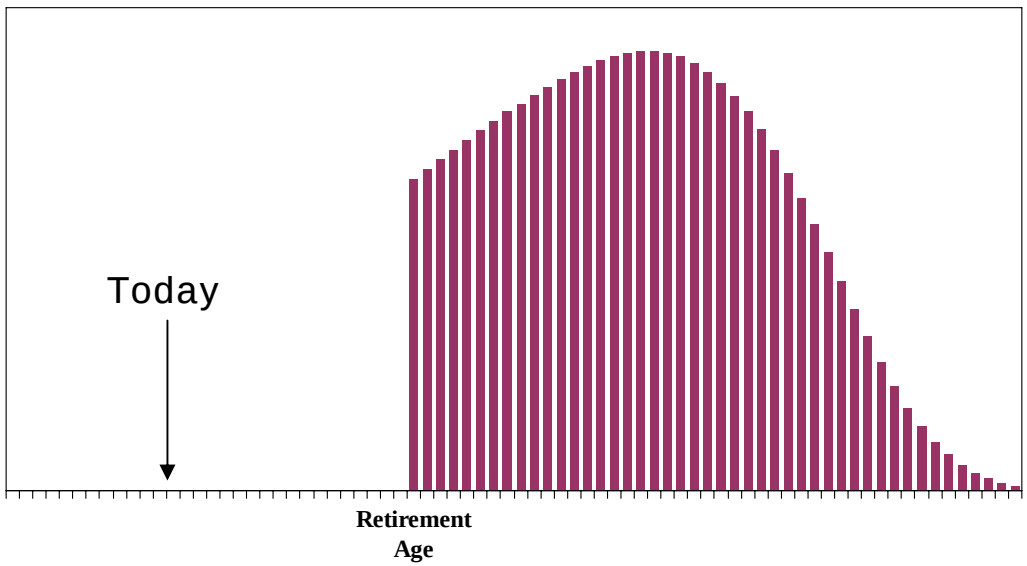
Age 70	NA	NA	$30,000	$30,000	$15,000	$37,500	$30,000

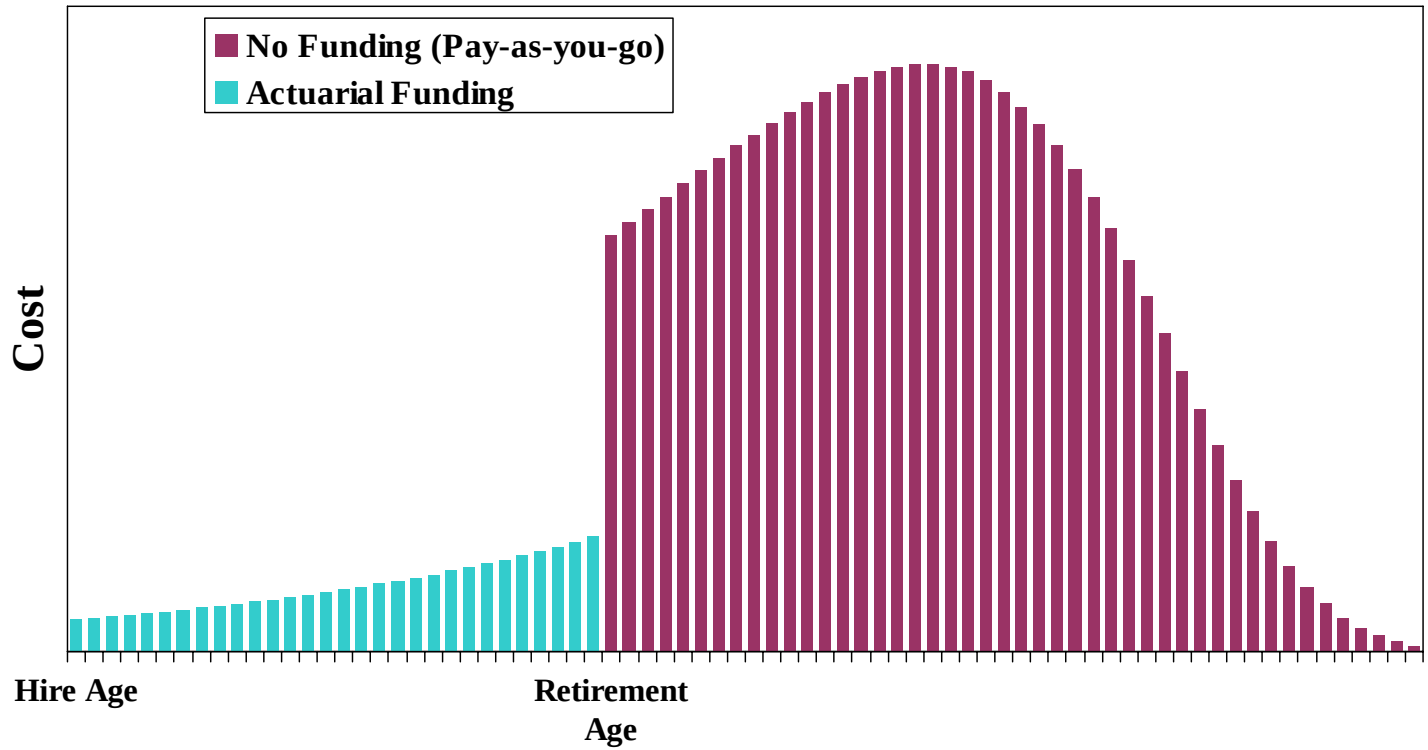
Measuring Obligations (continued)

- We then convert each of the benefits to a payout stream (reflecting COLAs where applicable) and the probability of paying each benefit

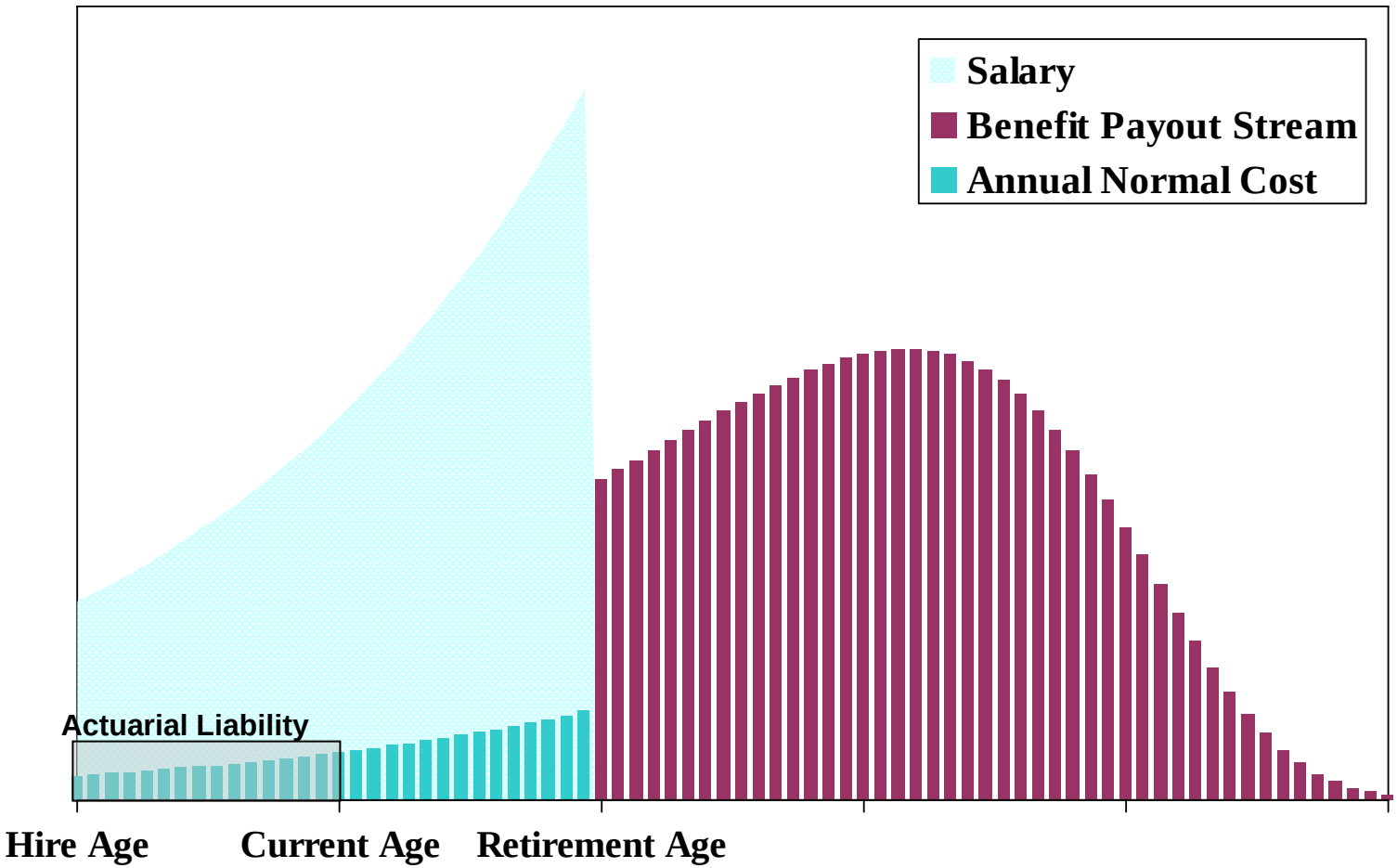


- The discounted value of these payout streams is the Present Value of Future Benefits (PVFB)

Funding Plan Development



Terminology Illustration



Contribution Components

- Normal Cost
  - Approximates annual benefit accrual
  - Only changes if benefits to assumptions change
- Amortization of Unfunded Actuarial Liability
  - UAL = Actuarial Liability – Assets
  - 2006 valuation uses 27 years to amortize
  - Payments calculated to increase at 4.25% per year
  - If payroll increases at 4.25% (and there are no further gains or losses) this will produce a constant contribution rate

Asset Smoothing (Actuarial Value of Assets)

Most plan employ asset smoothing to dampen the impact of market fluctuation on costs

SDCERS Asset Smoothing Method

1	Actual Assets 6/30/2006	$	4,000,000
2	Expected Assets 6/30/2007	$	4,320,000

Example 1: 10% earnings

3a	Actual Assets 6/30/2007	$	4,400,000
3b	Excess over expected (3a - 2)	$	80,000
3c	Actuarial value 6/30/2007 (2 + 25%*3b)	$	4,340,000

Example 1: 5% earnings

4a	Actual Assets 6/30/2007	$	4,200,000
4b	Excess over expected (3a - 2)	$	(120,000)
4c	Actuarial value 6/30/2007 (2 + 25%*4b)	$	4,290,000

Stress Testing