

Saving DB Pension Plans: What it will take, and why

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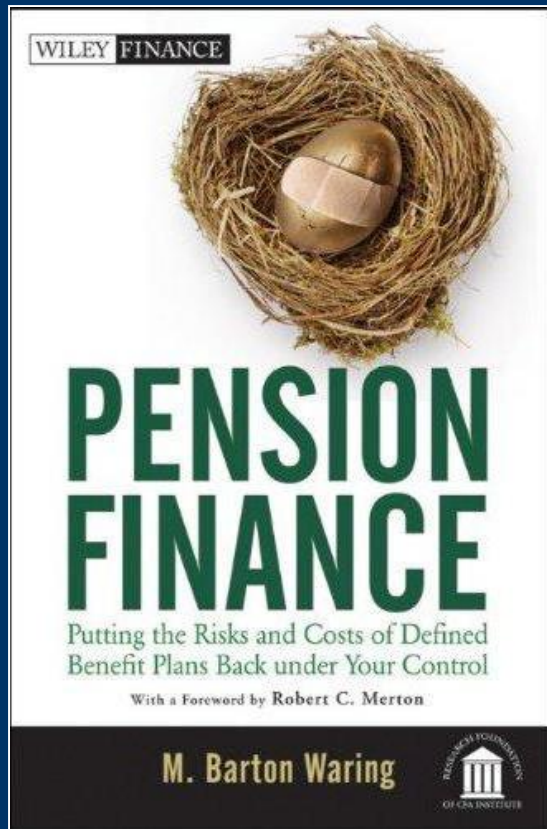
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*CFA Institute Research Foundation
and the
CFA Society of Los Angeles*
June 3, 2014

Pension Finance:

Putting the Risks and Costs of Defined Benefit Plans Back Under Your Control



- *A CFA Institute Research Foundation book, published by John Wiley & Sons*
- Sponsors experience regular negative surprises; many plans are closed, more are in trouble. This book has solutions.
- A clean-sheet-of-paper approach to pension accounting and actuarial science, using market value accounting principles
- Implications for contribution risk and pension expense risk, for affordable benefit levels, for investment strategy and policy, and more
- A topic on which nearly every CFA member has involvement!

Total pension funding deficit: \$4+ Trillion!

Actuarial science meets economics

- The pure finance of a DB plan is actually quite straightforward
 - The sum of many deferred annuities: Project the future benefit payments; discount them to PV; make payments to pay for them; keep track of progress
- Market value or “economic” accounting makes it all clear
 - Compute the present value of future cash flows with a market-related discount rate for balance sheet, income statement, cash flow statement
 - Basically, yield of long term government bonds (nominal and real)
- In contrast to actuarial method, which uses expected return on the assets, which is *totally irrelevant* to valuation of the liability
 - We’ll see exactly why, today.

Market value accounting enables a clear-eyed, hard-headed look at what is really going on, “under the hood” of the plan

Conventional pension actuarial accounting

A book value system, with a high degree of distortion

- Asset-based discount rate for liabilities, rather than liability-based
- Long amortization periods delay overdue contributions
- Unusual methods for computing normal cost “payments”
- Smoothing of asset returns
- Income equals expected return, not actual realized return
- Confusing multiple measures of same things: of liability, normal cost for computing income, contributions, and liabilities

So — what does a CFA member need to know when working with DB pensions?

Difficult or impossible for lay people to understand — or to trust!

What is the right discount rate?

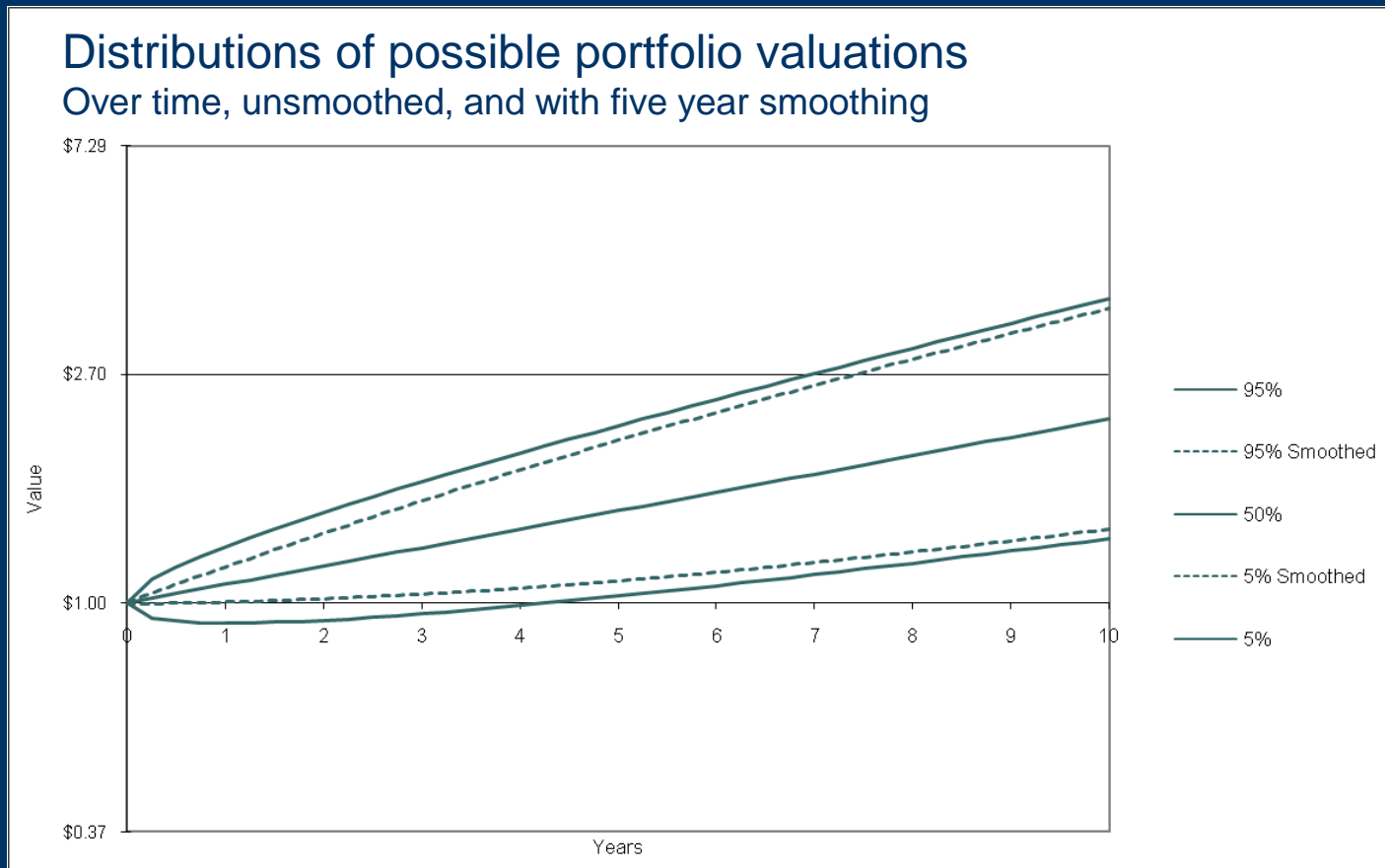
The central question

- The actuaries prefer the expected return on the pension asset portfolio
- Economists have long argued that the correct rate is the expected return on the liability-matching asset portfolio (LMAP)
 - A hedging portfolio: “risk-free” bonds, for the most part
 - The idea is to match the market-related risk found in the cash flows being financed, i.e., the supposedly risk-free cash flow obligations of the pension obligation

The discount rate is used not just on the balance sheet, but also on the income statement and the statement of cash flows

“The accounting will always follow the economics”

This is why we need to study economic accounting for pensions



One example: 5 year asset smoothing eliminates no risk, over time

Proof: The expected return assumption drives extreme contribution volatility

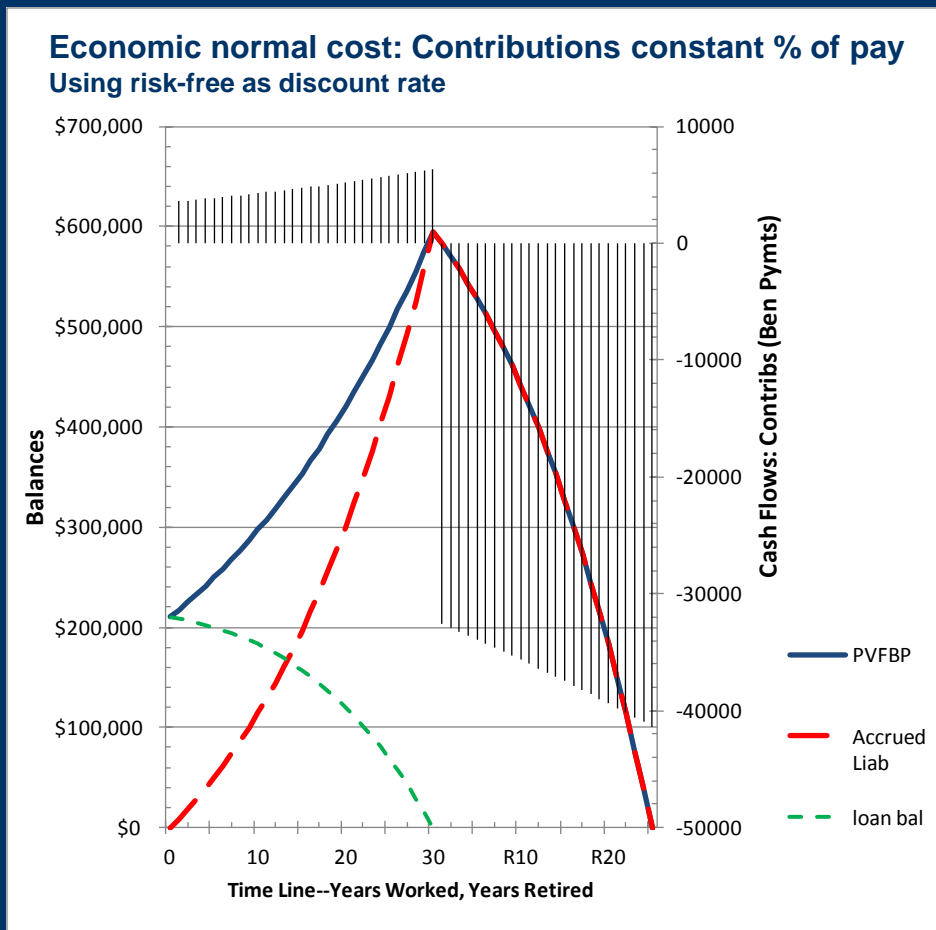
*We'll work from this simple example,
a one-person plan*

- New employee starts today; \$40,000/year, growing with 2% inflation
- Will work 30 years, retire for exactly 25 years
 - Benefits are 1.5% per year of service, times final pay
 - COLA equals half of 2% inflation
- Expected return 7% (geometric), 10% standard deviation
- Risk-free rate of long duration liability 3.53%
- The investment policy is the usual high equity policy

Holding investment policy and all else the same, we'll compare the plan's contribution experience discounting at both the expected return, and at the risk-free bond rate

What does a plan look like?

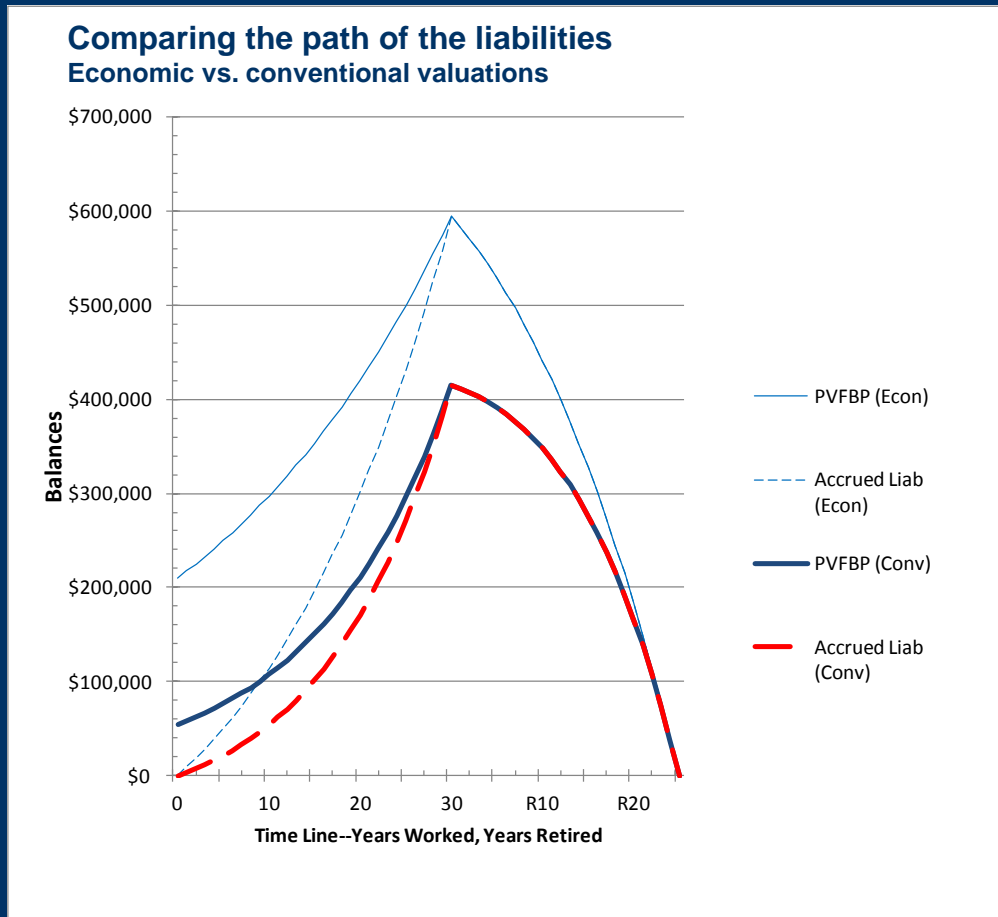
Market value view, taken one employee at a time . . .



- It's just a deferred life annuity!
- Normal Cost "payments" build up the accrued liability to pay off the future value of the full liability, the PVFBP (college savings account analogy)
- Or equivalently to pay off the present value of the PVFBP (mortgage payment analogy)
- Assets *should* always be equal to accrued liability
- AL is the legal liability, but *it is only a lesser-included portion* of full liability PVFBP

Compared to the actuarial view

Higher discount rate makes smaller apparent liabilities



- But wait: The benefit payments are the same in either case. And we can hold investment policy constant, so returns will be same in either case.
- *Why does the actuarial method look less expensive? What is missing in this comparison?*

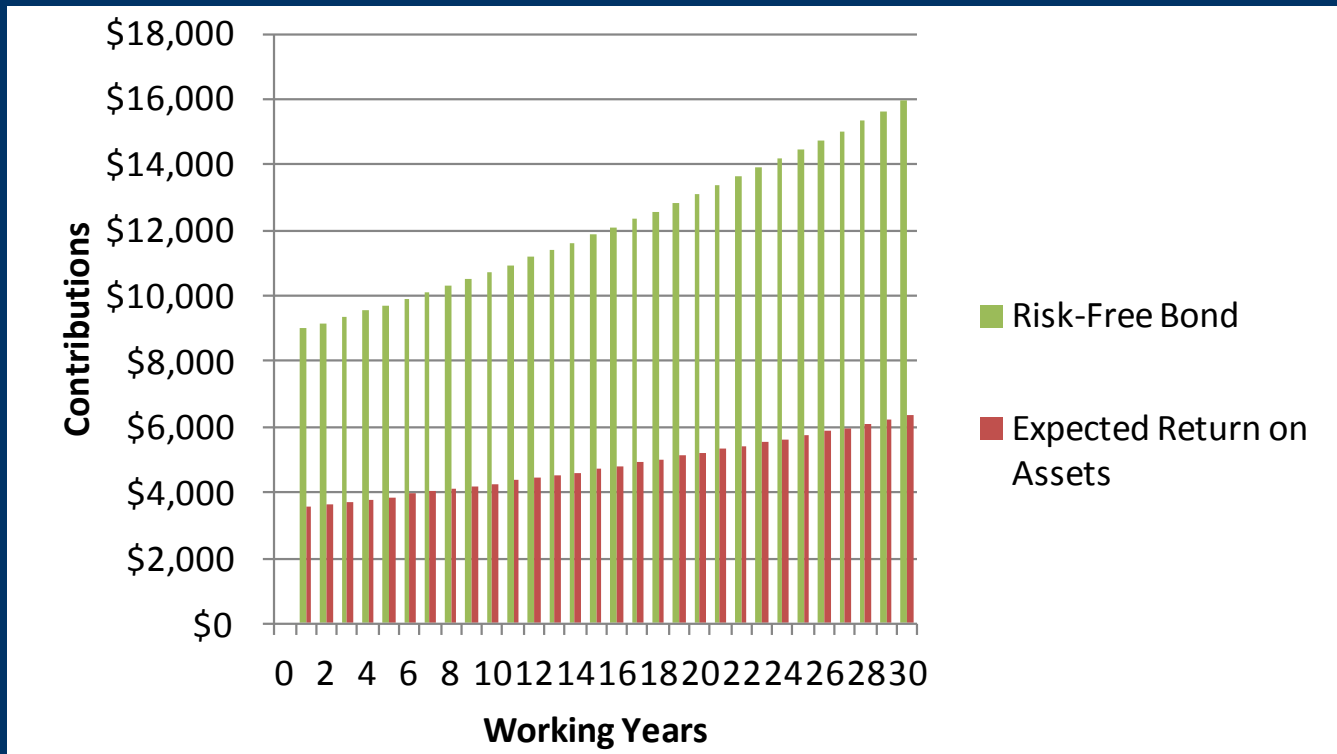
Computing normal costs (NC), pension expense (PE), and contributions (C)

Neither difficult nor arcane, at heart

- NC is notional payment, not cash; builds up accrued liability (AL) “funding target”
- Contribution is actual payment, towards funding AL with pension assets (PA). Equal to NC as base (when fully funded).
 - ❖ $C_{\text{base}} = \text{NC} = \text{PMT}(d, t_{\text{NC}}, \text{PVFBP-AL}, ,)$
- When underfunded, make it up over some period of time t_{makeup}
 - ❖ $C_{\text{makeup}} = \text{PMT}(d, t_{\text{makeup}}, \text{AL-PA}, ,)$
- The makeup amortization period is usually not the same as the NC amortization period, but if they are equal:
 - ❖ $C_{\text{total}} = \text{PMT}(d, t_{\text{NC}=\text{makeup}}, \text{PVFBP-PA}, ,)$

We're just amortizing the unpaid portion of a debt, through some form of payment function

Why discount at the expected return on assets? *The savings from using the expected return will be huge! Right?*



*“Expected” payments to amortize the PVFBP liabilities,
for both discount rate methods, over employee’s working life
(constant proportion of pay, i.e., growing payment function)*

Risk: Investors don't "get" the expected return just because they are long term investors

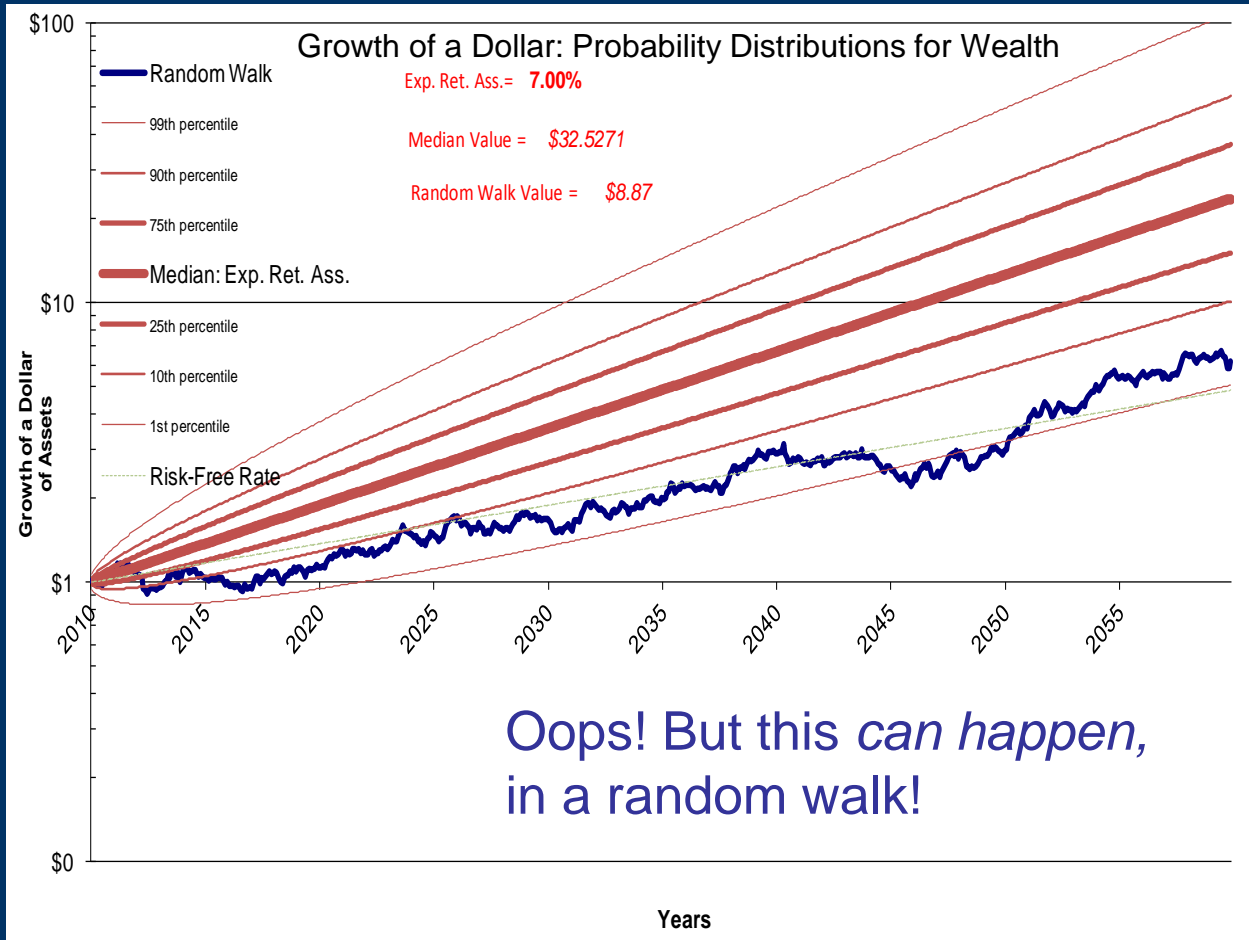
The actuarial discount rate method counts on getting the expected return. What happens if it doesn't?

- The S&P 500 only delivered a .55% per year compound average return for the 12 years between 2000 and 2011; a dollar grew to only \$1.07
- Over that same period, an 8% expected return assumption would have grown a dollar to \$2.52
- ***So at the end of 2011 the assets were only worth 42% of what was being expected! No wonder there is a pension crisis.***
- It will take a compound average return of 16% per year for the next 12 years to make up this shortfall
- In fact, disappointing returns over long periods of time are normal

Just how long, exactly, is the "long term," anyway?!

Risk to wealth increases with time

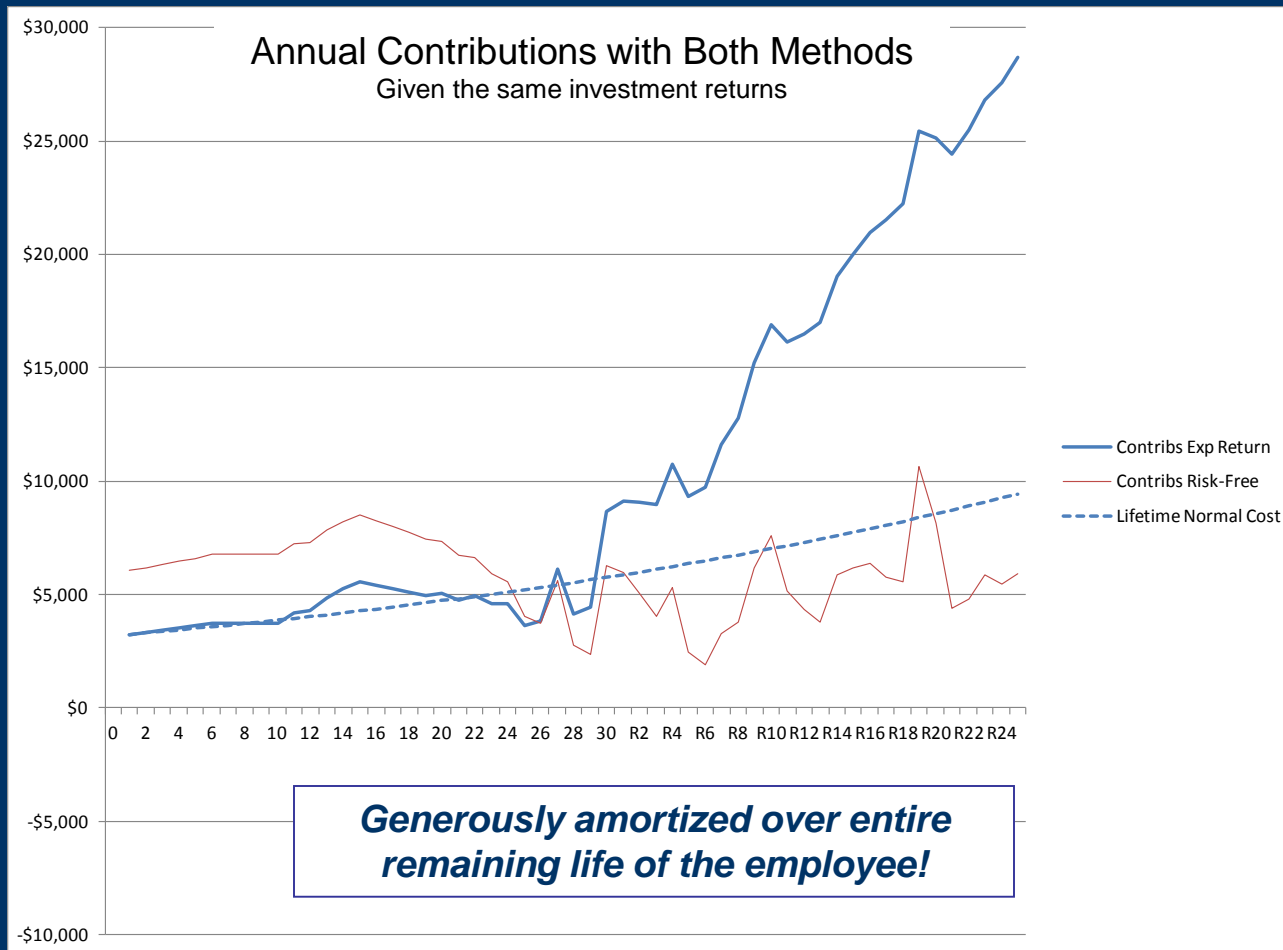
Let's follow asset volatility through to contributions



While many bad returns are in fact offset with good returns, there is a 50% probability that the ending portfolio over time will be less than suggested by the expected return, perhaps by a very substantial amount

Economic method: higher contributions earlier, but always lower later

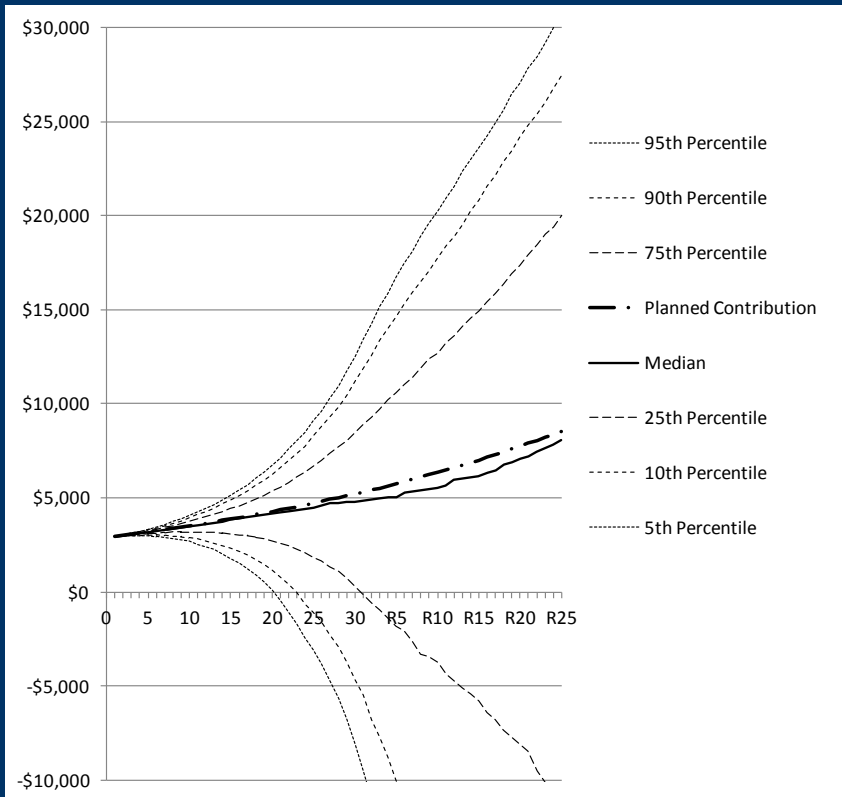
An example — contributions under a single monte carlo “run” of the economy



Surprises nearly disappear, with risk-free rate

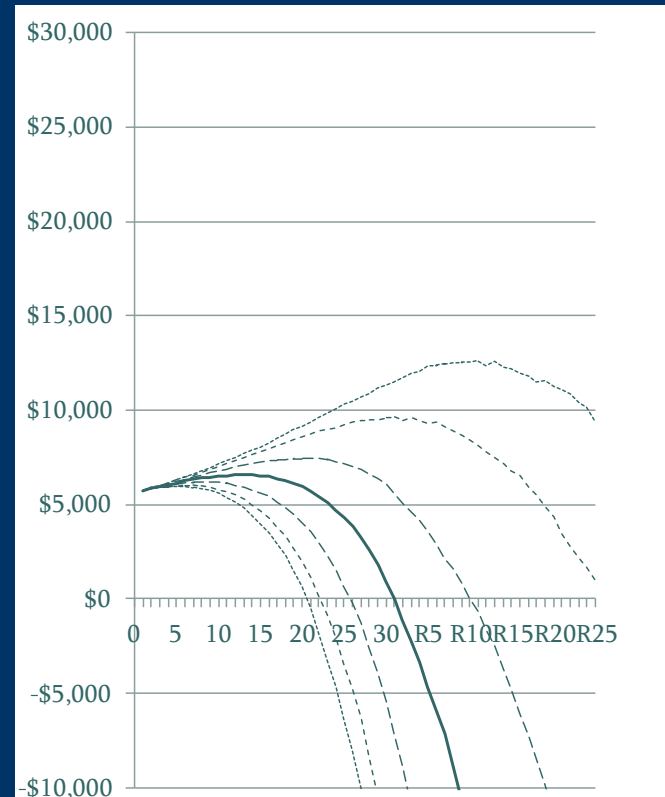
See why sponsors have come to expect negative surprises when using the expected return!

Discount rate: Expected return on assets



More than half the time contributions are larger than planned, often by a lot

Discount rate: Risk-free rate



Very seldom do contributions badly disappoint

That's just a single employee . . .

What about the aggregate population?

- Weighted by their individual PVBs, plan is dominated by employees with high tenure, and by early retirees—highly divergent
- And late-period retirees also have potential for very highly divergent contributions
- Market volatility affects all, and in the same direction
- Just as in the center right of the chart, contributions at the aggregate level can easily be many times the planned level

Who will pay these overdue contributions?

*The employers don't seem to be able to,
right now, for example!*

- Contribution rules, with their long term amortizations and wide corridors, aren't remotely likely to make up any resulting accrued liability deficits
 - Contributions have increased, but not nearly enough
- Participants will ultimately bear the loss, in a bankrupt plan, getting cents on the benefit dollar
- After being told by the accounting system for years that their benefits are secure; just wait . . . you'll see . . . the assets will come back...

*Good intentions and blind faith in the expected return assumption
don't adequately fund a pension plan*

Low early contributions “up” the risk “volume control”

Sooner or later, there will be sponsor insolvency and defaulted benefits

- Good hearted efforts by the actuaries to justify lower contributions and to defer contributions to the future only act to insure eventual plan failure
 - High discount rates, long amortizations, normal cost method choice, etc.
- Slightly more than 50% chance, over extended periods, that realized returns will fail to beat an unbiased expected return estimate — often by a lot
- ***In the very long run, nearly a 100% chance that plans will face an extended period of poor returns, and if early contributions have been low, makeup contribution requirements will be levered, huge***

Discounting with the expected return on assets isn't cheaper, but instead sets up a slow motion bankruptcy!

The return on deferred pay to the employees

Surprisingly high, and surprisingly strongly supported

- The discount rate for the employer is also the expected return to the employees
 - Portion of salary is explicitly—or implicitly (or both)—withheld from cash pay and deferred to retirement
- Why is it that employers insist on paying such high rates of return on deferred compensation?
 - They don't do that for other debts!
- And then—they *guarantee* the high rate, by promising to pay the scheduled benefits!
- Why?

This is a very good deal for the employees—but only to the extent that the guarantee is backed by a solvent sponsor!

Pensions are all alone on this discount rate issue

- No one else in finance and banking uses the expected return of the debtor's assets to discount that debtor's future cash flow obligations to present value—except government and Taft-Hartley pensions (and for corporate pension expense)
- *No one else*
- *No where else*
- Why are pension actuaries, the GASB, and others supporting this harmful practice?
 - Some improvements for corporate plans (PPA, etc.), but none yet for government plans
- *Change is difficult*

Don't make the same mistake—confusing mean expectations with risky realizations—in advising your clients!

Insights about investment objectives

Traditional actuarial views versus what we now know

- Traditional actuarial choices for investment policy and objectives usually focus on actuarial or accounting views, and try to:
 - Minimize the present value of future contributions
 - **Can't be done; investment policy doesn't change value!**
 - Minimize the volatility of one of normal cost, or contributions, or pension expense (seen as mutually exclusive)
 - **But if instead our objective is to control the volatility of the economic deficit, PVFBP-PA, we will have controlled the risk to the economic versions of all three of these key variables—and thus also their actuarial and accounting versions**
 - Either surplus optimization, or simply surplus risk minimization
 - Never change investment policy in attempt to meet a high expected return assumption – a backwards effort!

A single investment objective, properly specified, can control almost all pension risk (excepting demographic risks)

Tough love, to save underfunded plans

Facing facts

- There is no money to make up the deficit — bad markets also mean low tax revenues
- Renegotiate benefits knowing the true cost of secure benefits — a dollar of secure benefits costs twice what we have assumed in past
- Make contribution promises hard obligations going forward—no avoidance; enforceable as debt payments, minimal amortization
- Will encourage better asset hedging, a plus for safety!
- Don't terminate the DB plan – it is far more efficient at providing retirement income than any DC plan

*Employers are clearly better off; but so are employees:
High benefits are worth little if they are defaulted upon*

If you price benefits at 50¢ on the dollar, you aren't going to have secure benefits

- High discount rates — and other methods used — bias to smaller stated liabilities, smaller estimated contributions
 - Failing to take into account the pass-through of equity risk
 - Reflects a visceral belief in complete reversion to the mean over “the long run”, which isn't true
 - Confuses expectations with realizations
- Secure benefits can't be provided using these methods
 - The possibility of default is nearly certain, over the long run
 - Unwise decision support: benefits on sale at half price
 - Not in the interest of either sponsor or employees

Good-hearted effort to make good retirement benefits available less expensively turns out to be misguided

Your voices are valuable . . .

One of the few ideas where investment professionals generally agree!

- Be articulate in arguing that the expected return discount rate means impossibly high contributions and/or default, whenever there are extended periods of disappointing market returns
 - Artificially reducing costs is not a viable long term solution, as they don't go away, and they earn high interest!
- Argue to keep the DB plan—don't throw the baby out with the bath water. Account for it sensibly, on a market value basis, so you know true cost of benefits
 - Pension funding risks and costs can be managed!
 - We'll make better decisions with economically meaningful measures of the liability, of anticipated contributions, etc.
- Don't switch to DC – Switch instead to new plan with economic DB!

The expected return is untenable as the discount rate, but DB pensions are very tenable!

Presenter biography: M. Barton Waring

- Financial economist, with general expertise on investment policy and strategy, including strategic asset allocation as well as implementation (investment manager structure), and with special expertise on actuarial and accounting issues for pension plans
- Barton is the retired former global Chief Investment Officer for Investment Strategy and Policy at Barclays Global Investors. He remains an active researcher and lecturer on investment policy and pension management topics.
- Barton has published a book under the aegis of the Research Foundation of the CFA Institute, on sound management of pension plans: *Pension Finance: Putting the Risks and Costs of Your Defined Benefit Plan Back Under Your Control*.
- Barton has particular expertise in pension investment and actuarial policy, but has also researched and written widely about the investment policy needs of all other investors—such as individuals, foundations, endowments, and governments. More than 35 of his investment policy articles have been published, most of them in the *Financial Analysts Journal*, the *Journal of Portfolio Management*, and the *Journal of Investing*. He is a current or past member of the editorial or advisory boards of all three of these journals. Five of his articles have won “best article” awards from their respective journals. A complete list of his publications can be found at www.bartonwaring.com.
- Barton holds a J.D. in law, with honors, from Lewis & Clark College, and an MPPM in finance from Yale University. He lives in the San Juan Islands of Puget Sound in Washington state.

Additional Slides

A plethora of actuarial accrual methods

Sufficient complexity to forestall debate on any topic!

- Traditional “funding method” is default, where not changed by law or regulation (expected return on assets)
- Public plans, multi-employer plans, corporate plans, have different financing rules
- Each financial statement often has different rules
 - The liability on the balance sheet
 - Pension expense on income statement
 - Contributions on cash flow statement
- Multiple sets of books—funding, accounting, tax

*And none of these approaches convey real information!
But despite the complexity, the underlying economics will always
control the financial outcomes—sooner or later!*

“If you manage the economics, the actuarial and accounting versions will follow”

Let’s manage the true economic value of all variables:

- True market value of the *assets*
- The economic value of the *liability* (including newly awarded benefits, etc.), and its related financing flows:
 - Economically-determined *normal cost*, and the present value of future normal cost
 - Economically-determined *cash contributions*, and the present value of future contributions
 - Economically-determined *pension expense*, and the present value of future pension expense

*Accounting numbers can be manipulated, but sooner or later
The actual or realized economic experience will show up—so hedge the
risks in order to control them, don’t “smooth”!*

Many payment functions in use for actuarial normal cost

Called normal cost “methods”

- Each pairs a normal cost method with a matching AL
- Economists think of level payments or maybe growing payments (growing annuity; “entry age normal”)
- Actuaries think of growing payments but also “benefit prorated” payments, such as the unit credit method used for the accumulated benefit obligation (ABO); also many other methods have been used
 - ABO, or unit credit normal cost: The marginal present value added to the liability as a result of one more year of service by the employee, based on current pay
 - Negative amortization in early years!

The method chosen usually operates to decrease the rate of contribution in early years; but this must be made up in later years— with interest on the delayed contributions! No free lunch!

Economic pension expense and contributions

Are identical at heart—no real difference!

- Equal to current year's increase in the AL, i.e., the increase in the pre-contribution deficit, or the sum of:
 - Normal cost
 - PV of demographic revisions (a narrowed version of supp. cost)
 - Income return and capital gains on AL
 - Less income return and capital gains on PA — *very volatile today*
- Plus, for the contribution only, any beginning of period AL deficit
 - i.e., an unpaid contribution that was due the prior period (it might have been amortized and partially paid, or just not paid)
- This identity is broken and obscured by actuarial methods
 - Different normal cost methods for pension expense, contributions
 - Amortization of investment earnings, of deficit repayment

In reality there are no “accounting,” “funding,” “tax” differences

Bill Sharpe makes the point with gentle humor

- A 5 minute video titled “The State Pension Actuary”
- http://www.youtube.com/watch?v=Mk87_qg4ObA
- An amusing look at financing an actuary’s home using the expected return assumption. There’s quite a saving!

A must-watch!

Is your home mortgage worth less if you invest your personal portfolio mostly in equities?

Actuaries use the $E(r)$ as current income in P&L! *Not actual realized returns!*

- Currently, we count the expected return in pension expense, and slowly amortize back in all cumulative deviations from it
 - Presumption is that we will “get” the expected return
- Much better to **charge each successive period’s investment gains or losses to that then-current period**
- The benefit payments are the same, the investment returns can be the same – the only difference in cost is when investment returns vary from expectancy for extended periods.
 - The expected pension expense is the same, ex ante, but is likely very different ex post (in realization)
- The analyst should be carefully aware of these distortions

Track what is actually happening, not what you hope to have happen

There is much else of interest in the book

- Investment strategy and policy—simply applying a two-fund theorem for investors with liabilities
 - Always fully hedge the liability
 - Risky assets held if you believe sponsors have utility functions, then subject to risk capacity and tolerance
- The employee call option on the “surplus” has been mis-specified—should be on FEL surplus (or at least PVFBP surplus), not AL surplus (Appendix B)
- The duration of the accrued liability has been mis-specified, and is longer than usually believed, leading to errors in surplus optimization and liability matching (p. 151)
- Credit risk premiums should never be included in the discount rate if we’re interested in securely funding the benefits (chapter 6)
- Improve the quality of analyst’s understanding of sponsor financial health