

Today's roundtable is arranged in five sections. I will begin each with a power point presentation lasting no more than 20 minutes, usually less. After each, I will expect to get a few clarifying questions, followed by questions with embedded points of view. After answering a few of these questions, I will try to moderate the discussion by encouraging you respond to each other's questions.

On the power point slides you will occasionally see red on dark blue notes near the bottom of the slides. These are references to pension finance articles written by actuaries. In the next week or so we will send e-mails pointing to an SOA database of these and other financial economics papers. We have built a modest library which will grow over the next several months.

In the interests of time, my presentations will often include assertions rather than demonstrations. The assertions are strongly supported by the lessons of financial economics.

The arguments are virtually all based on arbitrage. They usually do not depend on market views nor upon individual preferences for risk and reward nor upon statistical return properties.

Here are today's five topics.

In the introductory session, I will outline a number of financial principles where the pension relevance may not be entirely obvious. I apologize. In a sense, these are markers for the later discussions which will be about pensions, pensions, pensions.

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We and our beloved DB plans are experiencing difficult times. Contribution and earnings shocks have led to plan terminations and freezes. Lack of appreciation by young workers has led to DC plans and cash balance conversions. Regulators have not made it easy for DB plans. Neither has the business press.

Today we will be talking about the financial economics approach to DB plans – what we may call “pension finance.” Although we know that we cannot rescue DB plans without a client-pleasing product, today we will focus on our **science** and our **profession**. We will talk more about DB consulting as a **business** in the Spring.

Those of you who are actuaries have been invited because the Financial Economics Task Force wants our thought leaders to think long and hard about what a potential new actuarial science implies for our evolving standards of practice and for what we say to policymakers.

We have invited many non-actuaries to share in the process, to help us work our way through a potential paradigm shift. We welcome your participation and ongoing help and interaction.

Our mutual goal is DB plan revitalization. The lesson I hope to close with today is that the route to healthy DB plans requires transparency. Accounting, funding and plan design must be more transparent. The value of DB plans must be clearer to plan participants, to plan sponsors and to the American public.

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Efficiency is an important concept for economists and it is simple to define. A system is efficient if output is high compared with the resources employed.

Just as with a mechanical device, the great enemy of efficiency is friction. In economics, common sources of friction include:

- Lack of transparency
- Transactions costs
- Taxes
- Regulatory barriers
- Costly bankruptcy

Transparency describes an ideal condition in which all market participants have costless access to the best information. Thus they can see through to the economic realities of an enterprise or a transaction. Rational parties operating in a transparent environment make efficient decisions. Lack of transparency is costly.

A familiar example for actuaries is adverse selection, which leads to a tradeoff between the benefits of accurate information and the costs of underwriting.

Lack of transparency may be engendered by arbitrary averages and amortizations such as those found in accounting and actuarial valuations.

Mark Ruloff has referred to the increasing demand for transparency. This may be positively viewed as an effort to reduce friction and improve efficiency.

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Transparency can facilitate arbitrage transactions. In a transparent marketplace, all arbitrage opportunities are visible to all investors and prices quickly adjust to reduce or remove such opportunities.

The absence of arbitrage (also known as the “no-arbitrage” principle) has become the central tenet of modern finance. The principle is simple: if two or more, seemingly different, financial instruments or strategies produce the same cash flows in all states of nature, then they must have identical present values. Another name, therefore for “no-arbitrage” is the “law of one price.”

Various frictions challenge the law of one price, but they do not defy the arbitrage pricing principle. If information is costly, if bankruptcy is costly, if transactions are costly, a range of prices exists in which no arbitrage opportunity exists. The market price will be in that range.

No-arbitrage also helps us price market **risks**. Even though risk tolerance varies from investor to investor, the **price** of market risk is singular. The cost of risk is equal to the cost to dispose of it. For traded risky assets, the expected risk premium is the market price for risk.

The use of the no-arbitrage argument for pricing may be traced to a very important 1958 paper by Modigliani and Miller. They argued that, in a frictionless framework, the value of a firm does not depend on capital structure.

The M&M paper may be seen as the beginning of Modern Corporate Finance.

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Modern Corporate Finance, sometimes called “the theory of the firm,” is one of the two main branches of financial economics. It includes:

The study of capital structure – how to allocate financing between debt and equity.

Pension finance – which has implications for pension investment, accounting, funding rules and benefit design.

Agency theory.

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Agency theory, as applied to corporations, is closely identified with Jensen and Meckling's 1976 paper.

In the context of the theory of the firm, “agents” are those people who make choices that affect the pocketbooks of others – called “principals.” It is convenient to think of principals as firm shareholders, lenders, etc. and to think of agents as firm management.

Agents have their own preferences – often at odds with those of their principals.

Agents use the cover of darkness to help themselves. Principals find it is costly to monitor and control agents. Incentives may be designed to align principal and agent interests.

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The other main branch – portfolio selection and asset pricing – is generally familiar to pension actuaries:

Portfolio selection gives us the Efficient Frontier and leads us to the Capital Asset Pricing Model.

Additional asset pricing work includes the Black-Scholes option formula, Steve Ross's Arbitrage Pricing Theory, important models of yield curve dynamics such as those of Vasicek and Cox-Ingersoll-Ross, and the multi-factor equity pricing models of Fama and French.

Much of the asset pricing branch has appeared as “investment” material on the SOA syllabus in recent years.

There is a little irony here. All of this “investment” stuff has been taught as though actuaries would find it most useful when they were involved in investing insurance company and pension plan assets. Much of the investment material is irrelevant to pension investing.

The great value of the investment material for many actuaries is that it shows us how to price insurance and pension liabilities, for example, by using reference portfolios to price pension plan cash flows and using Black-Scholes to value options embedded in pension plans and insurance contracts.

Pension finance actuaries make extensive use of arbitrage arguments. In *Reinventing Pension Actuarial Science*, Larry Bader and I use arbitrage to justify Principle Number 1 (which equates \$1 invested in bonds or equities) and Principle Number 4 (which uses a reference portfolio to measure liabilities).

The demand for transparency is Principle Number 3.

The single price of market risk is Principle Number 2.

Principle Number 5 which says that “risks are borne and rewards are earned by individuals, not by institutions,” follows from agency theory.

Agency theory also supports the following pension finance insights:

- Managers should not waste time and effort doing for shareholders what they can do for themselves.
- The Efficient Frontier is an irrelevant tool for pension asset allocations.
- The PBO is not an economic liability and should not be an accounting one either.
- DB plans need to generate economic value added in order to justify their existence.

The possibility of costly bankruptcy justifies risk management and the risk-minimizing argument for all-bond portfolios.

Bankruptcy also forms the basis for minimum funding rules.

Tax arbitrage demonstrates the shareholder value that is derived from all-bond investing.

We look for efficient solutions – those that carry the lowest possible friction – for America’s retirement needs. Often we can see that well-designed, well-funded, well-reported, well-and-**lightly**-regulated DB plans can deliver those solutions.

We would like to change some laws, some regulations and some of our own standards.

Questions?

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We will look at investments in two pieces.

The first, the actuarial equity bias, was discussed in Session 37 at the Spring meeting in Dallas in 2001.

The second, first attributable to Irwin Tepper and Fischer Black almost 25 years ago, appears in the two papers that we asked you to read in advance of today's roundtable.

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In this section we'll look at how anticipating equity returns seems to increase the value of companies that invest pension assets in equities.

We'll take this in two bites. The first takes us through what happens economically when a plan sells liability matching bonds and buys stocks.

The second shows how the actuarial measurement can mislead analysts and investors.

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I could start with M&M and transparency. To avoid a rehash of M&M and accounting issues, I will substitute the sole shareholder alternative.

Pretend:

You are the sole shareholder of a private company.

Company has \$1 million in its pension plan. You also own several million \$ diversified portfolio of publicly traded assets.

For now, we will ignore taxes.

How should you invest the \$1 million pension plan?

I assure you that this situation can be generalized to large publicly traded corporations.

Further, substituting taxpayers for s/h's, it can be applied to pension plans sponsored by governments.

In addition to your own large portfolio of diversified assets, you own the private company and thus own its assets and owe its debts.

Therefore you also own its pension assets and owe its pension liabilities.

You look at your investments as a total portfolio and choose your overall asset allocation to get the best expected returns that you can for an acceptable level of risk.

From any starting place, if the pension plan adds or subtracts publicly traded assets, you can, in your diversified portfolio, subtract or add the very same publicly traded assets.

You can offset any pension plan trades so as to maintain your optimal total portfolio risk/return profile.

Thus you are indifferent to the allocation of pension plan assets.

Now we define a starting place, a base case.

The pension plan has \$1 million in bonds.

The bond cash flows exactly match the liability cash flows of the plan.

The plan sells its bonds and buys the S&P index. Are you richer than before? While you might expect to be richer in the future, you find that your overall asset allocation is now too risky.

So, in your diversified portfolio, you sell \$1mm of the S&P index and buy the liability-matching bonds. Your aggregate portfolio is unchanged.

In fact, ignoring statutory restrictions, you could do this exchange directly between the pension plan and your diversified portfolio. Just swap personal stocks for plan bonds.

SWAP is the right word. You have just entered into a swap with no present value: \$1mm bonds for \$1mm equity.

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Now for how the actuarial process can mislead investors.

The plan actuary calls to tell you – remember you are sole shareholder owner of the firm – that pension costs have declined by \$60,000 annually reflecting the addition of the 6% equity risk premium to the expected return on plan assets.

Are you richer? You know that cannot be.

Can the actuary can give you an economic or financial reason for your new wealth?

Is the company worth more?

No, but he assures you that it will be in the long run.

When? He cannot say.

Can you recognize that expected future value now?

Yes, you can sell the company to those who buy reported earnings. Comparable companies have a 15:1 P/E. So moving \$1mm from bonds to stocks adds \$900,000 to company value.

Do you believe that?

An ordinary company enters into a worthless swap and is suddenly more valuable due to actuarial and accounting methods and assumptions.

This mis-measurement is pervasive. The magnitude of the distortion – roughly equal to the notional value of the swap – is typical

A number of financial analysts can see thru this. Curiously, most do not.

Coronado and Sharpe tested this and found that pension earnings have fooled investors – investors seem to just multiply pension earnings by a P/E ratio.

This phenomenon helps explain why it is so hard to persuade managers to copy abandon what the Brits call “the cult of the equity.”

Analysts do not necessarily want the BEST answer. They want to know today what the consensus analyst will believe 30 days from now.

If an analyst does not believe that the consensus analyst will see thru the opaque accounting 30 days from now, then he does not opt to see thru it today.

Thus, actuarial mis-measurement => equity investments despite:

- 1) \$1mm stocks = value of \$1mm bonds
- 2) Increased expected stock value is exactly offset by the market price for the increased risk.

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This brilliant UBS cartoon pretty well sums up the impact that bad accounting has on pension asset allocation decisions made by corporations.

Credit where credit is due:

The cartoon appears in a UBS Pension paper issued in September, jointly written by Steve Cooper in the U.K. and David Bianco in the U.S.

So, a first order truism:

Ignoring taxes, we should be entirely indifferent to allocation of assets held by corporate pension plans.

But actuarial mis-measurement favors equities.

Now we look at the tax impact. It is large and it implies that virtually every plan should be invested entirely in taxable bonds.

Running through this argument is a strong sense of transparency. Today the accounting includes the equity bias. As the UBS cartoon suggests, with transparent accounting, look out below.

We assume a 35% corporate income tax rate.

S/H's maintain risk exposure by personal swaps of \$.65 for every \$1 swap in the pension plan.

This neutralizes s/h position before taking into account the s/h's personal income taxes.

So final result depends on the impact on s/h personal taxes.

Plan base case is the same as before:

\$1mm bond assets = liability cash flows.

We add taxpayer personal tax rates:

40% on bond income

15% on equity returns – this is an estimate of an annual tax over a multiyear holding period. Actual annual-effective rate is a declining function of the holding period.

5% risk-free rate.

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Following a \$1mm bonds → S&P
pension swap,

and s/h \$650K S&P → Bond swap,

s/h personal taxes are increased by:

5% of 162.5k every year.

Details left as an audience exercise.

The after tax present value of the tax increase in perpetuity is \$270.8k.

A LOSS to s/h's.

In reverse, All Bond allocation adds \$270.8k of after-tax present value per \$1mm swap.

How valuable is this compared to starting s/h value.

Each \$1mm shift adds \$270.8k to s/h's. This may be compared to the entire value of the \$1mm held by the pension plan.

The \$1mm in the plan has an after-tax value to s/h's of \$552.5k.

So re-allocating from stocks to bonds adds 50% to the value of the amount shifted.

\$2 well-allocated (bonds) is as valuable as \$3 mis-allocated (stocks).

This is not the result of some statistical model or estimate.

It does not depend on the future performance of the capital markets.

It is a risk-free arbitrage gain.

Following Tepper's 1981 paper, I have illustrated the value gain as though it depended on s/h action.

With transparency and reasonably efficient markets, the value gain arises from the pension transactions alone.

The s/h reaction is mostly a didactic device used to illustrate the value of the gain.

One alternative way to capture the value is for the company to increase balance sheet leverage. This approach was outlined by Fischer Black in 1980.

What if everybody tried to switch to bonds?

Can the capital markets accommodate an immediate wholesale shift by pension plans from stocks to bonds?

No.

But let us suppose a slow propagation combined with share buy-backs. What does the new equilibrium look like?

We will see firms with increased balance sheet leverage, an end to pension leverage, less notional equity, more bonds, less cross-ownership, companies more focused on own business – not running equity mutual funds.

What transition effects may we anticipate?

Pension plans act faster than balance sheets. So we'll see pressure to sell equities, and demand for bonds.

Poor equity returns during transition.

First mover pension plans win.

Let's recap.

Shareholder indifference w/o taxes

Actuarial mismeasurement => equities

Apparent 90% gain

Taxes + transparency => bonds

Real 50% gain

First mover pension plan advantage

Questions?

Now, we turn to accounting issues.

We look at how FRS17 is more transparent than FAS87 and what still remains Post-FRS17 to get good economic accounting.

We can discuss the appropriateness of PBO versus ABO based accounting.

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For our purposes CICA FAS and IAS
are virtually the same.

FRS 17 is closer to the financial economics approach because it:

values assets and liabilities at market

immediately recognizes gains, losses and vested benefit improvements

and separates operating costs (subject to a P/E multiple) from financing results (that are properly recognized without a multiple)

We need at least three more steps beyond FRS 17:

- 1) eliminate *expected* asset returns
- 2) eliminate expected pay increases
- 3) value liabilities in accordance with Principle #4 of *Reinventing* – using the reference portfolio concept – this is equivalent to using a default-risk adjusted yield curve to value liabilities for accounting purposes.

Questions?

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PBO versus ABO

PBO versus ABO

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Next – minimum funding rules and the PBGC.

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I'll try to tackle this in three quick steps.

Benefits are promises made in lieu of pay.

If we promise, but do not fund, we are borrowing from our employees.

With transparency, rational employees must be expensive lenders because they cannot diversify their inherent over-exposure to the employer's risk.

Funding the promise amounts to the provision of collateral, makes the promise more valuable.

Borrowing from diverse lenders in order to fund lowers total compensation cost and delivers tax arbitrage.

Thus, with rationality & transparency & no government guarantees, we'll negotiate fully funded benefits.

Now let's recognize that employees are ignorant lenders. But recognizing that society is all of us – s/h's and employees – our greater interest cannot be derived by letting Peter rob Paul.

Society can impose the results that transparency and rationality imply. Imposing full funding is Pareto efficient.

This is not a moral issue. This is the result of economic analysis.

All of the minimum funding rules can be replaced by one rule: stay fully funded always.

Current rules tell us that funding history is consequential. It is not. What matters is the funding ratio and the asset liability mismatch.

There is an argument often made to the US Congress saying that we should allow more funding in good times.

Consider 1998-2000. Maybe General Electric would have contributed more to increase tax shelter. But would Bethlehem Steel?

Even if Bethlehem Steel had contributed more, they only would have lost more money sooner.

What looks like a plea for time diversification turns out to be a plea for a tax break for strong companies.

Now let's look at PBGC guarantees.

Pension contracts are long term. By the time of a pension default, many employees are too old to recover. So society commits itself to making sure that pension promises are kept. It does so by a combination of:

Monitoring – Funding rules – Insurance

Monitoring is usually annual and delayed.

Funding protects:

- Employees w/o government insurance
- Government insurer if we have one
- Other companies – under the U.S. system

Insurance is efficient for pure accidents

but insurance invites anti-selection and moral hazard

with the PBGC we get a default game in which the weakest sponsors fund as little as possible, mismatch a lot, and make promises that others must keep.

full-funding mitigates anti-selection and moral hazard

an alternative is to allow underfunding and mismatches while charging perfect risk-adjusted premiums

but this requires intrusive monitoring of the plan and the sponsor

and, in order to encourage risk-reduction, we would have to charge excessive premiums

In the last three years, we have had a rich argument about the use of double-A bond indices to measure funding status

If the idea is to make each company pay for its own promises (even if it goes bankrupt), then double-A is always inadequate.

Assume you have a perfectly-matched, well-diversified double-A portfolio on the day of bankruptcy. In order to meet all promises, every bond in the portfolio must make every payment over many years. In other words, unless the bonds are riskless, the portfolio is very likely to come up short.

If we monitored daily and paid for all losses immediately, merely having assets equal to liabilities every day would be fine. But, with benefits continuing to accrue, and mismatch risk, full-funding requires a cushion.

Funding measures require a yield curve.
Yield curves facilitate hedging; indices and averaging hurt hedging.

The American Academy of Actuaries has argued for predictable funding targets. Financial economics teaches us that hedge-able funding standards are much sounder.

Predictable means that I can estimate the distribution of risky outcomes.

Hedge-able means I can take, manage, or dispose of the risk as I choose

U.S. rules average bond yields over time to make the measure more predictable. This is counter productive. If I hold the perfect matching portfolio every day of the averaging period, I will not match the average required on the date of valuation. Averaging discourages rational risk management.

Questions?

Our program indicates that the full name for this session is “Plan Design: How may DB plans be revitalized in a transparent world?”

As a profession we should consider designs for plans themselves AND for the regulatory environment.

Pension finance can point the way to designs that add economic value. Some of those designs may run afoul of existing rules. We should change those rules.

Financial economics looks at DB plans as contracts made between shareholders and employees. We should want contracts that create value. In the article “What Next?” I laid out some tests for value creation at the plan and policy level. I believe that revitalization depends on adding value.

My advocacy of very strict funding rules might lead some of you to believe that I am pro-regulation. I am ***pro-sound-funding*** but I am not in favor of rules that force us to write value-destroying contracts. Thus I would like to see less regulation in regard to vesting, back and front loading, age discrimination, whipsaw, and the like. These are value destroyers.

I have also seen value-destroying benefit designs. I will offer examples of how benefit designs and some actuarial techniques destroy value. My admonition to all us: STOP IT.

I will offer some examples of potential value-adding designs and I will say: GO TO IT. But you will note that some value destroying designs are with us because of bad regulation and that some valuing-adding designs are *not* with us because of bad regulation and so I say: CHANGE THE RULES.

Value Destroyers

Lump sums

Long cliff eligibilities

- Subsidized early

- Shutdown benefits

Inefficient transfers of risk

Things that increase costs of labor and/or capital

- Implicit contracts

- Off-market CB crediting rates – e.g. current coupon on 10-year bond

- PBO service cost

- Smoothing/amortizing

- Unhedge-able

 - Benefit promises

 - Benefit valuations

 - Funding rules

- Uncompensated A/L mismatches

Value Destroyers

Agency costs

Moral hazard

Principals missing from the table

Future taxpayers

PBGC

Valuing \$100 benefit at \$70

Robbing Peter to pay Paul

Value Creators

Annuities

Transparency/Communication/Explicit contracts

Attract, retain, motivate and exit

Principal/agent at the employer/employee level

Pay administration - focus on total compensation

Attract – ABO service cost allows competition for young workers

Retain and Motivate – New vesting schedules – ERISA change

Encourages investment in training

Creates “training” bond

Creates “performance” bond

Exit – DB superior to DC

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Rule Changes

A paradigm shift? – already under way?

Be careful what we ask for

As we cooperatively manage the paradigm shift,
should we continue “business as usual”
commentary to policymakers?

ASOP 27?

Questions?