

When You Assume...

Pennsylvania Association of Public Employee
Retirement Systems
10th Annual Spring Forum

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May 29, 2014



Biographical Information

- Director, Actuarial Services, for Municipal Finance Partners, Inc.
- Member of the American Academy of Actuaries
- Fellow of the Society of Actuaries
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- Enrolled Actuary under ERISA
- I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Disclaimer

- This presentation does not necessarily reflect the views of PAPERS, my clients or any actuarial organizations.
- This presentation absolutely reflects the values and mission of myself and my firm, Municipal Finance Partners, Inc.

Purpose of Actuarial Assumptions

- Represent the condition of a pension plan, and its sponsor, in a fair and unbiased manner.
- Different Measurements:
 - Ongoing sufficiency of contributions
 - Current termination basis
 - Financial Reporting
 - Credit Rating
- Focus on funding

Conflicting Objectives of Funding Policy

- Reasonable allocation of funding to years of future service (Intergenerational Equity)
- Reasonable management and control of future contribution volatility
- Support public policy goals of accountability and transparency

Actuarial assumptions and methods are tools to meet these objectives.

There is No Right Answer!

- Actuaries will have an acceptable range of assumptions.
- Individual assumptions vs. set of assumptions as a whole
- Process for changing assumptions:
 - Review/monitor experience
 - Assess impact of change
 - Decision
- Gyroscope



Key Actuarial Assumptions

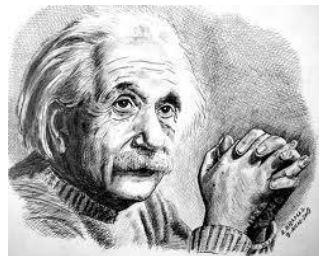
- Economic
 - Inflation
 - Interest Rate/Discount Rate
 - Salary Scale
- Demographic
 - Mortality
 - Disability
 - Retirement Rates
 - Turnover

Inflation

- Underlying factor in economic assumptions
 - Inflation impacts corporate earnings, dividends and stock prices.
 - Inflation affects interest rates and fixed income yields.
 - Higher inflation leads to higher salary increases
- Directly impacts liabilities for cost-of-living increases
 - Automatically granted
 - Ad hoc increases-regular pattern of increases recognized in advance for GASB 67 and 68.

Interest/Discount Rate

- Used to discount future distributions (benefit payments) to the valuation date
 - Time theory of money: \$1 tomorrow is worth less than \$1 today.
 - Depending on the source, Albert Einstein referred to compound interest as either the 8th wonder of the world, the human race's greatest invention, or the most powerful force in the universe.



Discount Rate Theories

- Traditional approach: Discount rate is the rate earned by the retirement fund.
- FASB (Corporate Financial Reporting): Based on interest rates on high-quality corporate bonds.
- GASB 67 & 68: Expected fund investment return until projected insolvency date/muni bond rate thereafter
- Financial Economics

Financial Economics

- Benefit liabilities are akin to fixed income assets (stream of payments).
- These liabilities are risk-free; therefore, they should be valued using risk-free (U.S. Treasury) discount rates.
- There is no excess value in equity or other “risky” assets.
- More appropriate to corporate finances than municipalities (bankruptcy value).

Investment Return History



Investment Return

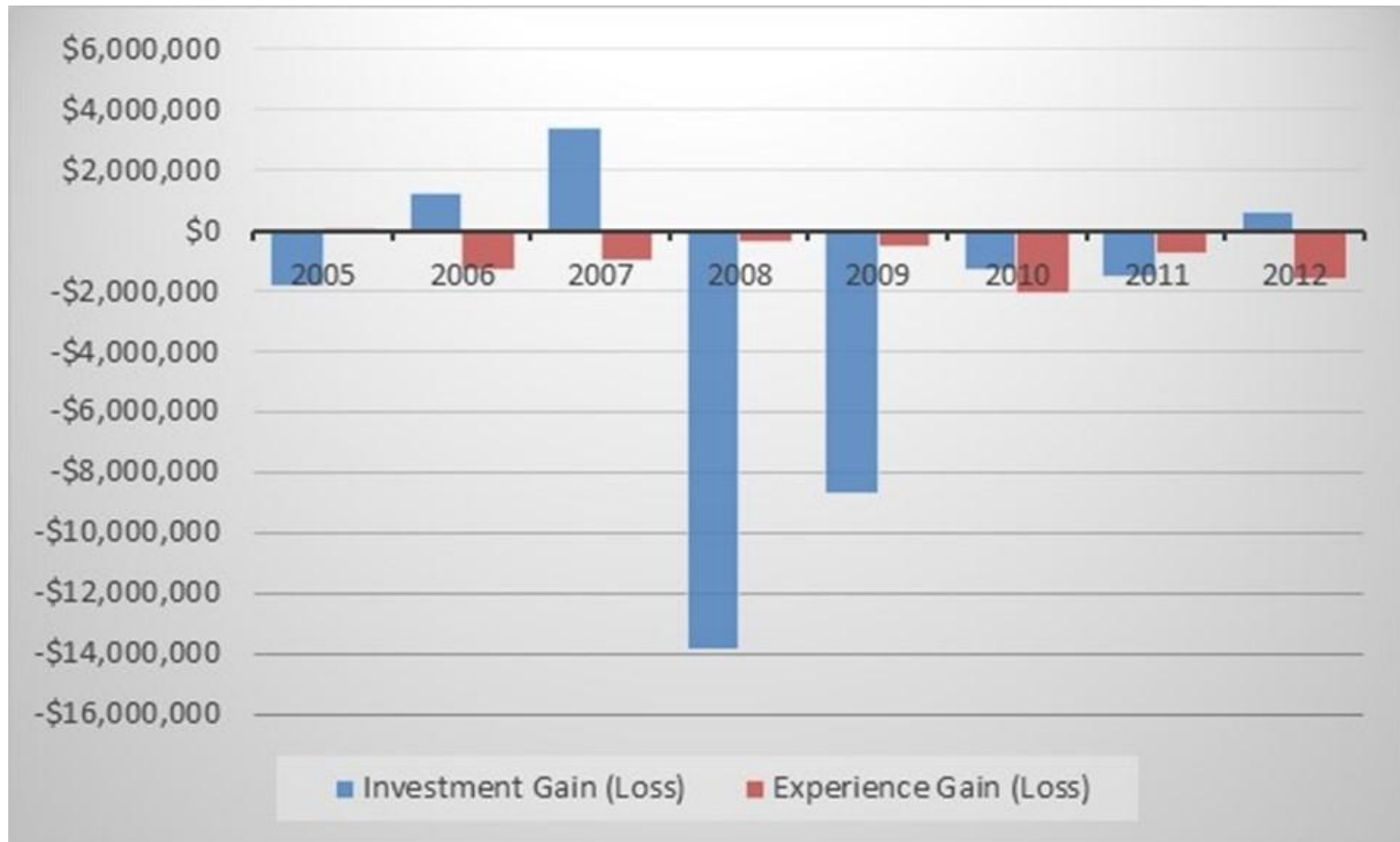
- Volatility makes measurement dependent upon period used.
- Averages:
 - 1999-2012: 5.78% (market value)
 - 2003-2012: 7.98%
 - 2005-2012: 6.14% (5.81% actuarial value)
 - 2008-2012: 4.87% (4.27% actuarial value)
 - 2009-2012: 11.97% (6.70% actuarial value)

Elephant in the Room

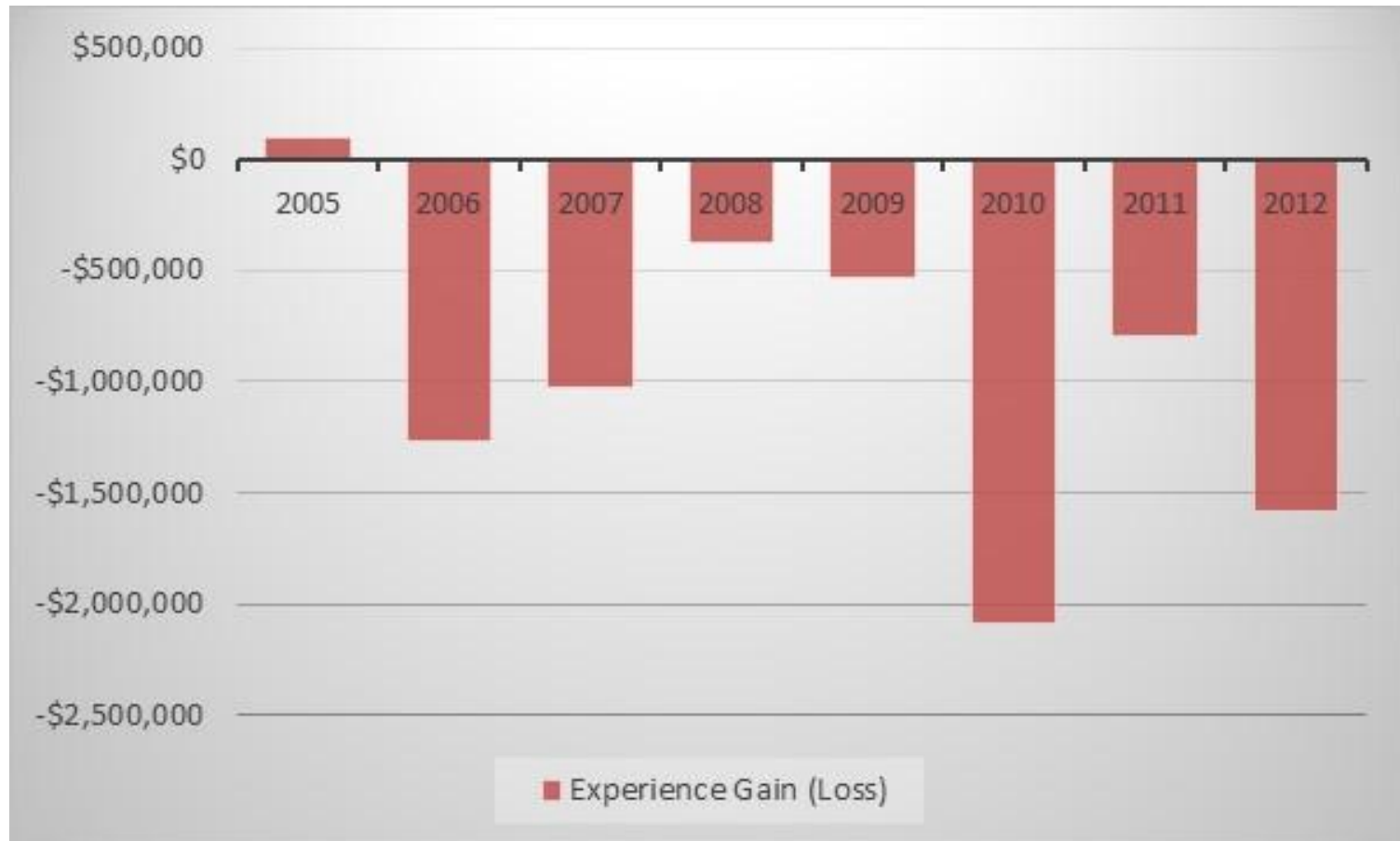
- The investment return has the largest impact of any of the actuarial assumptions
- Rule of thumb: 1% decrease in discount rate increases liabilities by 10% (varies, depending on demographics)
- Moody's is adjusting your liabilities based on their opinion as to the "correct" rate



Asset and Non-Asset Gains/Losses



Experience (Non-Asset) Losses



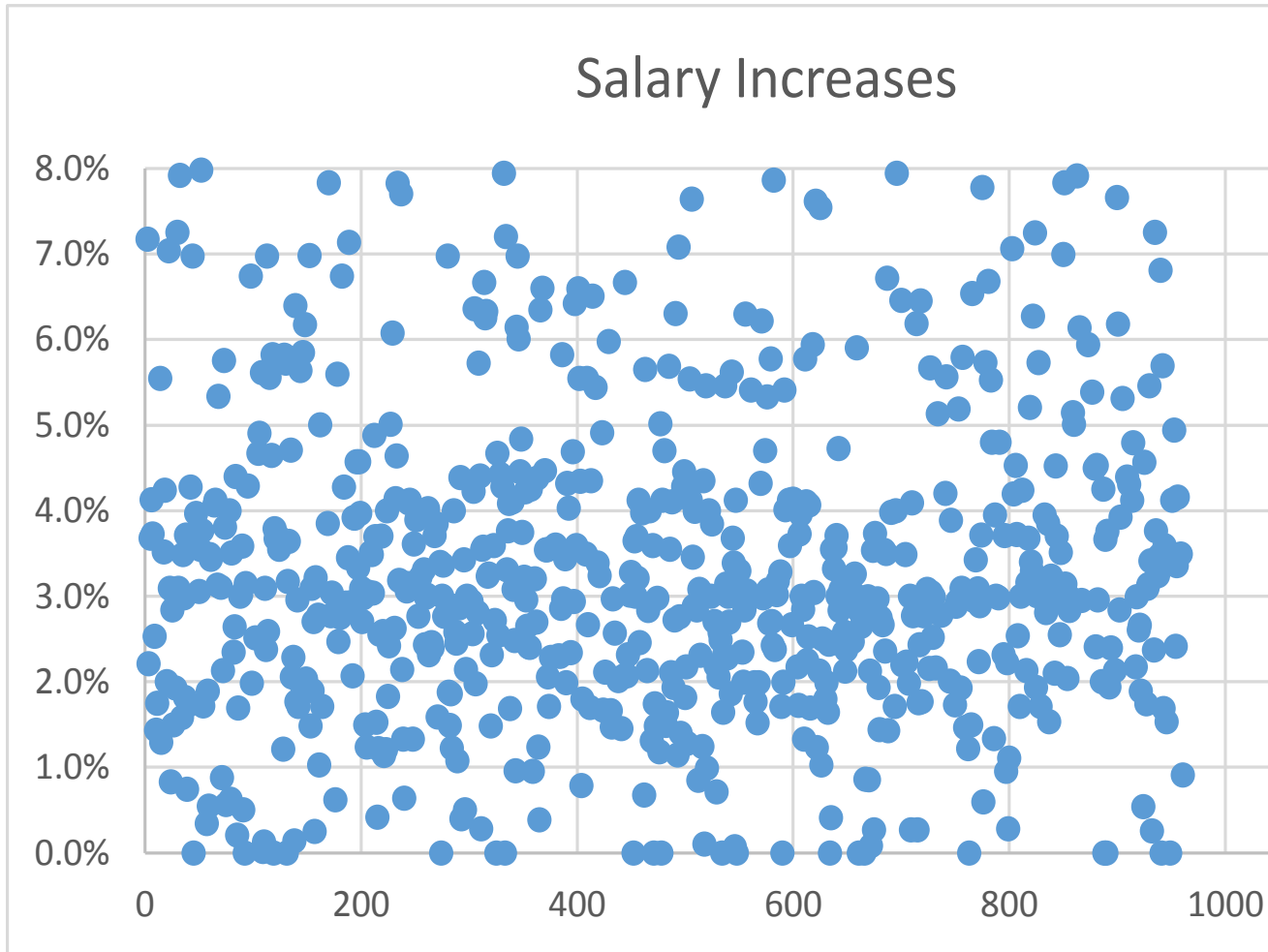
Salary Increases

- What is definition of plan compensation (what is excluded from W-2 pay?). Salary increase assumption must consider:
 - Cost-of-living increases (inflation)
 - Longevity increases
 - Merit increases
 - All promotions over a career
 - Tendency for more overtime in last 3 years (pension spiking)
 - Age and service

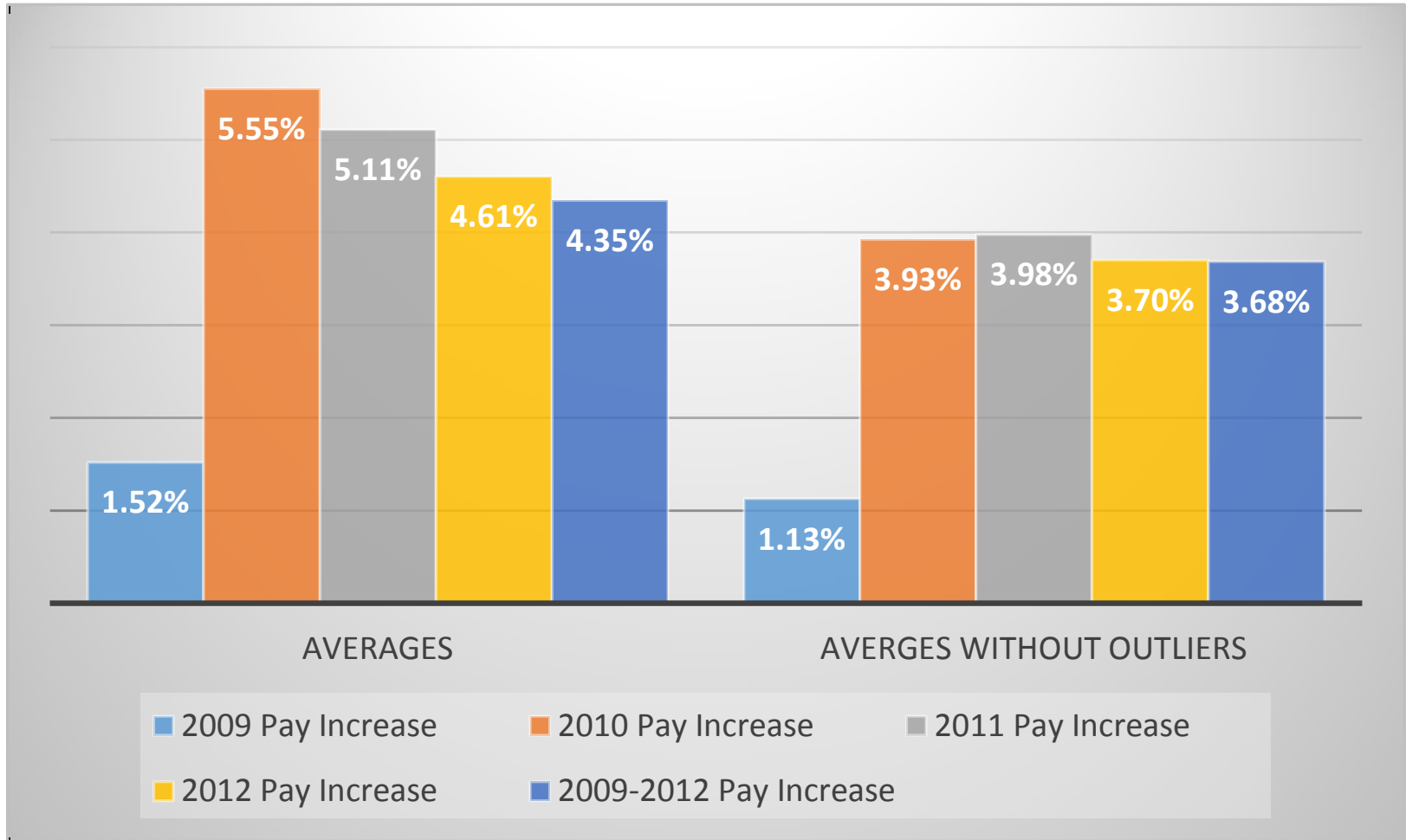
Relation to Other Assumptions

- Inflation: Cost-of-living increase component
- Interest rate: “Spread” between valuation interest rate assumption and salary scale assumption
 - Limited to 3% under Act 600 without waiver

Salary Increases (2008-2012)



Salary Increase History (2008-2012)



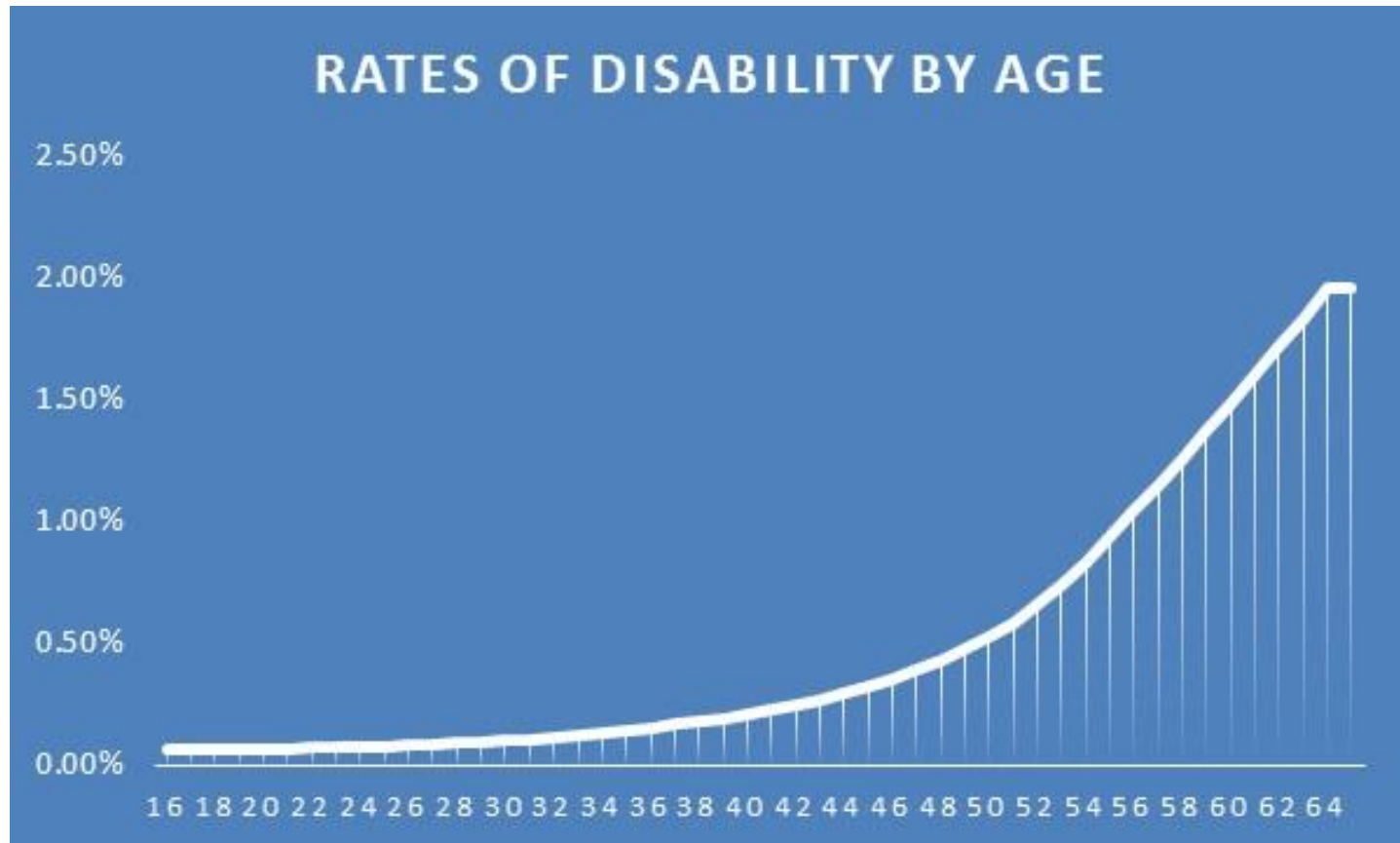
Mortality

- Generally based on population mortality, as less than 100,000 lives are probably not sufficiently credible for specific table.
 - Population mortality shows study improvement
 - Shift from Group Annuity studies to Retired Pensioner studies
- RP-2000 table currently in use; replacements are being studied.
- Projected mortality:
 - Project to current year
 - Project to ultimate year

Disability

- Generally standard tables in used
- What is the plan benefit?
 - If no additional benefit, these are effectively withdrawals.
 - If similar to pension benefit, assumption not so important
 - If benefit is greater than retirement benefit, disability experience can be quite high (moral hazard)

SOA 1987 Table



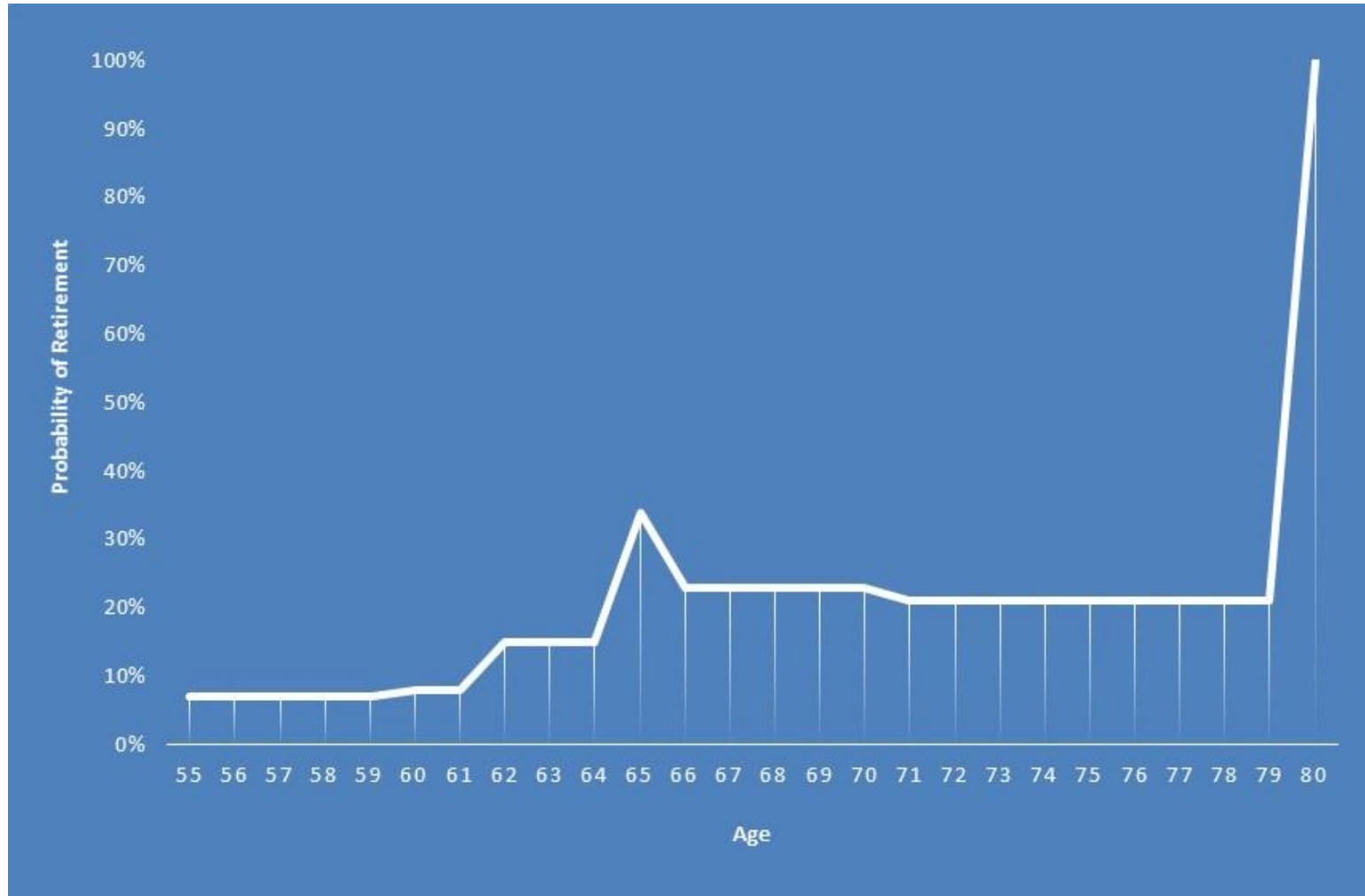
Retirement Benefits

- Plans generally have a normal and an early retirement age; for example, age 60 normal retirement and age 55 early retirement after 10 years of service.
- Retirement benefits are generally reduced actuarially for early retirement; however reduction may be lower than actuarial (subsidized).
- Plans may have DROP benefits, which tends to postpone retirements.

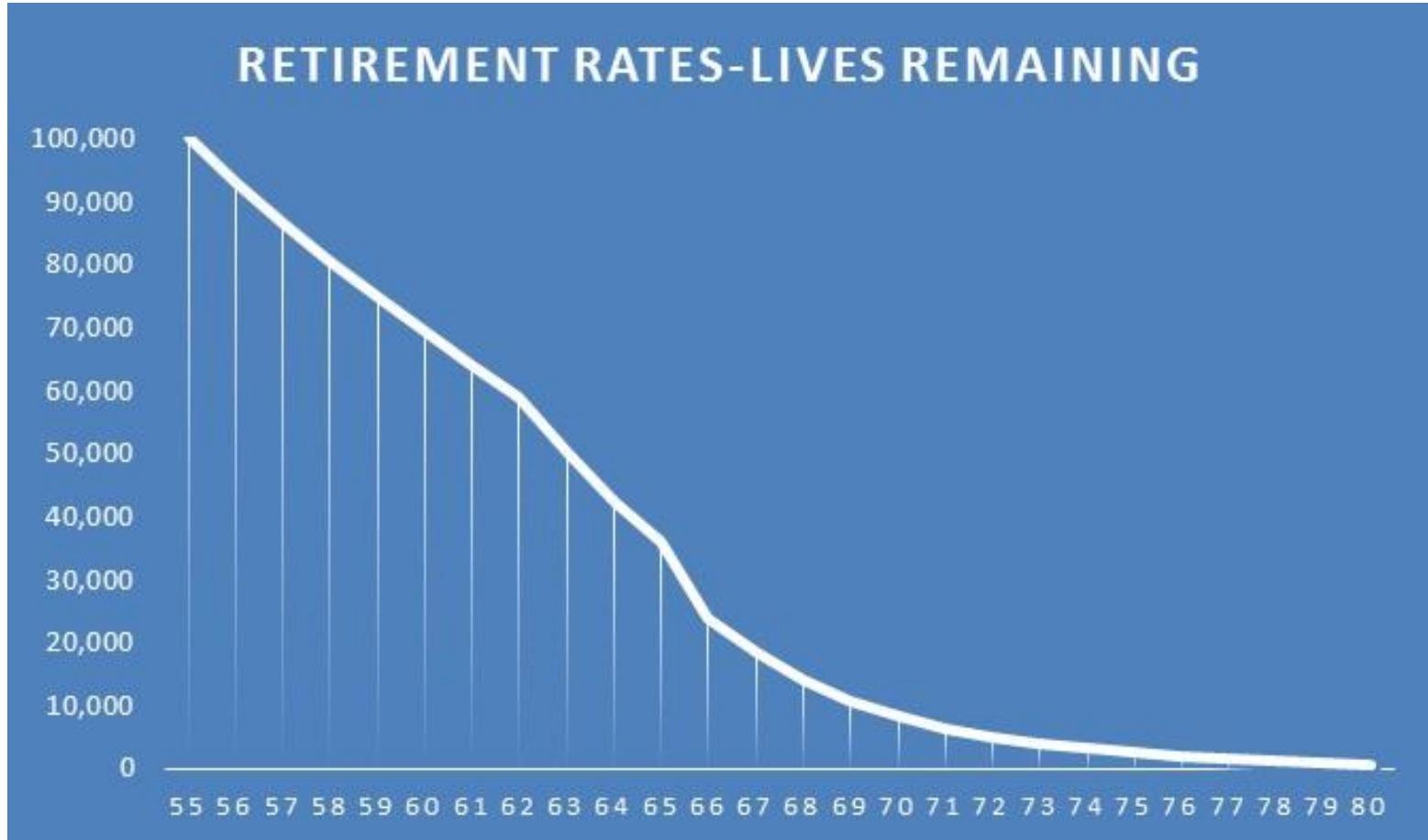
Influences on Retirement Age

- Retirement benefits/DROP Plan
- Social Security/Medicare Eligibility
- Rigors of the job
- Tradition
- Health of employee
- Medical insurance
- Other jobs available

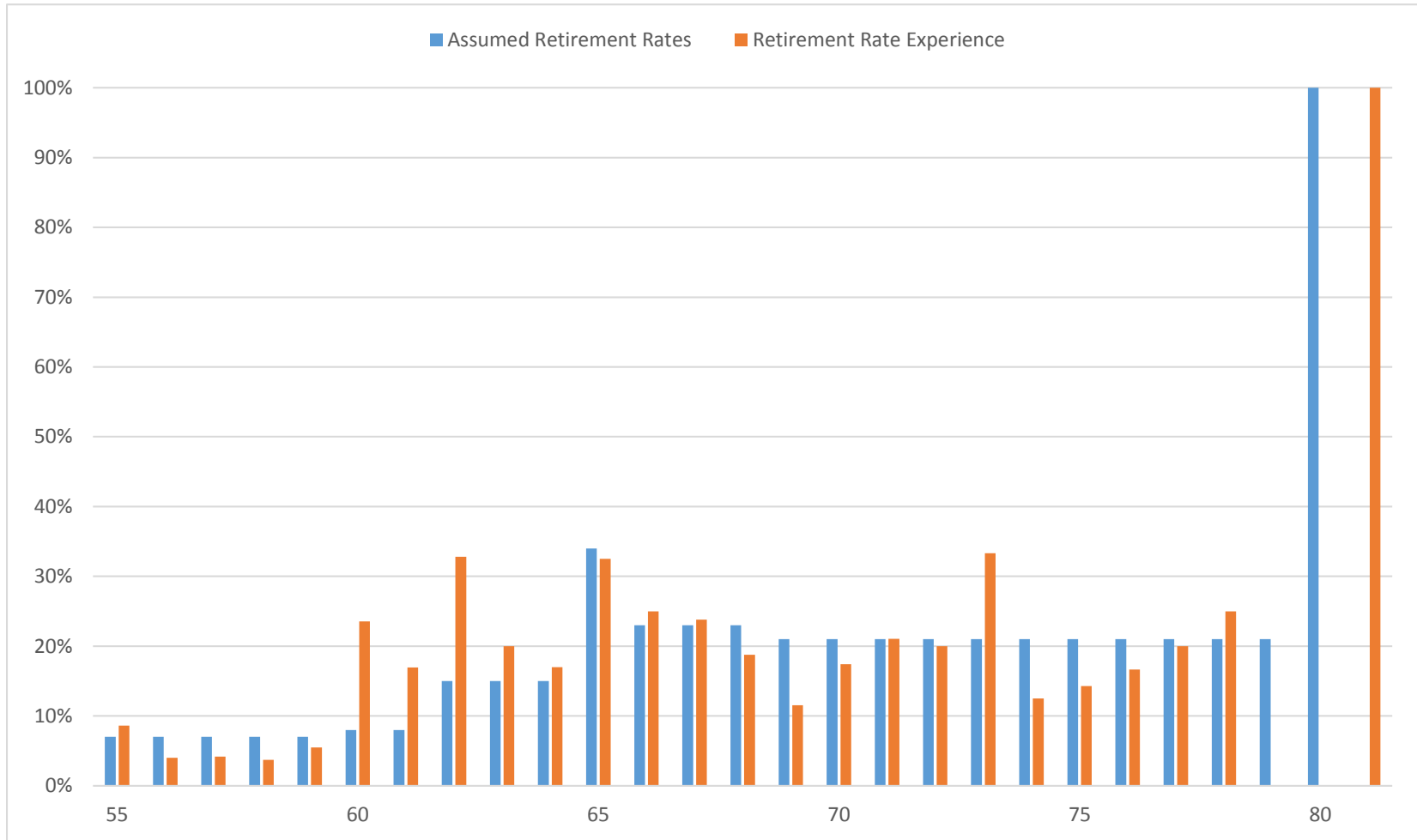
Retirement Rate Table



Retirement Rates-Lives Remaining



Retirement Rates Experience



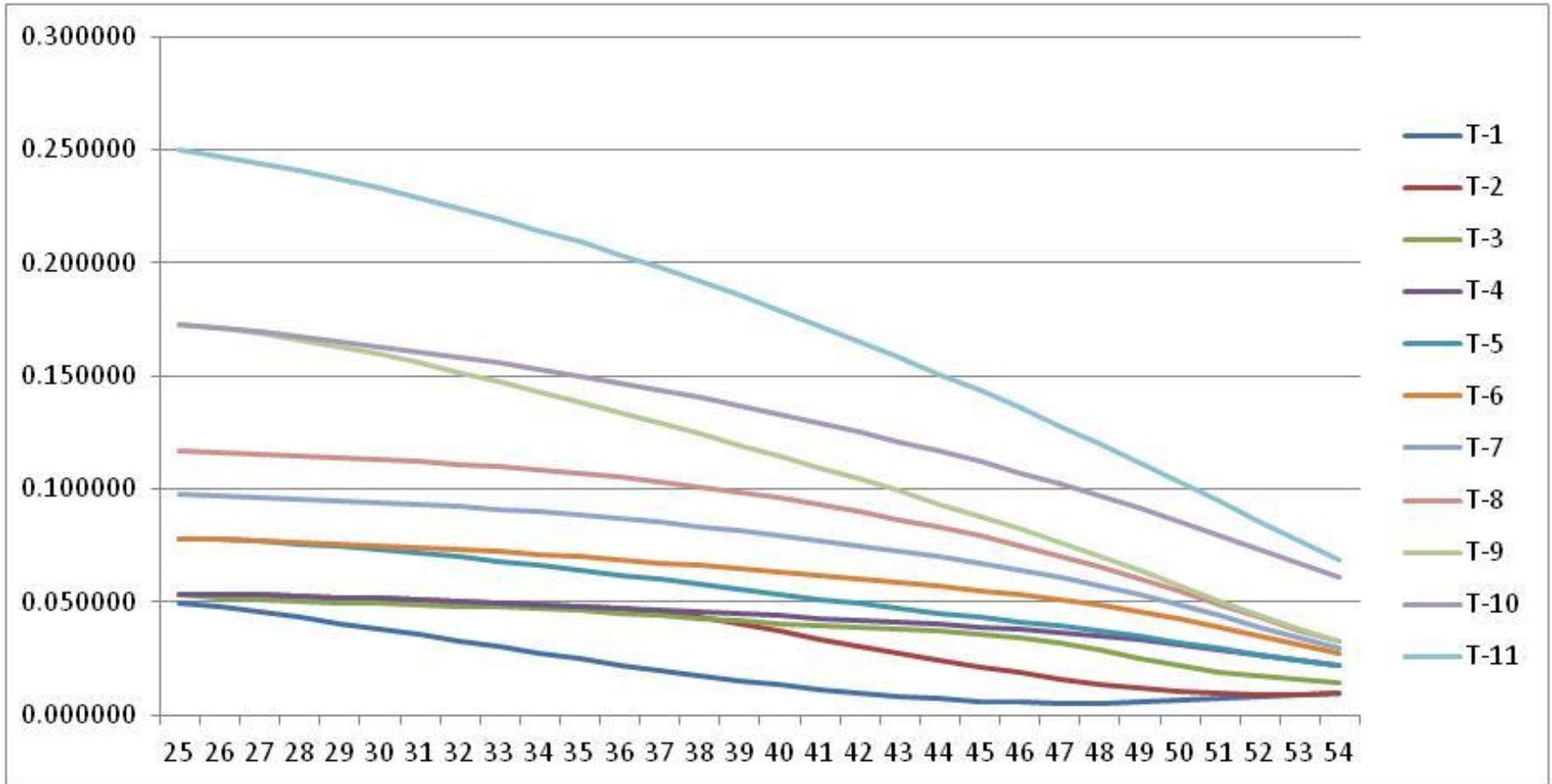
Turnover or Withdrawal Rates

- We are valuing the likelihood of
 - Forfeitures of benefits due to non-vested termination
 - Gains due to shortened accrual periods
 - Gains due to forgoing impact of future salary increases
- This is the assumption where an improper fit can cause cascading gains or (usually) losses.

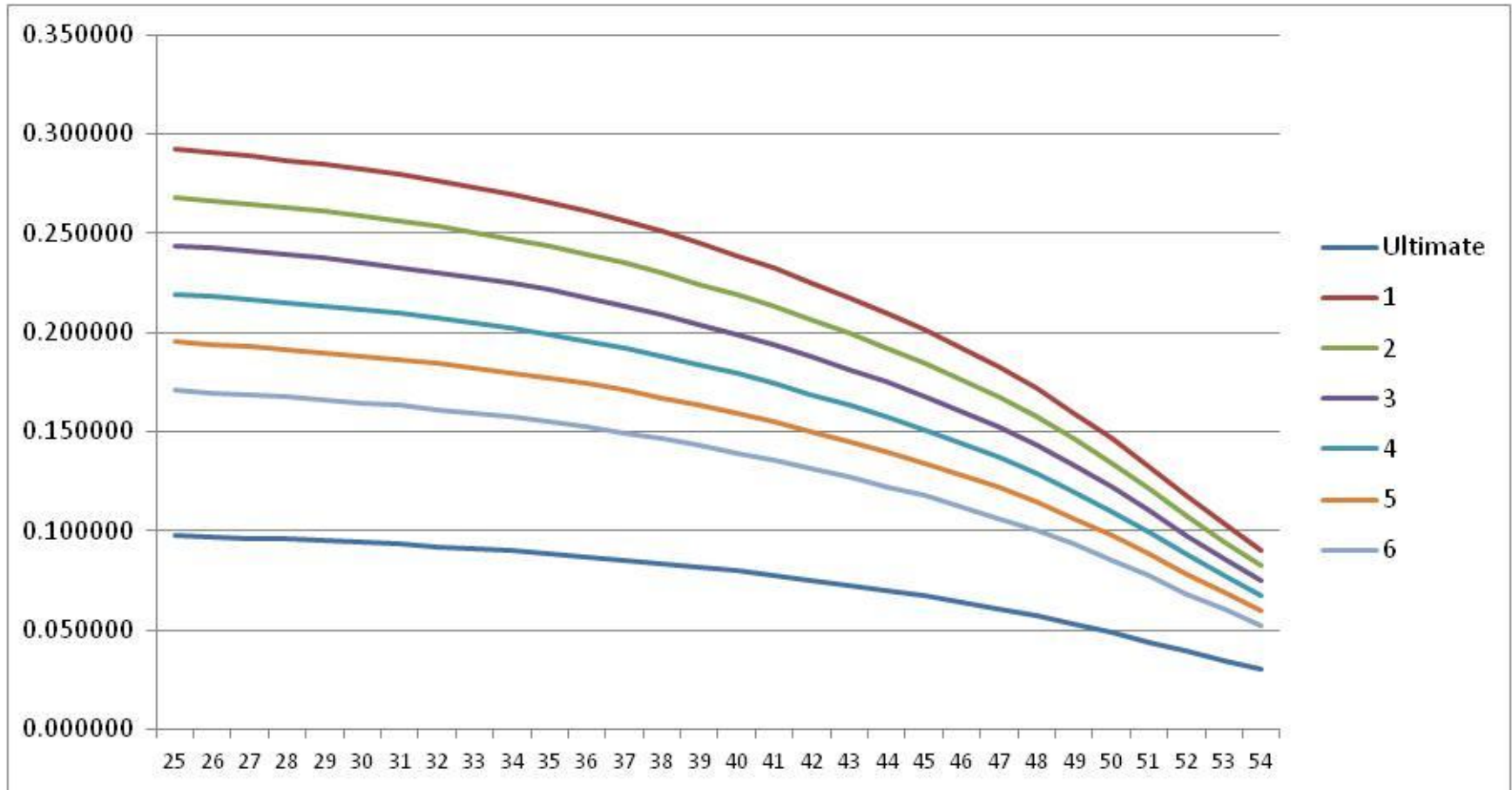
Influences on Termination Rates

- Age and service of employee
- Retirement and termination benefits
- Portability (Act 600)
- “Corporate” culture
- State of the economy-job availability (local as well as national)
- Job conditions

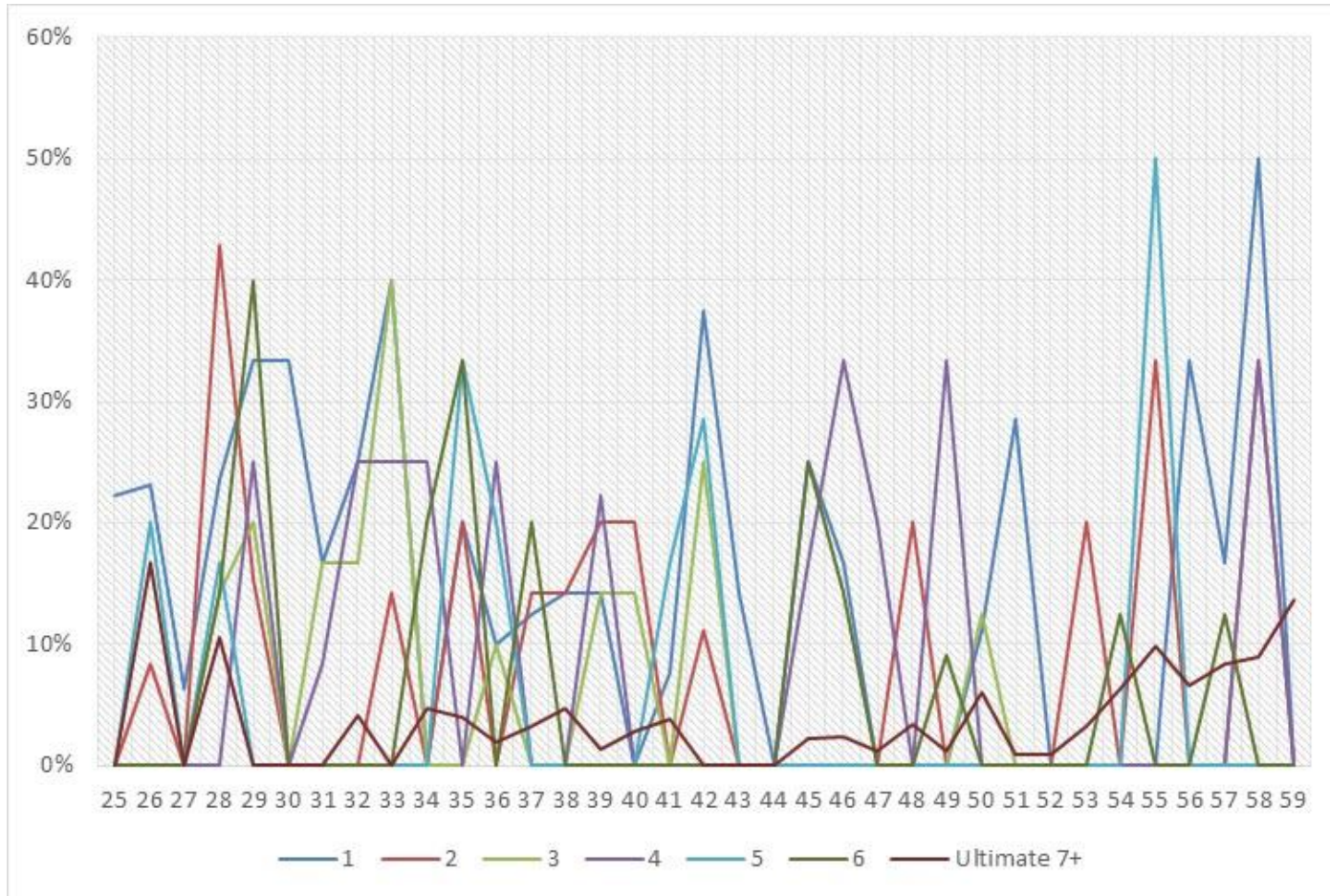
Family of Turnover Tables



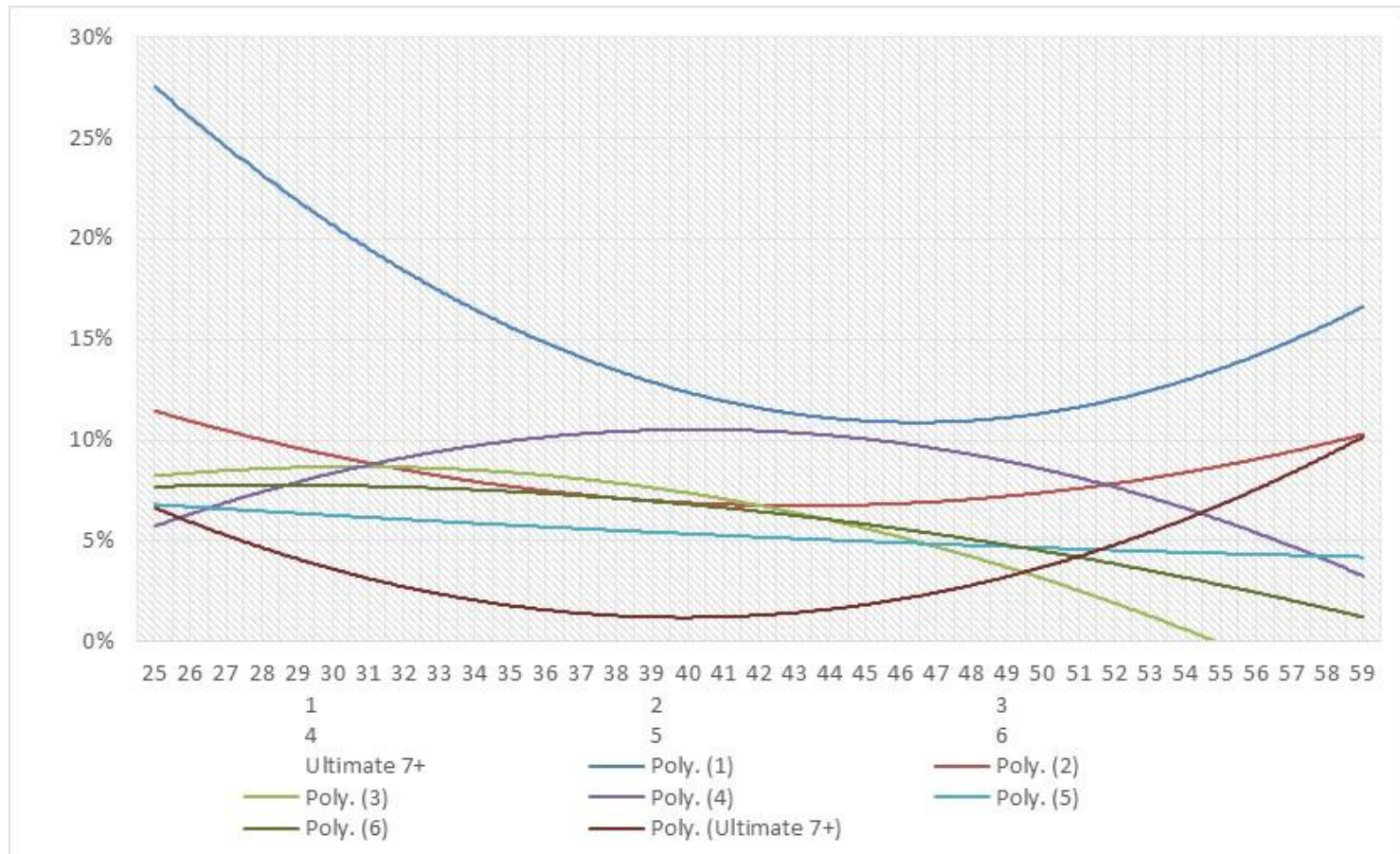
Select and Ultimate Table



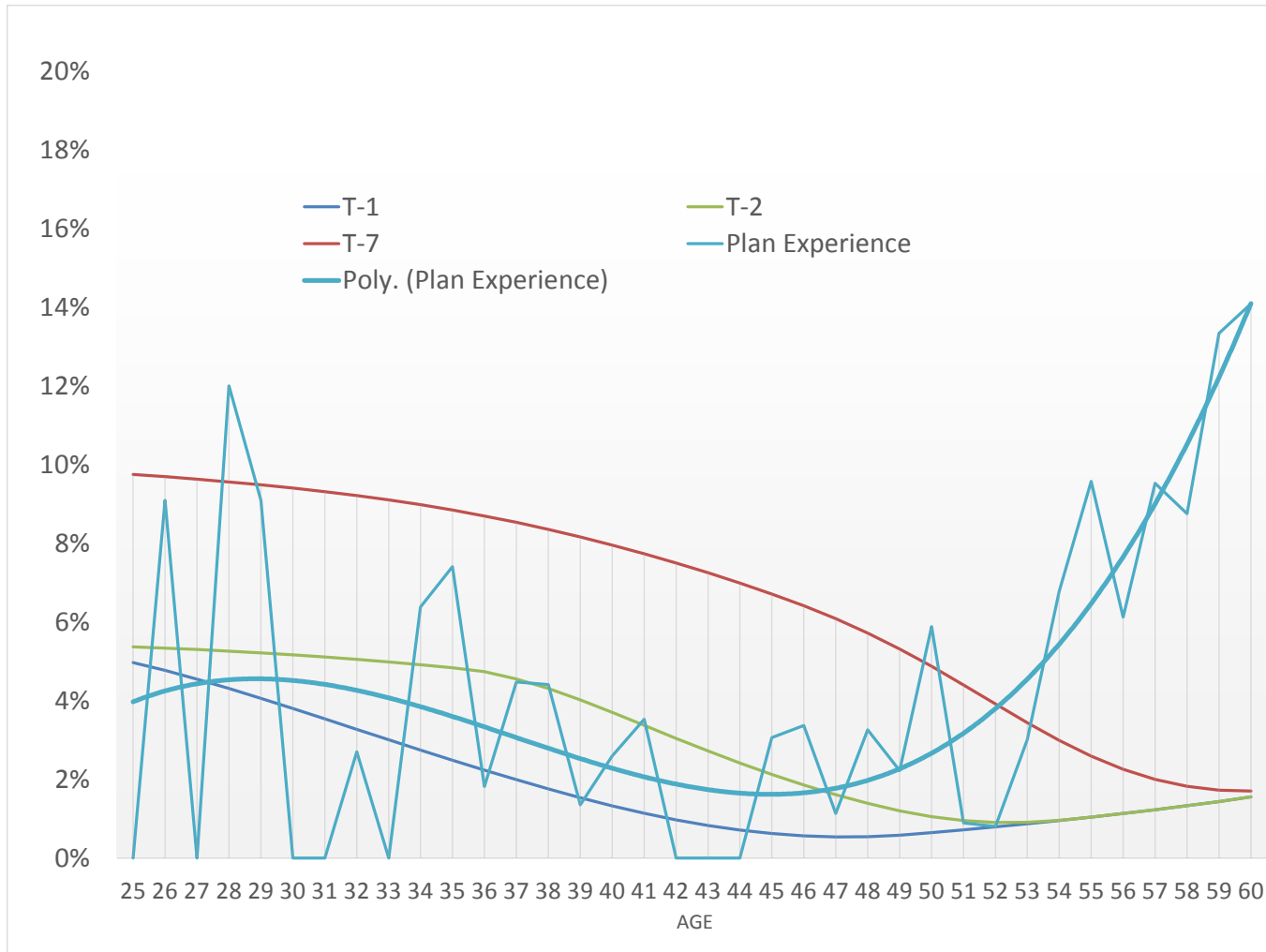
Study Findings



Smoothed Study Findings



Comparison of Ultimate Tables



Other Actuarial Assumptions

- Percent Married at Retirement/Death
- Age of Spouse
- Benefit Election (Lump Sum)
- Family Composition
- OPEB Benefits
 - Percent Electing Benefit
 - Medical Claims by Age/Sex
 - Medical Inflation

Are Our Assumptions Correct?

- Goal of the measurement (i.e., to determine an Actuarially Required Contribution (ARC) to fund expected future plan liabilities)
- Actuarial assumptions and methods are required to unbiased; gains should offset losses over the long term.
- Actuaries are required to review actuarial assumptions and methods periodically.

Justification of Assumptions

- GASB 67 & 68: Actuarial assumptions must be justified:
- “Significant assumptions and other inputs used to measure the total pension liability, including assumptions about inflation, salary changes, and ad hoc postemployment benefit changes (including ad hoc COLAs) should be disclosed.”
- How does one justify actuarial assumptions?

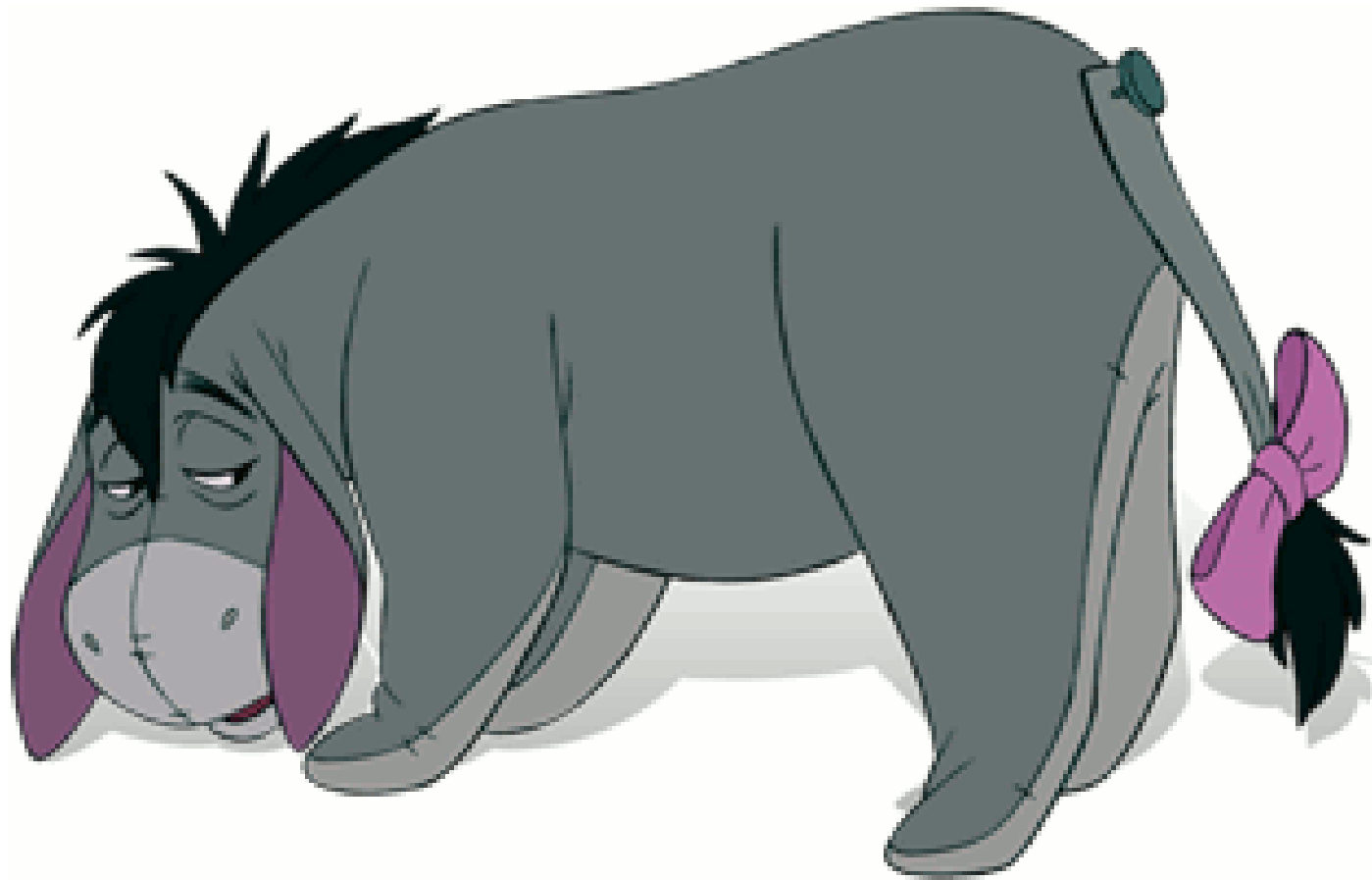
Experience Studies

- Experience studies are required under GASB 67 & 68:
 - “The dates of experience studies on which significant assumptions are based also should be disclosed.”
- Act 96 (County Pension Law) also requires periodic experience studies:
 - “The actuary of the board shall periodically make an actuarial investigation into the mortality and service experience of the contributors to and beneficiaries of the fund.”

Conclusions

- Assumptions are of a long-term nature
 - A current 25 year old may be receiving benefits 60 or possibly 70 or more years from now.
- Review and adjust assumptions periodically but not habitually (there is a lot of distance between always and never).
- We will get to “the right answer” over time either way; the question is how do we get here.

When You Assume...



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You create a better model to forecast the impact of future events!

Questions

