COMMENT 28: AUGUST 4, 2008

July 28, 2008

ASOP No. 27 Request for Comments
Actuarial Standards Board
1100 17th Street NW – 7F
Washington, DC 20036-4601

Via email to: comments@actuary.org

Re: ASOP No. 27 Request for Comments

Submitted by: Jack R. Buchmiller, of Stamford, CT

State & local government defined benefit (DB) pension plans in the United States are under-funded by approximately[1] $1.4 trillion. A large measure of the blame for this state of affairs is due the numerous errors and defects in the Actuarial Standards Board's (ASB) actuarial standards of practice (ASOP) and misleading disclosure standards promulgated by the Governmental Accounting Standards Board (GASB). But the problem begins with ASB. To paraphrase the late Peter Drucker, 'what gets mismeasured gets mismanaged', and the mismeasurements are ASB's. *"Let facts be submitted to a candid world."* The facts of the matter are as follows.

Actuarial Accrued Liabilities (AAL)

ASOP No. 27's section 3.6 on page 5 (dated December 1996[2]) method for calculating DB pension liabilities is invalid. In fact, it is nonsense: nonsense in theory and nonsense in fact. Section 3.6 states that:

> *"The discount rate is used to determine the present value of expected future plan payments. Generally, the appropriate discount rate is the same as the investment return assumption."* [emphasis added]

The stated exception to the "generally" is for ERISA plans where a Treasury or corporate bond yield curve is required for valuation purposes.[3] GASB repeats this error with their statement *"The assumptions with respect to the inflation rate, investment return (discount rate)* ..."[4] as the parenthetical suggests investment returns and discount rates are synonymous. They most emphatically are not.

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[1] "Approximately" as their true financial condition is concealed from taxpayers, bondholders, and plan members, as is explained below.

[2] See: http://www.actuarialstandardsboard.org/pdf/asops/asop027_053.pdf

[3] There are other flaws in ERISA methodologies. FAS-87 may be the only instance where tax accounting is used for both financial *and* management accounting.

[4] Exposure draft, page 2, section 4d(5)(c).

The theoretical argument against this is 'Modigliani-Miller' -- whose eponymous 1958 paper[5] is a foundation both of modern finance and of their respective 1985 and 1990 Nobel Prize awards in economics. Excerpting from the announcement of Modigliani's prize:

> *"The first Modigliani-Miller theorem concerns the question of how the market value of a firm is affected by the volume and structure of its debts. The central proposition of the theorem gives a clear answer to this question: neither the volume nor the structure of the debts affects the value of the firm ... this value ... is independent of how these assets have been financed."* -- The Royal Swedish Academy of Science, October 15, 1985[6]

And, obviously, vice-versa as neither by logic nor arithmetic can asset allocation change the amount of the pension benefit (liability) promised. The definition of a DB plan's benefit statement is entirely independent of asset class and/or assumed asset returns.[7] The benefit is usually defined as (hence, "DB"): final average salary[8] (FAS) times the number of years of service times a benefit factor.[9] The benefit is not indexed to any investible asset class or classes.

ASOP 27 section 3.6 is nonsense for other reasons. In practice its logic is circular as section 3.6.1 states that the investment return assumption is based upon an "expected" asset allocation. This "expected" -- *but not actual* -- return assumption becomes the discount rate for liabilities under ASOP-27. After performing that actuarial task it moves back to the investment function to become the hurdle rate of return for the asset allocation optimizer – a practice of which actuaries cannot pretend ignorance. The optimizer determines the asset allocation which then determines the return assumption which becomes the discount rate which determines the asset allocation … and so on. Circular logic is nonsensical, but those are ASB and GASB's standards.

ASOP 27 is an unfit standard for financial disclosure as it makes valuation an entirely arbitrary exercise. Arbitrary because the actuary works from "expected" not actual asset allocations (actual returns are averaged to oblivion). With global financial assets of some $118 trillion[10] there are an infinite number of possible ("expected") asset allocations at the security level and almost as many at the asset class level. This means a nearly infinite[11] number of possibly "expected" portfolios and valuation rates are available to any given plan, each and any one of which are equally valid under ASOP 27 and in full compliance with GASB's "standards".

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[5] *"The Cost of Capital, Corporation Finance and the Theory of Investment"* which appeared in the American Economic Review, Vol. 48, No. 3, June 1958, pp. 261-297.

[6] See: http://**nobelprize.org**/nobel_prizes/economics/laureates/1985/press.html

[7] There is a common factor, inflation, but it is wage inflation within a specific plan's geography versus the national CPI or GDP deflator which influences bond prices, or serves as the index for inflation-linked securities.

[8] Some plans use simply the final year's salary.

[9] Most plans have 'break-points' for length of service – e.g., 1.5% for 10 to 20 years' service, 2% for 20 – 30 years, etc.

[10] McKinsey & Co. http://www.mckinseyquarterly.com/article_abstract.aspx?ar=1899 or The Wall St. Journal 1/10/07.

[11] In practice the return assumption is expressed in two or three decimal places narrowing the range of acceptable valuation rates to 'only' several thousands.

We illustrate by example.[12] Assume the sole pension obligation is to pay a one-time $1,000,000 benefit in five years. Discounting at 1.125%, the low implied yield on 3-month Eurodollar futures contracts in this past cycle, that pension liability is worth $944,718[13]. But discounted at 30% -- a rate an actuary is permitted to assume if the fund is "expected" to invest only in upper-percentile "alternative" investments, then the *identical* pension liability may be reported at a paltry $247,185. Any value within, or even outside of, that range is perfectly acceptable under ASB and GASB standards. Thus ASOP 27 and GASB 25, 27, & 50 would permit two dramatically different disclosures for *perfectly identical obligations*. This contradiction is seen in actual practice: on the same reporting date, June 30, 2004, the Minneapolis Employees Retirement Fund assumed a 9.00% investment return while the New Hampshire Retirement System assumed only 6.00%; differences in asset allocation were immaterial.[14]

Therefore, ASOP 27 and GASB valuations can be whatever managements want them to be -- and GFOA will cheerfully attach its "excellence" award for financial reporting (just ask taxpayers in San Diego). This is hardly a reasonable "standard" for financial disclosure, especially for fiduciaries whose duty is to 'act with the utmost good faith'.

As a pension fund's sole purpose for existence is to fund pension benefits, *a matter in which it has not choice but duty,* the valuation exercise is purely one of time value once the future cashflows have been properly estimated. The valuation of pension liabilities for purposes of disclosure to trustees and investors should be objective. Expected future pension benefit payments must be discounted using "risk free" rates, by convention[15] the United States government yield curve, the "Treasury" curve.[16]

Actuarial Value of Assets (AVA)

As ASB's current "Request" letter references ASOP No. 44 and because honest & accurate asset valuation & disclosure are essential to plan governance, I also comment on

[12] While both examples are permissible under ASB & GASB, neither is correct because future pension liabilities must be discounted purely for time-value using a 'risk free' yield curve, as discussed further below.

[13] Using an HP-12C: 1.125% Actual/360 = 1.141% 30/360; assuming semi-annual discounting: 1.141%/2 = *I*; n = 5yrs = 10 periods; FV = $1m; solve for PV. Set 'n' to 30 years, the tenor of an ERISA plan's discount rate, and the difference widens even further.

[14] Source: NASRA's "Public Fund Survey for FY 2005" dated Sept. 2006. Demographic differences were assumed immaterial based on our knowledge of similar public plans.

[15] I have long pointed out that Treasurys are not risk-free, not even credit risk free. Assuredly, that's a minority viewpoint, but one currently gaining recognition.

[16] As of 12/31/06 the value of our $1 million example would be $795,044 based on a 4.694% 5-year T-note. In fact, Treasurys are risky and, even if observable, the true "risk-free" curve moves so there is still interest rate risk.

asset valuation standards & practices. (Note: all references are to the exposure draft, styled herein as "ASOP-AVA" instead of ASOP-44.[17])

Financial assets must be reported at market or 'fair' values and not at artificially contrived "smoothed" values. We observe that:

> *i)* Price equals value for reporting purposes. Historical cost is of limited value for disclosure purposes, and of none whatsoever when distorted by any type of "smoothing" technique. When a smoothed or averaged value is purported to be the value as-of a specific date it materially misleads and deceives the user of the financial statements as to the true value of assets on that date. The user can always create a smoothed figure, should there ever be a desire, but the user cannot un-smooth the numbers.
>
> *ii)* ASOP-AVA section 3.2.2 states that "*the actuary should consider plan sponsor objectives such as a desire for stable or predictable contributions or costs*" -- so much for fiduciary duty and care!

It should be obvious that ***the purpose of pension contributions is not to be smoothed but to fund pensions***. By virtually every concept of "fiduciary", especially in law, the interests of the beneficiaries come before all others, including the interests of sponsors. If smoothed results are used in the sponsor's public financial disclosures, then readers are misled and deceived as to the financial condition of that entity and beneficiaries ill-served.

Contribution volatility can and should be managed by asset allocation and/or hedging activities, not by 'cooking' the numbers. Volatility is a fact-of-life in financial markets. "Smoothing" does not manage volatility, it only conceals it and that is deception.

Not only is smoothing materially misleading, but ASB places no limits on it. For example, on May 18, 2005 CalPERS announced it would smooth asset gains & losses *"over fifteen years rather than three years"* and smooth actuarial gains & losses over thirty years instead of ten for contribution purposes[18] -- from three to fifteen years and from ten to thirty years? Where will ASB and GASB draw the line: at 50 years, at 100 years, at infinity? Much can change in 30 years (for example, less than 30 years after starring as a bodybuilder in the movie *"Stay Hungry"* Arnold Schwarzenegger was elected California's governor). Assuming a retirement age of 65 and today's life expectancy at that age, Charon will have rowed the majority of California's public pensioners across the river Styx before CalPERS has expensed their long-past service.

> *iii)* ASOP AVA section 3.2.3 states that "*The actuary may select different asset valuation methods for different classes of assets.*" In other words, AVA may be

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[17] *"Selection and use of asset valuation methods for pension liabilities"*, fourth exposure draft, dated August 2006. I have not updated my references to ASOP No. 44 as the differences are not material – and why should I work any faster than pension actuaries, who take up to 30 *years* to update their figures?

[18] See: http://www.calpers.ca.gov/index.jsp?bc=/about/press/pr-2005/may/contributions.xml

manipulated by applying inconsistent valuation techniques, making the true asset value even more impossible to derive from reported actuarial results. The actuarial valuation of assets is a joke; ASOP-AVA (#44) produces garbage.

Fortunately, the audited non-actuarial section of a GASB CAFR (usually?) has fair market values so we need not dwell further on this, except to note this malformed AVA becomes part of the funding method. "Garbage in/garbage out" therefore actuarial funding strategies are *guaranteed* to fail. And so they have, by $1.4 trillion, or more.

AAL is not a measure of pension liabilities

In nearly every CAFR I have seen, the only representation of pension liability is the actuarial accrued liability (AAL), or a similarly misleading construct. However AAL is not a really a liability figure but rather a hypothetical value used for and a by-product of actuarial budgeting or costing (actuarial cost methods). Despite this fact, AAL is public plans' only reported "liability" and is used as such in various sections of the CAFR (e.g., "actuarial valuation balance sheet"). It is used for reporting plans' funded status, funded ratios, and solvency test measures. It is also used to present pension liabilities in state and local government CAFRs and (by reference) in "official statements" for bond issues. This last usage is a *de facto*, if not *de jure*, violation of SEC rule 10b-5 (as a financial analyst, I express no opinion as to intent, *scienter*).

> GASB should not promulgate and ASB should not permit standards that require, encourage, or condone materially misleading or deceiving investors, taxpayers, plan members, or the public at large.

ASB and GASB must require calculation and disclosure of the "accumulated benefit obligation" (ABO) and "present value of benefits" (PVB) measures of liability. FASB requires disclosure of ABO and the "projected benefit obligation" (PBO). ABO is the liability accrued or "accumulated" through statement date. PBO is the ABO recalculated using the estimated the future final average salary but not the future service, making this is a somewhat meaningless figure as it is hard to imagine accruing to future salary without any intervening service. PVB takes into consideration both final salary and future service. For transparency of disclosure, both ABO and PVB should be on the balance sheet, the former a subtotal of the latter. The fair value of invested assets is the balance to ABO – assets accumulated to-date to pay for service accumulated to-date, both reported at present value, fairly calculated. The incremental liability of the PVB is offset by future investment returns and a long-term receivable: sponsor's liability for future contributions. (This receivable should not be recognized on the plan's balance sheet if the liability is not also recognized on the sponsor's. Receivables for previous shortfalls should be a separate line-item.)

> ASB and GASB must adopt and require ABO and PVB, accurately derived, as the two acceptable measures of pension liabilities.

Materially misleading discount rates[19]

The discount rate used by nearly all public pensions for valuing their pension liabilities is materially misleading. Of 102 plans (net) surveyed by the National Association of State Retirement Administrators (NASRA) in 2006 [20] or 227 surveyed by Wilshire Associates in 2004 the average rate is 7.99% and the median 8.00%, with 41% using 8.00%; 93% use a figure between 7.50% and 8.50%. The high and low rates were 9.00% and 6.00%, and those two plans[21] reported as-of the same date, June 30, 2004, underscoring the arbitrary and unrealistic nature of "generally accepted" accounting and actuarial pension practices.

To illustrate just how misleading GASB and ASOP "standards" are, an 8% discount rate is almost *double* long term Treasury bond yields on the relevant dates which are at or above yields on 30-year 'B-' rated junk bonds, the lowest-rated credit curve available on the Bloomberg Professional service.[22] Public pensions' 8% average discount rate was well above 2005's average yield of 7.40% on long term bonds issued by those well-known benchmark credits, the Socialist Republic of Vietnam[23] and, for fans of the movie "*Borat*", almost double the 4.33% yield on Republic of Kazakhstan bonds[24]. Why do American city and state pension plans discount their pension liabilities off yield curves significantly higher than those of corporate junk bonds, Vietnam, and Kazakhstan? Because GASB and ASB let them!

As the timing of cashflows is crucial and because the slope of the yield curve can vary significantly from year to year, valuations must be made using period-specific discount rates derived from the entire "spot" or zero-coupon "risk-free" yield curve.

> ASB and GASB must require pension liabilities be discounted at "risk-free" rates using the complete term-structure (the full yield curve).

Our recommendation of the risk-free curve is consistent with the International Public Sector Accounting Standards Board's proposed standard for employee benefits in its "Exposure Draft 31" dated October 2006.[25]

Untimely reporting

In the majority of CAFRs we have seen, actuarial liabilities (AAL) are reported with a one-year lag. In other words, a June 30, 2005 CAFR discloses actuarial values for June 30, 2004 (or, July 1, 2004). This means that the plan's and the sponsor's pension liability

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[19] Also called the "valuation interest rate" or "actuarial interest rate" (AIR).

[20] "Public Fund Survey Summary of Findings for FY 2005" dated September 2006 (http://www.publicfundsurvey.org/)

[21] Minneapolis and New Hampshire, as noted elsewhere.

[22] We used Bloomberg's "fair market yield curves – history" or FMCH function, curves #511 & 885.

[23] Vietnam's USD $228.2 million 3.75% of 3/12/2028; average yield per Bloomberg from 12/31/04 to 3/4/05; the next data point is even lower, 6.874% on 1/12/06.

[24] Kazakhstan's USD $350 million 11-1/8% of 5/11/2007; average yield from Bloomberg (GY) – remember: GASB and ASB completely ignore term structure, so why worry about it in our example?

[25] See: http://www.ifac.org/Guidance/EXD-Download.php?EDFID=00172 The IPSASB is part of the International Federation of Accountants (IFAC).

disclosures are not only inaccurate but also outdated – and that's assuming CAFRs are published within a few months of fiscal year end, many are not (see endnote *i*).

There is no justification for this delay. Life insurance actuaries have far more difficult calculations to make as they deal with a vastly larger number and variety of liabilities, including whole life, term life, universal life, fixed annuities, variable annuities, etc., each with a lengthy list of possible variations (riders). Pension actuaries deal with only one type of annuity, a pension obligation, and rarely more than four "tiers" of benefits. Life insurance actuaries are able to produce *quarterly* valuations under *two* different accounting standards, FASB and statutory accounting, making for *eight* valuations per year instead of just one, and they are able to do them all in less than two or three months. As sponsors generate payrolls every week or two, timely or real-time data is available to pension actuaries.

> ASB and GASB must require balance sheets be produced on a timely basis with assets and liabilities reported as-of the statement date.

Violation of stated accounting principles

Based on the presentation in GASB's white paper *"Why Governmental Accounting and Financial Reporting Is – And Should Be – Different"*[26] we find that GASB statements 25 & 27 violate supposedly core principles underlying GASB's government accounting principles and concepts. Specifically:

> *"Further, GASB Concepts Statement 1 (paragraph 56) states:*
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> > *Governmental accountability is based on the belief that the citizenry has a "right to know," a right to receive openly declared facts that may lead to public debate by the citizens and their elected representatives. Financial reporting plays a major role in fulfilling government's duty to be publicly accountable in a democratic society."*
> >
> > -- white paper, page 21, Appendix A [emphasis added]
>
> "*Furthermore, citizens are interested in evaluating interperiod* [a.k.a. inter-generational] *equity by determining whether current taxpayers and users of government services fully financed the costs of providing current-period services or whether taxes and user fees from prior or future periods were, or will be, needed to finance the current services provided."* -- pages 8-9

In the section specifically regarding pensions:

> *"As long as the individual government's funding approach met established accrual-based parameters, the transparency sought by most governmental financial statement users was achieved."* -- ibid. page 13

[26] Undated; http://www.gasb.org/white_paper_full.pdf

"Transparency"? *Oops!* As we have already outlined above, GASB's disclosure standards for pension assets, liabilities, and funded status are materially misleading, deceptive, and opaque. There are no *"openly declared facts"* regarding current and long term pension liabilities. The fact that tomorrow's taxpayers are indentured to pay for yesterday's services is artfully concealed by ASB and GASB so-called "standards".

On page 15 of their white paper GASB observes that state & local governments have *"over $1.7 trillion in bonds"* outstanding. By comparison, the 102 of the largest pension plans among them reported only $2.5 trillion of AAL as discounted at very off-market discount rates. When AAL is fair-valued, the total pension liability is $3.7 trillion, more than double the outstanding bonded debt cited -- $2 of pension debt for every $1 of funded debt, a very significant but not "openly declared" fact. Given their total assets of $2.3 trillion an unfunded pension liability of $1.4 trillion is an almost gap to plug by tweaking asset allocation to "alternatives".

Estimating the true liabilities of public plans: NASRA and Wilshire Associates data

How severely pension plan members, taxpayers, and investors are deceived by ASB and GASB's misbegotten actuarial & accounting standards is difficult to estimate. Using different methods and data sources I estimate public plans' aggregate underfunding is around $1.4 trillion (or higher). These estimates are discussed below and then further validated further with fair value disclosures from two pension systems.

I used primarily two sources for summary data on U.S. state and local government pension plans. The National Association of State Retirement Administrators (NASRA) "Public Fund Survey / Summary of Findings for FY 2005" dated September 2006[27] and Wilshire Associates' two reports[28] on state and local government pensions dated 2004, whose data I combined into one spreadsheet.

In both surveys each plan's reported dollar-value of AAL was 'marked' to fair value using the 30-year U.S. Treasury bond yield as-of each plan's respective reporting date versus the reported actuarial interest rate (AIR), given their (pensions & long-bonds) similar durations[29] this is simple bond math -- i.e., the price of an 8% coupon bond or annuity at the Treasury yield on the statement's as-of date. This fair value-AAL (FV-AAL) is subtracted from the market value of assets to arrive at the true funded status.

Similarly, the process was repeated for Wilshire's 2004 data. Unfortunately, after repeated badgering by NASRA[30] Wilshire ceased publishing details on state plans after

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[27] "Public Fund Survey Summary of Findings for FY 2005" dated September 2006 (http://www.publicfundsurvey.org/)

[28] *"2004 Wilshire Report on State Retirement Systems: Funding Levels and Asset Allocation"* dated March 12, 2004, and *"2004 Wilshire Report on City & County Retirement Systems: Funding Levels and Asset Allocation"* dated October 1, 2004, by Wilshire Associates, Inc.

[29] From a survey of the literature, most estimates of DB liabilities put their duration around that of the Treasury long bond. The long bond was ERISA's metric for over 30-years, until the PPA-2006. Our calculated duration for NJID's cashflow, further below, is 13 years based on +/-1% change in the zero curve (on a price-value-of-a-basis-point or PVBP basis, which captures both duration and convexity).

[30] *"State Retirement Funds Refute Latest Wilshire Report"* – press release and letter dated April 2, 2004 (http://www.nasra.org/resources/Press%20Release%20April%2004.pdf) and *"State Retirement Plans Take Issue with*

2004 but have largely continued it for cities and counties. Their surveys and analysis remain useful, but far less than before.[31]

The 2006 NASRA survey covered 136 plans or 102 plans, net, when consolidated.[32] The 2004 Wilshire Associates survey had data on 227 plans. But the results are very similar – *especially when liabilities are adjusted to their (estimated) fair economic values.* Aggregate figures from each survey are in the following table (summary of reporting dates[33] in the endnote[i]).

	NASRA 2006	Wilshire 2004
# of plans (net)	102	227
"Avg" statement date	7/2/2005	1/5/2003
Sum of Actuarial Assets	$2,178,271,985	$2,238,025,000
Sum of Actuarial Liabilities	$2,489,766,618	$2,423,279,000
AVA - AAL Surplus/(Deficit)	**($311,494,633)**	**($185,254,000)**
AVA / AAL	87.5%	92.4%
Sum of Asset Market Value	$2,263,202,215	$1,991,428,000
Sum of Fair Value of AAL	$3,679,160,732	$3,294,438,330
Actual Surplus/(Deficit)	**($1,415,958,517)**	**($1,303,010,330)**
Actual aggregate funded ratio	61.5%	60.4%
Actual funded ratio, avg of plans	59.6%	60.0%
Average Return Assumption	7.99%	8.01%
30-year U.S. Treasury (Avg)	4.33%	4.97%
Assumption vs. Reality	3.66%	3.04%
Median Return Assumption	8.00%	8.00%

Estimated actual deficits are four- to seven-times greater than reported! $1.350 versus $0.303 billion and $1.303 vs. $0.185 billion (No wonder NASRA has no patience for honest valuations, or disinfecting sunshine.) Funded ratios are really only 60.0% and not the reported 87.6% or 92.4%. A cumulative $1.4 trillion deficit is a very material figure for state & local government taxpayers. As NASRA says their survey covers 87% of public (state) DB plans by assets, this puts the national total closer to $1.5 trillion.

Unfortunately none of the rating agencies nor the GAO or SEC have confronted the systematic and deliberate under-reporting of public pensions' liabilities.

Sensationalist Research" -- no sensationalism in that headline! (http://www.nasra.org/resources/NASRAPressRelease3-18-03.pdf).

[31] Last I looked, they still publish details on local government and corporate DB plans.

[32] In some cases plan liabilities are reported separately for different plans – e.g., Teachers' vs. Employees, but assets are reported or commingled on one line. For example, NASRA reports actuarial liabilities for three New Jersey plans (discussed in more detail below) – Teachers, PERS, and Police & Fire, but assets on one line, styled New Jersey Division of Pension and Benefits. (New Jersey's pensions have plethora of names and/or 'stylings'!)

[33] While NASRA and Wilshire imposed reasonable cut-offs, some plans reported CAFRs three or four years old. Public plans typically report fiscal year liabilities a year late.

Validation of methodology: NJID and NYC

Our above figures can only be estimates because ASB and GASB standards do not require honest valuations fairly disclosed. However, we can calibrate or compare our estimates to the only two instances, of which we are aware, of honest attempts at fair value disclosure, NJID and NYC.

New Jersey Investment Department (NJID, a.k.a. NJIT)

On March 15, 2007 Dr. Douglas A. Love, Chief Investment Officer of Ryan Labs and a member of the New Jersey Investment Council (NJIC), an oversight body for NJ's pensions, made a presentation to the Council. In that presentation (slide 7) is the "total liability structure" as-of mid-fiscal year (September 30, 2006) for the New Jersey Investment Trust (NJIT), projected annually through 2037. (Note: Dr. Love styles it 'New Jersey Investment Trust' whereas other sources style the entity as New Jersey Investment Division or NJID. This paper uses both.)

Pension benefit payments rise from $5.96 billion in fiscal 2008 to over $9 billion a year from 2019 through 2029, but not dropping below $7 billion *per annum* until 2036. Undiscounted, the payments total $271.8 billion. NJIT's assets were $74.49 billion on September 30, 2006 (slide 13). Their actuarial assumed investment return was an above-average 8.50% p.a. The present value of those cashflows discounted at 8.50% is $81.5 billion and 91% funded.[34] (Excerpts from my spreadsheets are in the endnotes.[ii]) On this actuarial valuation, NJIT is underfunded by $7 billion, a significant deficit but a fraction of the real deficit.

If we discount NJIT's annual cash out-flows using the U.S. Treasury zero-coupon or "spot" curve yields (as a proxy for the actual "risk-free" yield curve), New Jersey's liabilities are really $130.8 billion and their deficit is actually $56.3 billion and they are only 57% funded using the Treasury zero curve. The following table summarizes this data, and includes a calculation based on the 30-year T-bond's nominal yield on statement date (i.e., a single, duration equivalent, interest rate).

	Discount rate	PV of Benefit Payments	Plan Assets	Funded Status	Funded Ratio
Actuarial Interest Rate (AIR)	8.500%	($81,471,859)	$74,490,000	($6,981,859)	91%
30-Year Treasury	4.763%	($128,029,397)	$74,490,000	($53,539,397)	58%
Treasury zero curve	(Avg: 4.726%)	**($130,820,569)**	**$74,490,000**	**($56,330,569)**	**57%**

Our $130.8 bln figure differs from Dr. Love's $132.1 bln primarily because we amortized the final lump-sum liability over 10 years.

The remaining difference is probably due to different discount rates, zero curves.

As the reader will note from the table, New Jersey's funded ratio is only 57%, very close to our public plan computed average of 60%. Even closer is the 58% single-rate (not a curve) estimate, which is comparable to the method I applied to the NASRA and

[34] Dr. Love has $91.6 bln as the actuarial liability at 8.5% on slide 7 but I cannot account for the nearly $10 bln difference. However our mark-to-market valuations differed by less than $0.5 bln, a 0.43% difference. Efforts to contact him to discuss our respective methods were unsuccessful.

Wilshire data. As Dr. Love's figures are not as-of a CAFR statement date, and our NASRA and Wilshire data is from NJID's fiscal years 2005 and 2001, the cashflow figures are not directly comparable to those sources (but one can interpolate fiscal years 2006 & 2007).[35]

There is another interesting analytical finding in these cashflow. Even if NJID earns their assumed *risk-free* 8.50%[36] combined average return on their stocks and bonds, their assets are completely exhausted in 2030 with $78 billion of benefits left unpaid. The present value of that $78 billion is the required tax increase New Jersey's taxpayers are facing to avoid defaulting on the state's pensions. This analysis is shown in the endnote.[iii] I am willing to share my spreadsheets with ASB, and for ASB to make them publicly available.

But 8.50% is a very optimistic return assumption, especially for a risk-free return. As true expected risk-free return is our discount rate curve (Treasurys) therefore we know that $130.8 billion of risk-free assets would be required to completely defease the liability. Splitting the difference, I used Bloomberg Professional's "Portfolio Summary Report" (PRTS) function to calculate NJID's asset yields. Using the weighted earnings yield (inverse of P/E ratio) on their equities and the yield to maturity of their bonds we derived an investment yield assumption of 6.54%.[37] On this basis, assets are exhausted in 2024 and either $136 billon of retirement benefits are left unpaid or $136 billion of additional taxes must be collected. Not a pretty picture for any New Jersey public employees, retirees, and taxpayers with life expectancies of 18 or more years from now. These calculations are also in an endnote.[iv]

New York City's five public pension plans (NYC-5)

New York City's five public pension plans (NYC-5)[38] reported a collective deficit of only $0.27 billon for fiscal year 2004, an average reported funded ratio of 99.5%. However, for the past several years Mr. Robert North, chief actuary for the City of New York's plans, has included (towards the end of their CAFRs) "Other Measures of Funded Status" for each plan. He calculates a "market value accumulated benefit obligation" ("MVABO") using U.S. Treasury spot (zero-curve) rates for the discount rates. ABO, or "MVABO" in North's nomenclature, is the metric required of all ERISA plans. (The Pension Protection Act of 2006 as replaced the 30-year Treasury with a three-segment

[35] Also: I added up the FY-2006 figures for the various plans in NJID's CAFR but came up with different total asset and other figures. Also, the CAFR's AIR was 8.25%, not 8.50%. As noted, I was unable to contact Dr. Love to reconcile the differences. For New Jersey, NASRA's 2005 market value of assets figure was $73.3 bln, actuarial assets $80.5 bln, and AAL $97 bln. *Nothing* is transparent or easy in pension-world!

[36] It's risk free as it's always 8.50%, in every single year.

[37] We are well aware of the limitations and implicit assumptions of this approach; it's purpose is to approximate a more realistic return assumption than 8.5% while allowing some harvesting of liquidity and other risk premia, over the risk-free portfolio.

[38] NYC Employees Retirement System or NYCERS; NYC Teachers' Retirement System or NYCTRS; NYC Police Pension Fund or NYCPPF; NYC Fire Pension Fund or NYCFPF; NYC Board of Education Retirement System or NYCBERS. Collectively they are styled herein as the "**NYC-5**" although the five plans have separate boards and assets are managed separately however the NYC Comptroller's Office oversees asset administration and other functions.

corporate bond curve, the wrong curve incorrectly applied for no good reason.) Thus, Mr. North's "Other Measures" are pension-world's "Rosetta Stone", connecting public plan valuations to those of ERISA plans.

When the fair value of NYC's pension liabilities are calculated using Treasury yields, the plans were only 60.8% funded in fiscal 2004, a deficit of $49 billion, equal to NYC's FY-2004 total funded debt. This 60.8% average is almost identical (60.0%) to that of the 102 and 227 plans in our NASRA and Wilshire analyses, with only the AAL with which to work.

For the three NYC plans for which I have FY-2005 data[39] -- NYCERS, NYCTRS, and NYCPPF, the ratios of ABO at 8% to the true ABO are 65.8%, 71.3%, and 65.3%, respectively, an average of 67.5%. By dividing the AAL, calculated at the usual 8.00%, by fair value-ABO the funded ratios are 71.8%, 63.3%, and 58.3%, respectively, for an average of 64.5%, and again very close to our previous 60% average for the FY-2005 NASRA data.

Our analytically-derived fair value funded ratios of the NASRA and Wilshire surveys are validated by actual fair value data reported by "insiders" at NJID and NYC.

Resolving the discount rate argument

Arguments over which discount rates or curves to use have raged for some time, but the arguments are easily resolved. Not the truth of the matter, which remains exclusively the risk-free rate curve, just the arguing. GASB and FASB can and should require all DB plans to disclose their best-estimate cashflow forecasts on a rolling 40-to-50 year basis. (Dr. Love or NJIT did it for 30 years, with a 'bullet' sum at the end.) Then the user of the financial statements can apply their own yield curves. As shown in the endnotes, it can be done in one or two pages. DB plans excuse for all of their various failings is that they are "long term investors". Good; now prove that you really do take a long term view: show us the long term.

Disclosure Standards

Disclosure standards for public pension funds are largely GASB's domain, but the actuarial section is a substantial portion of most CAFRs, so too must ASB be mindful of disclosure standards. For those reasons, and reasons stated elsewhere herein, I am including comments on disclosure standards, and intend to send to GASB and other interested parties.

In paragraph 1 of the introduction on page 1 to the exposure draft dated 12/15/06 for revisions to Statements No. 25 and No. 27, the Government Accounting Standards Board (GASB) writes:

[39] Give me a few more weeks for NYCFPF and NYCBERS to mail their most recent CAFRs and I'll have fair value data for NYC from 1999 through 2006, inclusive.

"This Statement is intended to improve the transparency and decision usefulness of reported information about pensions by state and local governmental plans and employers."

That exposure draft was adopted as GASB-50 without consideration or incorporation of any of the points regarding valuation or disclosure mentioned above or below,[40] therefore GASB falls very short of their supposed objective – apparently, they aimed to miss.

Our concerns with GASB's standards are as follows:[41]

No balance sheet
The balance sheet is the most fundamental of all financial disclosure documents. Double-entry book-keeping was invented by the Venetians some 500 years ago, but GASB has not yet seen fit to ask public pension funds to produce balance sheets. Instead, they produce something styled as a "statement of plan net assets" or similar derivative which is very incomplete, as explained below.

Misrepresentation of "total" liabilities
The so-called "statement of plan net assets" or "statement of fiduciary net assets" (or similar) materially misrepresents the financial condition of the pension plan because it omits all long term and most short term liabilities from what should be, but is not, a balance sheet. These liabilities are the essence of the enterprise and therefore essential to the integrity of disclosure. We assume that omission is why the presentation is styled a "statement of plan net assets" instead of a 'balance sheet' or 'statement of financial condition'.

The omission of long term pension liabilities is materially misleading and deceptive for several reasons.

a) The sole legal, business, and moral purpose of a pension fund is to pay pension benefits, now and in the future -- i.e., to fund benefits. Therefore, logically, the measurement of those liabilities must be the primary focus and purpose of disclosure.
b) Pension obligations are, depending on the jurisdiction, variously protected by state constitution, statute, case law, municipal code, and/or contract (e.g., collective bargaining) [42] and therefore are long term commitments or liabilities difficult to ignore – yet GASB *completely* ignores them in disclosures of financial condition, even though they are both very certain and very measurable.
c) Benefit payments are the largest single expense or "deduction" in the "statement of changes in plan net assets" ("fiduciary assets", etc.) so it defies logic that they

[40] The comments in this document are a revision and extension of those sent to ASB and GASB in February 2007.
[41] As GASB did not significantly revise its exposure draft, so I have not remapped my comments & references from the exposure draft to the final standard, GASB-50. After all, "a nod is as good as a wink to a blind horse".
[42] We have read arguments that there is also a property right under the U.S. Constitution – an argument we shall leave to the lawyers.

are never capitalized onto a balance sheet (*nee* "statement of plan net assets"). It is as if depository institutions (banks) omitted deposits or insurers their reserves from their balance sheets.

By omitting all long term pension liabilities from the financial statements, plan trustees, members, and beneficiaries, and sponsors' creditors, taxpayers, and public at large are deceived as to the true financial condition of both the pension plan and its sponsor or sponsors.

> GASB standards should require a complete and audited balance sheet. ASB should provide honest valuations to that purpose.

No "current maturities" of long term pension liabilities

In current practice the "total liability" appearing on the demi-balance sheet misrepresents the facts. First for the reasons outlined above, omission of long term liabilities, and second because the current portion of those long term obligations is not recognized among the "statement of plan net assets" presentation of current ("total") liabilities.

The only current or long-term pension liability disclosed is "benefits in process of payment" or "benefits payable" (or etc.) which is merely the payable accrued for the current month – next month's payments are not recognized. However, as with long term debt and leases, this "current" portion should be disclosed.

> GASB standards should be amended to require disclosure of pensions' current portion of long term liabilities in a "current liabilities" section, in a proper balance sheet.

Misleading and factually incorrect calculation of pension assets and liabilities

In sections 4c on page 2 of the exposure draft (now Statement 50) GASB calls for disclosure of the "funded status" of the plan in notes to the financial statements, instead of in "required supplemental information" (RSI). GASB's draft suggests disclosure of funded status in both dollar and percentage terms by using the "actuarial value of assets" (AVA) and "actuarial accrued liabilities" (AAL). However, these figures are calculated following the Actuarial Standards Board's (ASB) statements of "actuarial standards of practice" (ASOP) which require public plans to use invalid methods and inaccurate assumptions in their derivation. Moving these inaccurate measures from the RSI to the notes accomplishes nothing of substance.

> GASB standards should be amended to require disclosure, in a balance sheet, of assets and liabilities at fair value; ASB should provide those fair values, and only fair values.

Disclaimer

These comments reflect my professional *but personal* views. They should not be taken to represent those of my employer. I choose not to identify my employer as such disclaimers are often (have been) ignored or glossed-over.

Non Sequiturs and Canards

Anyone who has dared to point out the folly of the pension emperor's thread-worn new clothes[43] can expect a barrage of non sequiturs and canards in response – like Wilshire. I shall address them here in advance. They are usually along the lines of:

The writer is anti-DB, especially anti- public sector DB plans:

I am a contributing member of a public sector DB plan. In fact, I believe DB plans are better, more efficient providers of post-retirement income security than DC plans can ever be, although I have been contributing the maximum permissible to my DC or 457 plan since joining (and for good reasons!). I was also a 401k enthusiast in my private sector days. DB plans offer risk-pooling, economies of scale, diversification (including "alternative" investments) DC plans cannot match. My preliminary research suggests that DC plans, risk-adjusted, cannot match DB plans without some form of cohort pooling.

I would also note that the DB-DC distinction is an a legal one, not an economic one. DBs can be made more portable and DCs can be made more efficient.

If we told the truth, then taxpayers would kill all the DBs.

Probably true, but that's no excuse for lying, no excuse for *de facto* violations of SEC rule 10b-5. (I have no insight into anyone's intent, *scienter*, on the matter which would be required for a *de jure* violation of 10b-5 and thus make no accusations, just observations.) It's also true that an honest DC is better than a dishonest (i.e., defunct) DB. There is no reason DB plans cannot be fully & efficiently funded. Each day wasted hiding the problem puts us one day closer to a zero-sum game showdown between taxpayers and pensioners. Pensions' liquidity advantage is perishable.

We've made tons of money investing in equities; you'd have us match fund in Treasurys and lose the "equity risk premium".

First, as the usual disclaimer goes, *"past performance is no indication of future performance"*. History was path-dependent and so too will be the future. We have barely 100 years of past performance data on which to forecast the next 50 years.[44]

Second, yes, equities have produced a +5,652% total return, so how come you're under-funded by $1.4 trillion? *"Show us the money!"* By mismeasuring your funded status you

[43] The never-aging assumption of 8%.

[44] Looking at long term federal, state, and local debt, pension, OPEB, and social insurance liabilities in the light of long term demographics is frightening. Among other things, 78 million baby-boomers are over a third of the current labor force, whose retirement reduces the labor input to corporate production-function (microeconomics) at the same time the capital input to the production function is reduced -- i.e., financial assets are liquidated to fund 'boomer retirements. (Mick Jagger turned 65 on July 26, 2008, and 'time is not on our side' to paraphrase an old Stones song.)

thought you needed only $60 of assets but you really need $100. Even if assets ($60) and liabilities ($100) grow at 8.00%, risk-free, in the future, never the twain shall meet.

Third, investing is not about asset class selection, it's about buying risk-adjusted future cashflows cheap. Equities can be cheap or dear at different times, as can government bonds. I'd not repeat the UK's mistake in their pension reforms, which drove "gilts" to miniscule yields. The tricky part is risk-adjusting the cashflows, but the discounting part is easy ("*It's the Treasurys, stupid!"*). Treasurys are rarely 'cheap' on a relative basis because they're deemed "risk-free" and more liquid. You don't need the latter, and I'm one of the few who questions the former (except relatively), so this argument doesn't work on me. In fact, I'd argue the investment literature has mis-specified the asset classes – but that's another topic entirely.[45] Yes, pensions can & should harvest risk premiums, but only if they know what risks they're taking and disclose that to those ultimately taking those risks – fair values, fairly disclosed.

Governments don't go bankrupt!
Technically true of our states but not local governments. But they can & do go broke, become insolvent, and/or unable or unwilling to honor their obligations. Pension plans too: when assets are gone but benefits still outstanding, the plan is insolvent – and taxpayers in for a very nasty surprise (just like the PBGC).

These are not marketable liabilities so market values and mark-to-market don't apply.
Marketability has nothing to do with it – admittedly I've fallen into the trap "mark-to-market" nomenclature. For valuation, disclosure, and management of a plan's assets & liabilities, economic value is essential – whether styled "market value" or "fair value". Employer-sponsors and, in most public plans, employee-members make cash contributions – cash[46] is the risk-free asset. The benefits are paid in cash. In between times, cash is invested in financial assets. Most if not all plans' optimize following Markowitz and then Treynor & Sharpe by modeling or assuming a CAPM world. Guess what: your asset allocation model assumes that I'm right and you're wrong! CAPM is based on the risk-free yield curve. ASB, however, holds that this future cash obligation disappears into some parallel non-CAPM universe of universal 8% risk-free returns, only to return to this world at just the right time and amount.

But, as GASB apparently finds the 500 year-old concept of the balance sheet too new-fangled, then I guess ASB is struggling with the 30 year old concepts of Modigliani-Miller, Sharpe, and Treynor.

Summary

[45] In a "Merton Model" world bonds are just options on equity – or vice-versa. The asset is the corporate cashflow; stocks & bonds are just "waterfalls" to direct the allocation of cashflows (applying CDO 'capital structure' terminology). Thus I'd parse corporates, munis, Treasurys, etc., rather differently.
[46] Specie, if you're really conservative.

While ERISA does not apply to public sector pension plans, its 1974 enactment dramatically changed the direction and evolution of "best practices" and what are "generally accepted" practices for all defined benefit plans in the United States, public and private. In the 33 years since ERISA the S&P 500 index has produced a +5,652% total return yet, somehow, DB plans in the USA – including ERISA/corporate plans -- are under-funded by roughly $2 trillion, of which $1.4 trillion is in the public sector.[47] Under current ASB and GASB standards we can make only educated guesses, based on misleading AAL disclosures, as to the actual funded status. As a matter of public policy this is entirely unacceptable.

'What gets mismeasured gets mismanaged' and as ASB- and GASB-compliant CAFRs are the primary disclosure to trustees of public pensions, and to their sponsors, promulgation and acceptance of materially misleading disclosure standards makes GASB partially responsible for this $1.4 trillion shortfall. Pension regulatory and accounting standards elsewhere in the world have recognized these realities. It is time for American accountants and actuaries to face, and to report, the truth about public pension funds' financial condition.

Although copyrighted, you have my permission to post these, my signed comments, in their entirety to your website, as per your "Request for Comments" dated March 27, 2008. I am willing to make my spreadsheets available for posting as well, within any limitations imposed by my data sources.

Sincerely yours,

JRB
[signed]

Jack R. Buchmiller
Stamford, CT

Email: jbuchmiller@gmail.com

[47] 'Roughly' as GASB, FASB, and ASB conceal the true numbers from us. In its fiscal year 9/30/06 annual report the Pension Benefit Guaranty Corporation (PBGC), insurer for nearly all private sector DB plans, reports underfunding of its insured single- and multi-employer plans at $500 billion. This is down from $600 billion in FY-05, a date closer to public plans' -- $1.4 + 0.6 = $2 trillion. The public sector's $1.4 trillion deficit has been separately & independently estimated by this writer and by Thomas J. Healey of the Kennedy School of Government at Harvard University. Morgan Stanley estimated it slightly higher at $1.5 trillion, this writer's upper estimate.

[i] The as-of dates of the CAFRs in each survey are as follows:

	2.0	3.2	
Date Range (first - last, #days)	731	1,187	
Total Plans	102	227	
Statement Date	**# Plans**	**# Plans**	**Statement Date**
30-Jun-05	74	67	6/30/2003
31-Dec-05	14	25	6/30/2002
30-Jun-04	4	20	12/31/2002
30-Sep-05	3	17	7/1/2002
31-Aug-05	2	13	1/1/2003
31-Dec-04	2	13	7/1/2003
31-Mar-05	1	12	9/30/2002
30-Sep-04	1	11	6/30/2001
31-Dec-03	1	10	12/31/2003
		9	1/1/2004
		7	10/1/2003
		5	12/31/2001
		4	7/1/2001
		4	1/1/2002
		3	10/1/2000
		3	8/31/2003
		2	9/30/2001
		2	4/1/2003

[ii] Data from Dr. Love's presentation to NJ Investment Council on 3/15/07. The two right-most columns and the date column are mine.

Liability structure: NJIC from Dr. D. A. Love, dtd 3/15/07

Present Value at or using:				
Treasury zero-coupon curve	(see column)	**($130,820,569)**		
30-Year Treasury %	4.763%	**($128,029,397)**	Bloomberg curve #111	
Actuarial Interest Rate (AIR)	8.50%	**($81,471,859)**	**Avg zero%**	
Sum of NJID Pension Payments		**($271,813,071)**	4.726%	**($130,820,569)**
0.0	**9/30/2006**		**Zero-curve%**	
0.5	3/31/2007	($2,380,504)	5.074%	($2,322,311)
1.5	3/31/2008	($5,963,049)	4.813%	($5,557,067)
2.5	3/31/2009	($6,328,742)	4.641%	($5,650,145)
3.5	3/31/2010	($6,682,031)	4.595%	($5,709,772)
4.5	3/31/2011	($7,025,997)	4.579%	($5,744,036)
5.5	3/31/2012	($7,359,906)	4.573%	($5,755,377)
6.5	3/31/2013	($7,679,228)	4.596%	($5,734,157)
7.5	3/31/2014	($7,979,905)	4.617%	($5,688,196)
8.5	3/31/2015	($8,258,578)	4.628%	($5,622,229)
9.5	3/31/2016	($8,507,693)	4.634%	($5,532,481)
10.5	3/31/2017	($8,724,007)	4.619%	($5,430,229)
11.5	3/31/2018	($8,906,133)	4.749%	($5,223,719)
12.5	3/31/2019	($9,058,650)	4.806%	($5,037,630)
13.5	3/31/2020	($9,188,907)	4.856%	($4,844,312)
14.5	3/31/2021	($9,295,922)	4.898%	($4,647,271)
15.5	3/31/2022	($9,370,026)	4.914%	($4,454,674)
16.5	3/31/2023	($9,411,316)	4.916%	($4,263,390)
17.5	3/31/2024	($9,424,567)	4.916%	($4,069,612)
18.5	3/31/2025	($9,409,086)	4.912%	($3,875,432)
19.5	3/31/2026	($9,364,359)	4.905%	($3,681,091)
20.5	3/31/2027	($9,290,286)	4.894%	($3,488,653)
21.5	3/31/2028	($9,185,786)	4.881%	($3,297,390)
22.5	3/31/2029	($9,051,105)	4.865%	($3,108,169)
23.5	3/31/2030	($8,887,487)	4.848%	($2,921,433)
24.5	3/31/2031	($8,696,511)	4.830%	($2,738,093)
25.5	3/31/2032	($8,480,203)	4.811%	($2,558,707)
26.5	3/31/2033	($8,241,086)	4.791%	($2,384,629)
27.5	3/31/2034	($7,981,009)	4.770%	($2,216,090)
28.5	3/31/2035	($7,702,454)	4.748%	($2,053,577)
29.5	3/31/2036	($4,367,974)	4.726%	($1,118,750)
30.5	3/31/2037	($2,646,640)	4.702%	($651,674)
31.5	*3/31/2038*	*($2,696,392)*	4.679%	($638,625)
32.5	*3/31/2039*	*($2,696,392)*	4.655%	($614,664)
33.5	*3/31/2040*	*($2,696,392)*	4.631%	($591,856)
34.5	*3/31/2041*	*($2,696,392)*	4.606%	($570,289)
35.5	*3/31/2042*	*($2,696,392)*	4.581%	($549,787)
36.5	*3/31/2043*	*($2,696,392)*	4.556%	($530,330)
37.5	*3/31/2044*	*($2,696,392)*	4.531%	($511,753)
38.5	*3/31/2045*	*($2,696,392)*	4.506%	($494,154)
39.5	*3/31/2046*	*($2,696,392)*	4.481%	($477,391)
40.5	*3/31/2047*	*($2,696,392)*	4.455%	($461,422)

[iii] Benefit payments, return assumption, and asset values from Dr. Love's PowerPoint. Calculations – two right-most columns -- by the author. Periods are Love's, dates are mine.

NJID Plan assets $74,490,000 **Return assumption** AIR
Yield 8.50%

	Sums	**($271,813,071)**	**$119,499,078**	**($77,823,993)**
0.0	**9/30/2006**	**Benefit Pay'ts**	**Investment Income**	**Asset Balance**
0.5	3/31/2007	($2,380,504)	$6,331,650	$78,441,146
1.5	3/31/2008	($5,963,049)	$6,667,497	$79,145,594
2.5	3/31/2009	($6,328,742)	$6,727,376	$79,544,228
3.5	3/31/2010	($6,682,031)	$6,761,259	$79,623,456
4.5	3/31/2011	($7,025,997)	$6,767,994	$79,365,453
5.5	3/31/2012	($7,359,906)	$6,746,064	$78,751,611
6.5	3/31/2013	($7,679,228)	$6,693,887	$77,766,270
7.5	3/31/2014	($7,979,905)	$6,610,133	$76,396,497
8.5	3/31/2015	($8,258,578)	$6,493,702	$74,631,622
9.5	3/31/2016	($8,507,693)	$6,343,688	$72,467,617
10.5	3/31/2017	($8,724,007)	$6,159,747	$69,903,357
11.5	3/31/2018	($8,906,133)	$5,941,785	$66,939,009
12.5	3/31/2019	($9,058,650)	$5,689,816	$63,570,175
13.5	3/31/2020	($9,188,907)	$5,403,465	$59,784,733
14.5	3/31/2021	($9,295,922)	$5,081,702	$55,570,513
15.5	3/31/2022	($9,370,026)	$4,723,494	$50,923,981
16.5	3/31/2023	($9,411,316)	$4,328,538	$45,841,203
17.5	3/31/2024	($9,424,567)	$3,896,502	$40,313,139
18.5	3/31/2025	($9,409,086)	$3,426,617	$34,330,669
19.5	3/31/2026	($9,364,359)	$2,918,107	$27,884,417
20.5	3/31/2027	($9,290,286)	$2,370,175	$20,964,307
21.5	3/31/2028	($9,185,786)	$1,781,966	$13,560,487
22.5	3/31/2029	($9,051,105)	$1,152,641	$5,662,023
23.5	3/31/2030	($8,887,487)	$481,272	($2,744,192)
24.5	3/31/2031	($8,696,511)	$0	($11,440,703)
25.5	3/31/2032	($8,480,203)	$0	($19,920,906)
26.5	3/31/2033	($8,241,086)	$0	($28,161,992)
27.5	3/31/2034	($7,981,009)	$0	($36,143,001)
28.5	3/31/2035	($7,702,454)	$0	($43,845,455)
29.5	3/31/2036	($4,367,974)	$0	($48,213,429)
30.5	3/31/2037	($2,646,640)	$0	($50,860,069)
31.5	*3/31/2038*	*($2,696,392)*	$0	*($53,556,461)*
32.5	*3/31/2039*	*($2,696,392)*	$0	*($56,252,854)*
33.5	*3/31/2040*	*($2,696,392)*	$0	*($58,949,246)*
34.5	*3/31/2041*	*($2,696,392)*	$0	*($61,645,639)*
35.5	*3/31/2042*	*($2,696,392)*	$0	*($64,342,031)*
36.5	*3/31/2043*	*($2,696,392)*	$0	*($67,038,423)*
37.5	*3/31/2044*	*($2,696,392)*	$0	*($69,734,816)*
38.5	*3/31/2045*	*($2,696,392)*	$0	*($72,431,208)*
39.5	*3/31/2046*	*($2,696,392)*	$0	*($75,127,601)*
40.5	*3/31/2047*	*($2,696,392)*	$0	***($77,823,993)***

[iv] Bloomberg Professional's PRTS function-derive portfolio yields for NJID applied to Dr. Love's cashflows for NJID. (Columns, as before.)

NJID yield using Bloomberg PRTS function's E/P & bond YTM. (as-of ???)

NJID plan assets		**$74,490,000**	**Return assumption:**	Portfolio's yield
Yield		6.54%	*(Yield = wtd: equities' E/P & bonds' YTM)*	
	Sums	**($271,813,071)**	**$60,960,922**	**($136,362,149)**
0.0	**9/30/2006**	**Benefit Pay'ts**	**Investment Income**	**Asset Balance**
0.5	3/31/2007	($2,380,504)	$4,874,775	$76,984,271
1.5	3/31/2008	($5,963,049)	$5,038,005	$76,059,226
2.5	3/31/2009	($6,328,742)	$4,977,468	$74,707,952
3.5	3/31/2010	($6,682,031)	$4,889,038	$72,914,959
4.5	3/31/2011	($7,025,997)	$4,771,701	$70,660,663
5.5	3/31/2012	($7,359,906)	$4,624,175	$67,924,932
6.5	3/31/2013	($7,679,228)	$4,445,143	$64,690,847
7.5	3/31/2014	($7,979,905)	$4,233,498	$60,944,441
8.5	3/31/2015	($8,258,578)	$3,988,326	$56,674,189
9.5	3/31/2016	($8,507,693)	$3,708,872	$51,875,368
10.5	3/31/2017	($8,724,007)	$3,394,828	$46,546,189
11.5	3/31/2018	($8,906,133)	$3,046,076	$40,686,131
12.5	3/31/2019	($9,058,650)	$2,662,582	$34,290,063
13.5	3/31/2020	($9,188,907)	$2,244,010	$27,345,166
14.5	3/31/2021	($9,295,922)	$1,789,522	$19,838,767
15.5	3/31/2022	($9,370,026)	$1,298,289	$11,767,029
16.5	3/31/2023	($9,411,316)	$770,058	$3,125,771
17.5	3/31/2024	($9,424,567)	$204,557	($6,094,239)
18.5	3/31/2025	($9,409,086)	$0	($15,503,325)
19.5	3/31/2026	($9,364,359)	$0	($24,867,684)
20.5	3/31/2027	($9,290,286)	$0	($34,157,970)
21.5	3/31/2028	($9,185,786)	$0	($43,343,756)
22.5	3/31/2029	($9,051,105)	$0	($52,394,861)
23.5	3/31/2030	($8,887,487)	$0	($61,282,348)
24.5	3/31/2031	($8,696,511)	$0	($69,978,859)
25.5	3/31/2032	($8,480,203)	$0	($78,459,062)
26.5	3/31/2033	($8,241,086)	$0	($86,700,148)
27.5	3/31/2034	($7,981,009)	$0	($94,681,157)
28.5	3/31/2035	($7,702,454)	$0	($102,383,611)
29.5	3/31/2036	($4,367,974)	$0	($106,751,585)
30.5	3/31/2037	($2,646,640)	$0	($109,398,225)
31.5	*3/31/2038*	*($2,696,392)*	$0	*($112,094,617)*
32.5	*3/31/2039*	*($2,696,392)*	$0	*($114,791,010)*
33.5	*3/31/2040*	*($2,696,392)*	$0	*($117,487,402)*
34.5	*3/31/2041*	*($2,696,392)*	$0	*($120,183,794)*
35.5	*3/31/2042*	*($2,696,392)*	$0	*($122,880,187)*
36.5	*3/31/2043*	*($2,696,392)*	$0	*($125,576,579)*
37.5	*3/31/2044*	*($2,696,392)*	$0	*($128,272,972)*
38.5	*3/31/2045*	*($2,696,392)*	$0	*($130,969,364)*
39.5	*3/31/2046*	*($2,696,392)*	$0	*($133,665,756)*
40.5	*3/31/2047*	*($2,696,392)*	$0	***($136,362,149)***