

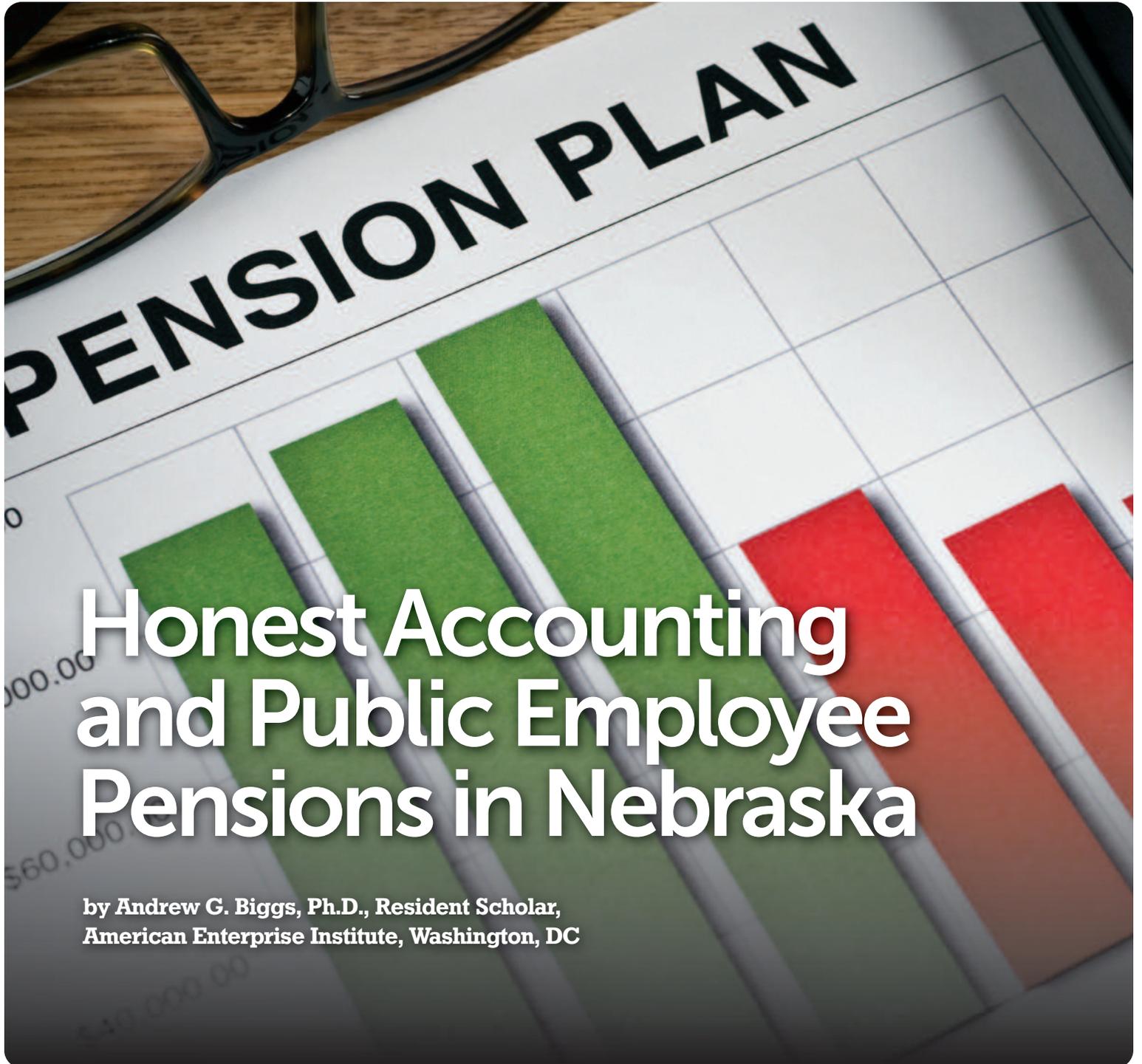
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Honest Accounting and Public Employee Pensions in Nebraska

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Summary

Defined benefit pensions plans for public sector employees are under financial strain in states around the country. But the true funding shortfalls may be understated due to pension accounting practices in which public plans may value their liabilities using the interest rate they project will be received on the plan’s investment. In most states, including Nebraska, this projected return is around 8 percent. But this assumption can be questioned for two reasons. First, many economists and pension experts project that future investment returns may be significantly lower than the historical rates that pension plans rely upon. For every percentage point the future yield falls below the projected 8 percent, plan liabilities and required annual contributions rise by roughly 20 percent. Second, most financial economists believe that the expected return on a portfolio of risky assets is the wrong rate to be applied to public pension liabilities, which are intended to be

guaranteed and in most states carry legal protections making them so. Academic economists and independent government agencies argue for so-called “fair market valuation,” in which the discount rate is matched to the risk of the liability, not of any assets used to fund the liability. Given the guaranteed nature of public pension benefits, this would point toward discounting pension liabilities using far lower yields, such as on U.S. Treasury securities. Doing so would reduce the funding ratios on Nebraska by almost half and increase unfunded liabilities by a factor six. In either case, policymakers should prepare for continued funding stress and go further in reforming public employee plans.

Introduction

The financial health of Nebraska public pensions depends crucially upon the interest rate that can be earned on the funds’ investments. Yet, due to pension accounting standards that literally ignore investment risk, most policymakers and members of the public are unaware of how sharply pension financing hinges upon the 8 percent rate of return that most plans assume going forward. For each percentage point decline in the assumed return, pension liabilities and the annual contributions necessary to fund them rise by around one-fifth. With Nebraska pension contributions having nearly doubled since 2006, further increases could make these plans appear financially unviable.

Yet public pensions’ rate-of-return assumptions rarely are examined closely. The state’s traditional defined benefit pensions assume they can earn 8 percent annual returns going forward, while the two cash balance plans assume a slightly lower 7.75 percent rate. In many cases, the rate of return is chosen beforehand and pension managers are tasked with finding some way of achieving it, regardless of the investment risks involved.

This study examines two important, but distinct, questions: First, are the returns projected by Nebraska public pensions reasonable? Are they in line with what independent experts project for the future? And second, even if reasonable, should pensions’ risky investment returns be used to value the plans’ benefit liabilities, which are guaranteed by law and must be paid regardless of how the plans’ investments may fare? These questions are often confused, but they demand independent lines of analysis.

This paper begins by examining how public employee pensions currently analyze their finances under rules promulgated by the Governmental Accounting Standards Board (GASB) and the role that the investment return plays in valuing future benefit liabilities. It next examines the investment return assumptions made by Nebraska plans and compares these assumptions to projections by economists and pension consultants. The following section examines how economic theory treats liability valuation, showing that most economists believe that a risky investment return – however accurately it may be projected – should not be used to value liabilities whose payment is intended to be guaranteed. Finally, the results of these methods are illustrated by applying them to six Nebraska public pension plans. Five of these plans are housed under the Nebraska Public Employees Retirement Systems – the Schools, Judges, State Patrol, State Cash Balance and County Cash Balance plans – while the Omaha Police & Fire is administered separately.

How Public Pensions Value Their Liabilities

To calculate their financial health, public employee pensions compare their assets – that is, the investments they hold today – to their liabilities, meaning the benefits that have been earned (or “accrued”) by public employees but will be paid out years or even decades into the future. Using these figures, pensions calculate two main measures of financial health: the funding ratio, assets divided by liabilities, and the plan’s unfunded liability, which is assets minus liabilities.

The key question for pension valuation is how to assign a value today to benefit liabilities that will be paid years or decades in the future. Because even the safest investments can earn interest, pensions need not contribute a full dollar today for each dollar of future liabilities. Thus, pensions calculate the present discounted value of their future liabilities, which is then compared to the value of their assets. Without such a present value, it is impossible to determine how well funded a plan is.

The present value of a plan’s liabilities is calculated using a method known as discounting, which is equivalent to compound interest in reverse. While compound interest involves taking a current dollar amount and adding interest

each year, discounting begins with the future dollar amount and subtracts interest each year until a present value is determined.

The present value of a future dollar amount depends crucially upon the interest rate at which the liability is discounted. For instance, consider a debt of \$1 to be paid 20 years from now. Assuming an 8 percent discount rate produces a present value of only 21 cents. At a 4 percent discount rate, however, the present value more than doubles to 46 cents.

Under current pension accounting rules, which the Governmental Accounting Standards Board establishes, a public pension plan discounts its liabilities using the rate of return the plan assumes will be generated by the portfolio of assets it holds. Nationwide, the average expected return on assets used in such valuations is close to 8 percent. In Nebraska, some plans assume an 8 percent return while others use 7.75 percent.

Discount rates are also used to calculate the plan’s Annual Required Contribution (ARC). The ARC consists of two separate costs: the “normal cost,” which represents the cost of benefits accruing in a given year and the cost of amortizing (or paying off) unfunded liabilities from prior years. The ARC, more so than the funding ratio or the unfunded liability, is the concern for policymakers on a year-to-year basis, as it determines the amount that taxpayers and public employees must contribute to the plan.

In recent years, most public pensions have seen their ARCs rise, due mostly to poor investment performance that has left plans underfunded. Nebraska is no exception. For instance, the ARC for the Nebraska cash balance plan for state employees nearly doubled from 2006 through 2011, from around \$16 million to over \$31 million. Other Nebraska plans have seen similar increases.

This study will examine two questions pertaining to the discount rates used by Nebraska public employee pensions. First, are Nebraska plans likely to achieve the 7.75 to 8.00 percent returns which they forecast and upon which taxpayer and employee contributions are based? And second, is the assumed rate of return on a pension’s assets – whether accurately forecasted or not – the appropriate figure to use in discounting pension liabilities. The first question requires looking at the investment projections made by independent analysts and comparing them to

those that Nebraska pensions have made. The second question is answered by referring to economic theory, which has strong opinions on how liabilities such as pension benefits should be valued.

Can Nebraska Plans Achieve the Projected Rates of Return?

Nebraska's traditional defined benefit pensions – the DB plans for schools, judges, state patrol, and the Omaha Police and Fire – assume an 8 percent average annual return. The state's two cash balance plans for state employees and county government workers assume a slightly lower 7.75 percent return. But are the 7.75 to 8.00 percent annual investment returns projected by Nebraska pensions achievable?

We should state at the outset that, in expectation at least, *any* return is achievable if the investor is willing to take sufficient risk. For instance, there are mutual funds that double the expected returns on the S&P 500 stock index – by doubling the risk on the fund. So could Nebraska pensions put together a portfolio with an expected return of 8 percent, or 18 percent, or 28 percent? Sure.

A more relevant question is whether pensions can achieve their projected returns with similar levels of risk to the past. That question is important because funding risk is passed on to state and city budgets and, by extension, to taxpayers. And the answer to that is likely no, for two reasons.

First, the safe, or riskless, interest rate available in the market today is far lower than it has been in the past. Since the expected return on a portfolio of risky assets is equal to the riskless return plus some premium for taking risk, a lower riskless interest rate makes it harder for pensions to achieve any given nominal rate of return. In the 1980s, for instance, Treasury securities at times had yields as high as 8 percent. This meant that plans could achieve 8 percent nominal returns while taking practically zero risk. Today, riskless securities have yields of 2 to 3 percent over long periods, meaning that to achieve a given rate of return a pension must take far more investment risk than in the past.

This fact makes it all the more troubling that pension accounting literally ignores investment risk. Under GASB accounting, the only factor that matters in valuing a plan's liabilities is the expected return on the plan's investments.

Whether that expected return is risky or riskless plays no role whatsoever. Contrary to common sense, under GASB accounting a plan that takes less risk is not, all other things equal, seen as safer or more responsible than a plan that takes more risk.

Second, the risk premium paid on stocks and other risky investments may be smaller in the future than it was in the past. Fama and French (2003) calculate that the large equity risk premium paid in the post-war period was due to a largely unexpected decline in yields on low-risk investments. They argue that stock investors in the past expected or demanded a far lower equity premium than they actually received. If so, this lower expected premium is a better indicator of the returns investors are likely to receive in the future.¹

Relying on these types of insights, pension consultants and economists attempt to project how investment returns may fare going into the future. This endeavor is speculative, to be sure, but not entirely so.

One prominent voice in the pension world is the consulting firm Wilshire Associates, which publishes an annual survey of state and local government pension financing. Wilshire surveys the investments and funding health of state and local government pensions nationwide.² As part of that analysis, Wilshire projects how each pension's investments are likely to fare over the following 10 years based on Wilshire's own assumptions regarding returns on various assets classes, as well as the risks and covariations of returns between assets.³

While the average projected return today for pensions nationally is around 7.8 percent, Wilshire projects a median investment return for pensions over the next 10 years of 6.9 percent. While the Wilshire report does not release return projections on a plan-by-plan basis, given the relative uniformity of pension investment portfolios it is reasonable to assume that Wilshire's projections would apply to Nebraska plans.

Using Wilshire's projections for average returns by asset class and the portfolio allocation reported by Nebraska DB plans, the cash balance plan could expect an average rate of return going forward of around 6.1 percent. (Table 1.) To be sure, each state's precise mix of investments within asset classes is different. Yet such differences are very unlikely to account for the lower annual returns projected by Wilshire.

Table 1. Potential returns for Nebraska DB pensions, based on Wilshire asset class assumptions*Source: Author's calculations from Wilshire assumptions.*

Asset class	Portfolio Allocation	Wilshire Return
U.S. Equities	31.5%	7.5%
Private Equities	5.0%	10.3%
Global Equities	15.0%	7.5%
Non-U.S. Equities	13.5%	7.5%
Fixed Income	30.0%	2.7%
Real Estate	5.0%	5.1%
Total	100%	6.1%

If the six Nebraska pensions plans analyzed here were to receive a 6.1 percent annual return over the long term, as Wilshire's figures imply, the present value of their liabilities would rise by around 30 percent and their unfunded liabilities would rise by 120 percent. Overall funding ratios would decline from around 75 percent to about 57 percent. Annual Required Contributions also would rise sharply, bringing the affordability of the plan into question.

Table 2. Risk and return of Nebraska DB portfolio, based upon PCA assumptions*Source: Author's calculations from PCA assumptions.*

Asset class	Portfolio Weight	Return	Risk (Standard deviation)
U.S. Equities	31.5%	7.2%	18.0%
Private Equities	5.0%	8.9%	26.0%
Global Equities	15.0%	7.4%	18.5%
Non-U.S. Equities	13.5%	7.2%	21.0%
Fixed Income	30.0%	2.2%	4.5%
Real Estate	5.0%	5.9%	10.0%
Total	100%	5.8%	12.6%

We next turn to investment return projections from the Pension Consulting Alliance, which publishes projections for returns on different asset types along with the estimated

risk of each asset class. Using these figures, along with PCA's assumptions regarding the covariation of asset returns, we can estimate both the mean return and the risk on NPERS portfolio of investments. Based on these figures, NPERS can expect an average annual return of only around 5.8 percent and a standard deviation of annual returns of 12.6 percent. (Table 2.)

These results point toward both higher risk and lower mean returns than the state cash balance plan has seen in the past. Historically, the plan's returns have averaged around 7.7 percent with a standard deviation of annual returns of 11 percent. These projected results are consistent with a general low-return investment environment, coupled with a shift in NPERS portfolio toward higher risk investments.

The British economists Elroy Dimson, Paul Marsh and Mike Staunton are well-known for their analysis of historical investment returns, as authors of the book "Triumph of the Optimists: 101 Years of Global Investment Returns." They also are authors of the annual Credit Suisse Global Investment Returns Yearbook, which projects returns for the future. In the 2013 edition of that report, Dimson, Marsh and Staunton argue that future returns are likely to be well below the historical averages that many investors rely upon.

We have seen that an investor with a 20–30 year horizon faces close to zero real returns on inflation-protected government bonds. Some countries offer higher yields, but only because of default and/or convertibility risk. The expected real return on conventional long bonds is expected to be a little higher, so the annualized real return on a rolling investment in cash is likely to be negative by as much as ½% over, say, 20 years, and close to zero over 30 years. Adding an equity premium of 3%–3½% to these negative/low real expected cash returns gives an expected real equity return in the region of 3%–3½% over 20–30 years. We are indeed living in a low-return world.

Even using Nebraska's inflation assumption of 3.5 percent – which is high compared to projections of less than 3 percent from the Congressional Budget Office and the Social Security Administration – this points to a mean return on equities of only around 6.5 to 7.0 percent. Returns at these levels make attaining pensions' projected returns of around 8 percent difficult in the extreme.

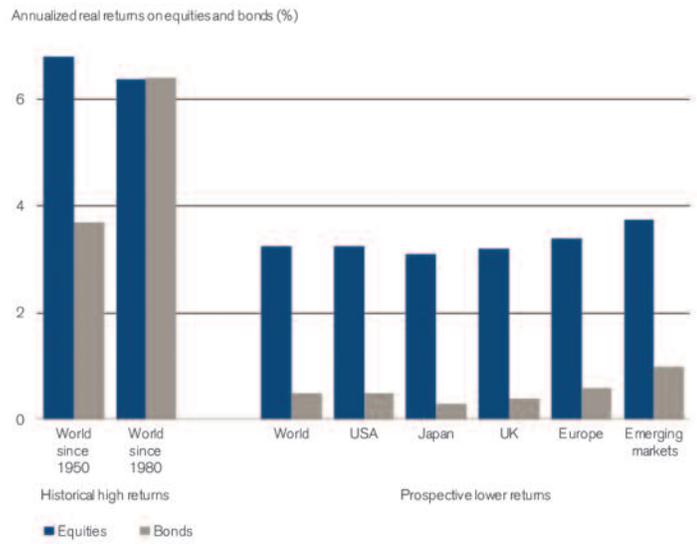
Dimson, Marsh and Staunton anticipate this result, stating that

Pension plans are also too optimistic, especially in the USA. While the average expected return on plan assets at S&P 500 companies has fallen from 9.1 percent a decade ago, it still stands at 7.6 percent. Meanwhile, the proportion of equities held has fallen to 48 percent. Given low current fixed income yields, plan sponsors need equity returns of some 12½ percent nominal or 10 percent real to meet such targets. U.S. public pension plans have even higher projections.

Moreover, investing overseas is not likely to help very much. As Figure 1 shows, Dimson, Marsh and Staunton project only slightly higher equity returns for emerging markets as for the U.S., Japan and Europe. While emerging markets are projected to have higher bond returns, these come with additional risk, both in terms of potential default and currency fluctuations.

Figure 1

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database



Finally, in the United Kingdom the Financial Services Authority dictates the returns investment providers use to simulate outcomes for personal pension plans. For a pension portfolio made up of two-thirds equities, one-third fixed income investments – something qualitatively similar to the typical public pension portfolio – the Financial Services Authority requires that by 2014 providers advertise three prospective rates of return: 2 percent

(pessimistic); 5 percent (median); and 8 percent (optimistic). These figures are a downward revision from the current rates of 5, 7 and 9 percent.⁴

Projecting investment returns is far from an exact science, and Nebraska’s pension managers and consultants may honestly believe that their projected returns are reasonable and achievable. Nevertheless, these are expert voices in the field whose views should be weighed carefully given the massive stakes for state and local budgets and Nebraska taxpayers. Moreover, these independent voices have no incentive to skew, intentionally or unintentionally, their projections in one direction or another. In the public pension world, by contrast, attempts to lower projected investment returns can meet with significant pushback from elected officials, due to the large contribution increases that lower assumed returns would require. For instance, in 2011 the board of the California Public Employee Retirement System (CalPERS) rejected their actuary’s proposal to lower the assumed investment return by 0.25 percentage points, citing concerns that California cities couldn’t “afford” the additional contributions.⁵ But if the investment return projections from the experts cited above are accurate, public pensions may fall below their projected returns by a significantly wider margin.

All of these sources point toward the conclusion that it may be difficult for Nebraska pension plans to achieve their projected rates of return with reasonable levels of investment risk. The following section will argue, moreover, that taking additional investment risk is no solution in boosting pension funding,

The Case for Fair-Market Valuation of Pension Liabilities

At first glance, the current approach to measuring pension liabilities that GASB established makes perfect sense: if you expect plan assets to appreciate 8 percent per year, then discounting the plan’s liabilities at 8 percent will tell you the exact assets the plan would need to hold today in order to meet its liabilities in the future. If the plan is underfunded, it will tell you the extra contributions you must make in order to bring the plan back to full funding. In this way, the current GASB rules dictating that the discount rate be derived from the expected return on assets may appear more “realistic” than alternative approaches.

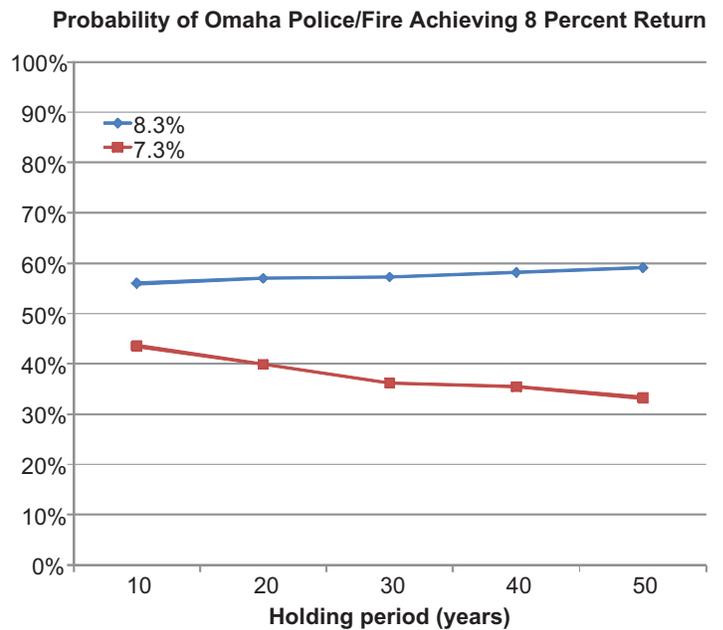
For this reason, many are puzzled that financial economists believe the discount rate applied to a benefit liability should have *nothing* to do with how the plan’s assets are invested. To economists, the discount rate you apply to a liability should be based on the risk of the liability itself, *not* of any assets used to fund the liability.⁶ If public pension benefits are guaranteed — as they are intended to be, and as legal rulings and state constitutions have determined them to be — then they should be discounted using the interest rates that the markets pay on guaranteed investments, such as U.S. Treasury securities.⁷ Such a value is often referred to as the Market Valuation of Liabilities (MVL). This is not only how the vast majority of economists view the valuation argument, it is also how private financial markets assign values to liabilities. This section discusses why that is the case.

While stocks, bonds, and alternative investments have high expected returns, they also can be very risky. In fact, most financial economists believe that their high expected returns are nothing other than compensation for the risk that, while these returns may be *expected*, they are not guaranteed. An analysis of Nebraska pension investments demonstrates this fact.

The Omaha Police and Firefighters Retirement System assumes an annual investment return of 8 percent, which is among the highest in the nation. The plan justifies this assumption using a 2009 analysis by the consulting firm Demarche, which concluded that the investment portfolio held by the plan had an expected compound return of 8.3 percent and a standard deviation of annual returns of 10.9 percent.⁸

Let’s take these figures as a given and simulate potential outcomes for the plan’s investments over periods of 10, 20, 30, 40 and 50 years. Using so-called “Monte Carlo” simulation, we project 5,000 possible investment outcomes based upon the risk and return characteristics from the Demarche analysis. This simulation shows that the probability of Omaha Police & Fire achieving its projected 8 percent average annual return hovers between 55 and 59 percent over periods ranging from 10 to 50 years. (Figure 2.) In other words, even if we accept the plan’s assumptions and those returns are realized, there is an over 40 percent chance that, even over the long term, the plan will not achieve the returns it has promised.

Figure 2



If average returns going forward could be lower than in the past, as the preceding section of this report suggests, then the chance of a funding shortfall obviously grows. For instance, assuming a mean return 1 percent point below the claimed 8.3 percent return, there is barely a one-third chance of hitting 8 percent even over the long term. This would increase total unfunded liabilities for the six plans analyzed in this study by 40 percent, or about \$1.2 billion.

The point here is simple: stocks are risky, even over long periods of time. Under current GASB accounting rules, a plan can call itself “fully funded” even if it has only around a 50-50 chance of being able to pay what it owes in full. Yet the plan, under state law, has a 100 percent obligation to make those payments.

The fair market valuation approach is designed to account for this gap. Market valuation says that if benefits must be paid 100 percent of the time, a plan is “fully funded” if it can pay benefits 100 percent of the time. Put another way, fair market valuation tells us when a plan can be considered *truly fully funded*: that is, when it can guarantee the benefits owed to future retirees *without* recourse to a taxpayer bailout. GASB’s definition of full funding, the one that Nebraska pensions use, relies upon the assumption that plans can return to taxpayers for additional funds in the future. But this standard makes no sense: if a taxpayer recourse is available, then public pension plans should

always be considered fully funded, regardless of how much they have contributed or amassed.

The mismatch between the high risk of the pension's portfolio and the low risk of the pension's benefits creates a *contingent liability* to pay full benefits even if the pension's investments do not produce the expected returns. This obligation represents an additional cost to the taxpayer over and above the cost of current contributions. The fair market valuation approach is designed to capture the value of benefits not simply expected to be paid, but *guaranteed* to be paid. Current pension accounting standards ignore the value of this contingent liability.

The way to calculate the full value of public pension liabilities is through a risk-adjusted discount rate; that is, an interest rate derived from investments that have approximately the same risk as the liability to which the discount rate is being applied.

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What Do Experts Say About Pension Accounting Rules?

The preceding section summarized the economic arguments against the current GASB pension accounting rules and for fair-market valuation, which would value public pension benefits using a risk-adjusted discount rate. Public pension insiders often treat fair-market valuation as, at best, an ivory tower concept that floated in from academia and, at worst, a crude political plot against public pensions and public employees.

This section shows how widespread support for fair-market valuation is among independent experts and non-partisan government agencies. The vast majority of academic economists and nonpartisan government agencies accept the arguments presented here regarding how to value public pension liabilities.

For instance, Donald Kohn, then-vice chairman of the Federal Reserve Board, declared in 2008:

While economists are famous for disagreeing with each other on virtually every other conceivable issue, when it comes to this one there is no professional disagreement: The only appropriate way to calculate the present value of a very-low-risk liability is to use a very-low-risk discount rate.⁹

Similarly, the Fed's director of research and statistics, David W. Wilcox, testified that:

These [public pension benefits] happen to be really simple cash flows to value. They're free of credit risk. There's only one conceptually right answer to how you discount those cash flows. You use discount rates that are free of credit risk. This is one of those things where it just really is that simple.¹⁰

In a 2009 research paper, two economists from the federal Bureau of Economic Analysis (BEA) noted:

If the assets of a defined-benefit plan are insufficient to pay promised benefits, the plan sponsor must cover the shortfall. This obligation represents an additional source of pension wealth for participants in an underfunded plan.¹¹

Beginning in 2013, the National Income and Product Accounts, which are the official "books" of the United States economy, will measure public pension liabilities

using a market-based tool that captures the value of benefit guarantees to employees. This means that liabilities as reported by pension plans will now be inconsistent with those same liabilities as reported in the official ledger books of the United States.

In 2011, the Congressional Budget Office issued a report that was widely taken as a confirmation of the market valuation approach:

By using the expected return on a pension plan's assets to discount future payments to beneficiaries, the guidelines issued by the Government Accounting Standards Board (GASB) implicitly reflect an assumption that the risk to workers that states and localities will fail to pay future retirement benefits is the same as the risk that expected returns on the plan's assets will not be realized. In fact, because the risk to future payments to beneficiaries is generally much less than the risk to the returns on typical assets held by pension plans, standard financial principles of valuation suggest that future benefit payments be discounted at a lower rate than under GASB's guidelines ... By accounting for the different risks associated with investment returns and benefit payments, the fair-value approach provides a more complete and transparent measure of the costs of pension obligations¹²

In October 2012, the IGM Forum at the University of Chicago's Booth School of Business surveyed 39 professional economists with regard to public pension discount rates. This group of highly respected economists represents differing areas of expertise and a wide variety of outlooks on the role of government. They were asked to express their agreement or disagreement with the following statement:

By discounting pension liabilities at high interest rates under government accounting standards, many U.S. state and local governments understate their pension liabilities and the costs of providing pensions to public-sector workers.

Ninety-eight percent of the economists surveyed agreed with this proposition, with 49 percent agreeing strongly. None of the economists surveyed disagreed (a small percentage were unsure).¹³

Also in 2012, the Moody's Investor Services announced that its ratings of state and local government debt would no

longer incorporate pension liabilities as measured under GASB rules. Instead, Moody's would discount pension liabilities using a corporate bond yield, similar to the way in which private pension liabilities are measured.

What Would Nebraska Pension Funding Look Like Under Fair-Market Valuation?

The first step to determining an accurate estimate of public pension liabilities is to choose the appropriate discount rate. We know from the previous discussion that discounting guaranteed benefit liabilities using an interest rate derived from risky portfolio investments is incorrect. We also know that the discount rate used to value government guaranteed benefits should be derived from an investment whose risk matches that of the pension liabilities being valued. Thus, while there is little disagreement among economists regarding how to choose an appropriate discount rate, there is some controversy among economists regarding a specific interest rate to use.

Perhaps the simplest approach is to use bond yields from the government sponsoring the pension plan. After all, both pension benefits and bond payments represent future payments of cash, which the same government guarantees. Currently, Nebraska municipal bonds with a duration of 15 years — about the average for public pension liabilities — have a yield of about 3.2 percent.¹⁴ If you consider pension benefits to have about the same risk as explicit debt that Nebraska governments issue, this might appear to be the appropriate discount rate to use.

However, Brown and Wilcox (2009) point out that in practice, accrued public pension liabilities have proven to be safer than explicit state/local government debt.¹⁵ Even when localities have effectively defaulted on their obligations, such as with New York City in the 1970s or Orange County, Calif., in the 1990s, pension benefits continued to be paid. Today, several bankrupt California cities such as Stockton and Vallejo are protecting accrued pension benefits for public employees while renegotiating payments to bond holders. For these reasons, Brown and Wilcox argue that a derivative of U.S. Treasury yields is the most appropriate.¹⁶

For simplicity, the calculations in Table 3 are based upon a 4 percent discount rate. This rate is above current Treasury yields, but might be thought of as approximating rates over

Table 3. Funding status for major Nebraska pension plans, under actuarial and fair-market valuation.

Sources: Author's calculations, based on data from plan actuarial valuations.

	Schools	Judges	State Patrol	Cash Balance	County cash balance	Omaha Police & Fire	Combined total
Actuarial valuation (GASB rules)							
Assets	7,358,964,135	125,927,523	282,810,785	392,442,206	116,379,465	467,375,458	8,743,899,572
Liabilities	9,609,157,134	137,464,661	362,298,975	379,734,639	110,630,278	1,077,607,299	11,676,892,986
Unfunded liability	2,250,192,999	11,537,138	79,488,190	(12,707,567)	(5,749,187)	610,231,841	2,932,993,414
Funding ratio	77%	92%	78%	103%	105%	43%	75%
Fair market valuation (economic rules)							
Market value of liabilities	16,925,501,206	242,129,279	638,150,844	646,010,100	188,205,841	1,898,089,852	20,538,087,121
Unfunded liability	9,566,537,071	116,201,756	355,340,059	253,567,894	71,826,376	1,430,714,394	11,794,187,549
Funding ratio	43%	52%	44%	61%	62%	25%	43%
Additional information							
Payroll	1,593,184,929	19,005,478	25,794,219	323,982,997	113,468,303	\$110,027,537	2,185,463,463
Return	8.00%	8.00%	8.00%	7.75%	7.75%	8.00%	
<i>Risk-adjusted</i>		4.0%					

recent periods of time. In each case, we convert the plan's liability as calculated using its chosen rate of 7.75 percent or 8 percent to a constant 4 percent discount rate. Then using this Market Value of Liabilities, we recalculate the funding ratio and unfunded liabilities for each plan.

As expected, the results in Table 3 show significant declines in the ratio of assets to liabilities and increases in unfunded liabilities. The combined effects are staggering. Putting all the above Nebraska plans together, under current GASB accounting the plans are 75 percent funded and face unfunded liabilities of around \$2.9 billion. While not an insubstantial sum, these figures appear far worse using accurate accounting. Under fair market valuation, the plans decline to only 43 percent funding and Nebraska state and local budgets faces total unfunded pension liabilities of \$11.8 billion.

The traditional DB plans are most impacted, because they assume higher discount rates than the cash balance plans. But if both plans offer benefits with the same levels of security and legal protection, then they should be valued with the same discount rate, not a differing rate based upon the investment returns they have assumed. The traditional DB plans have chosen a financing strategy involving lower

upfront contributions, invested in riskier assets, with a larger contingent liability placed on future taxpayers should those higher returns not be realized. But this does not make the plan better funded than the cash balance plans that choose a slightly more conservative funding strategy.

What does fair-market valuation tell you?

It's sometimes claimed by defenders of actuarial valuation that the fair-market approach doesn't "tell" you very much, that it presents an abstract figure that isn't of much help to policymakers. That's not true, although proponents of market valuation often don't go to sufficient lengths to point out what the MVL represents.

For instance, consider a pension that invests in risky assets. Under actuarial valuation, a single scenario is presented, in which the plan receives the expected return on assets each and every year, despite the very wide range of possible outcomes. Policymakers have little idea how much of their plan's funding health depends upon "true funding," meaning the contributions made to the plan plus a safe

interest rate, and how much depends upon taking investment risk and assuming that such risks will pay off. Moreover, policymakers considering increasing or decreasing the risk taken in pension investments are provided with only two results: that increasing risk makes the plan “better funded” while reducing investment risk does the reverse. It should not be surprising that U.S. public pensions take greater investment risk either than private plans or their public sector counterparts in other countries, where more rational accounting rules are used.

But fair-market valuation looks far more relevant to policymakers if we examine it step by step though an example. For simplicity, consider a pension that needs to pay a \$1 million guaranteed lump sum benefit in 15 years’ time. (Incorporating longer time horizons, additional contributions, annuitized payouts and other factors doesn’t change the results qualitatively.) Assuming an 8 percent average investment return, the plan “fully funds” that benefit with an initial investment of \$301,420, which is the present value of \$1 million assuming an 8 percent discount rate.

But that 8 percent annual return is far from guaranteed; Figure 3 illustrates using 20 examples based on “Monte Carlo” simulation. Note that, while the “expected value” of the fund after 15 years is \$1 million, relatively few of the actual end balances are close to that value. Most are well above or well below the required \$1 million. If nothing else, this illustrates the futility of basing pension financing decisions on a single calculation based on a risky rate of return.

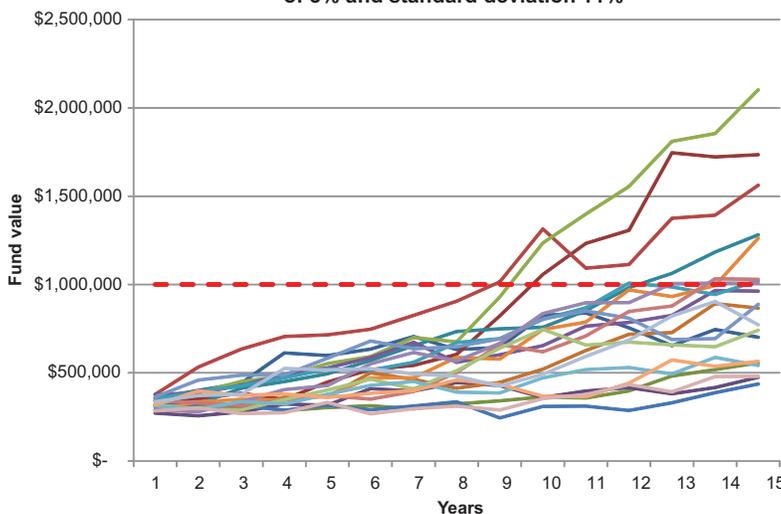
For the fund itself, neither overshooting nor undershooting the \$1 million goal is desired. For cases in which the end balance falls below \$1 million, the plan faces a shortfall – and must turn to the taxpayer for help. Cases where the fund overshoots aren’t necessarily better. While the plan can meet its benefit obligation, the surplus funds mean that it effectively “over-charged” the taxpayers who made the initial \$301,000 investment. Either way, someone loses.

But there’s a solution. For each of these potential investment outcomes, the plan could turn to financial markets. For instance, there might be one outcome in which the end balance of the fund is \$1.5 million. In exchange for an upfront payment from an investor, the plan could offer to give away to an investor the \$500,000 difference between that \$1.5 million end balance of the fund and the \$1 million it actually needs. Such agreements are made every day through financial products known as “options.” The upfront payment received would help offset the initial \$310,000 investment and avoid overcharging taxpayers today.

Alternately, there may be a case in which the fund’s end balance ends up at only \$500,000, which is below the \$1 million obligation owed by the plan. In exchange for an upfront payment from the fund to a private investor, the investor would promise to make up the difference between the \$500,000 end value of the fund and the \$1 million the plan needs to pay. This upfront payment to the private investor obviously would increase the amount of money the plan needs to set aside, but it helps the plan avoid overcharging taxpayers in the future.

Figure 3

Simulated investment returns over 15 years, assuming mean of 8% and standard deviation 11%



Using the tools of finance theory, we can calculate how much private financial markets would charge in each case. And, by extending the sample from 20 simulations to thousands, we can calculate the cost of these agreements for almost every possible outcome for the fund, from the very best to the first worst.

By summing the costs of these financial agreements and adding the initial \$301,000 investment, we can find the cost of *truly* fully funding the plan – that is, to guarantee both that retirees will receive their benefits in full and that the plan won’t have to turn to taxpayers for a bailout.

The total funding cost – the initial investment in risky assets plus the individual side agreements to

ensure full funding – come to around \$549,000. This value is far higher than the \$301,000 that public pension actuaries would tell you is full funding.

But it is exactly the same as the figure that fair-market valuation would provide, simply by discounting the \$1 million liability at the riskless interest rate. In other words, the figures provided by fair market valuation aren't ensconced in the ivory tower, but represent the values placed on investment risk by real-world investors. It is actuarial valuation that assumes that plans can earn high 8 percent returns without any risk, which is out of touch with reality.

It's obviously impractical for a pension plan to contract these giveaways and guarantees for every possible investment outcome. But they don't need to. In fact, all a plan would need to do is purchase a single "put option" with a "strike price" of \$1 million, while selling a single call option with the same strike price. The put option would pay the difference if the fund value came in below \$1 million, while the call option would sell off any end balances over \$1 million. And guess what? The total price would again be the same: \$549,000.

This shows something important about fair-market valuation: while there are an infinite number of investment possibilities, if the pension plan wishes to truly fund its obligations – to guarantee retirees their full benefits and guarantee future taxpayers they won't be called on for a bailout – then there is but a single price for doing so. And that price is the value of the liabilities calculated using a discount rate that matches the risk of those liabilities.

Why does it cost so much more to guarantee against bad outcomes than can be gained by selling off the proceeds of good outcomes? The principal reason is that the stock market and other risky assets are correlated with the economy: when the market is down and the fund needs a bailout that also will be when the economy is down, unemployment is up and tax revenues low. In economists' terms, that's when the marginal value of a dollar is highest and thus when individuals and financial markets charge the most for a dollar of insurance. As Washington State's actuary has written with regard to its own plans' experiences:

"Weak economic environments were correlated with weak investment returns. Lower investment returns created the need for increased contributions at a time when employers and members could least afford them."¹⁷

Likewise, good times for the pension fund will be correlated with good times in the economy, when everyone else is flush and the value of an additional dollar is low.

It is sometimes said that "economists know the price of everything and the value of nothing." In this case, though, the very opposite is true. The market valuation approach incorporates both the full range of possible investment outcomes and the value that individuals, be they investors or taxpayers, place on those outcomes. It is standard actuarial accounting which is out of step with reality, supposing only a single, totally unrealistic outcome: that pension plans can earn high investment returns without any risk.

In a sense, the MVL is *too* good a measure of pension liabilities. It captures both the full range of investment possibilities and the values that individuals place on those outcomes, reflecting the fact that high returns occurring in good economic times don't compensate for the costs of low returns occurring when the economy is low. Yet these results are not obvious to consumers of pension financial disclosures, leading them to believe that a full and comprehensive measure of pension funding is an arcane, ivory-tower figure with no relevance to policymakers or the public.

Conclusions

Nebraska runs a number of pension plans for its state and local government employees, including both traditional defined benefit plans and more modern cash balance plans. By national standards, Nebraska's plans are reasonably well-funded and managed. Yet it is not clear that Nebraska pension plans can achieve the roughly 8 percent investment returns they project and upon which their funding health so heavily relies. Certainly they cannot achieve these returns at low levels of market risk.

Moreover, there is a growing consensus among pension economists and independent government agencies that the projected rate of return on a pension's assets is simply the wrong interest rate to use in discounting the plan's future liabilities. The reason is simple: the return on plan assets is derived from risky investments, which the plan's benefits are intended to be riskless. This mismatch produces highly misleading results regarding a plan's funding health. Indeed, it allows a plan to call itself "fully funded" even if

there is a better-than-even chance its current assets *won't* be sufficient to meet its current liabilities.

The immediate solution to these problems is better accounting. Implementing fair-market valuation of public pension liabilities would give an accurate view of what these plans owe, a view that incorporates both the level of benefits and the fact that benefits are guaranteed. Moreover, because the Market Value of Liabilities is not calculated using the expected return on plan assets, pensions would no longer have the incentive to seek out higher-risk portfolios or to exaggerate the returns from the portfolios they currently hold.

Once better accounting is in place, providing a more accurate view of the costs and risk of public pension financing, policymakers may wish to consider alternates that do not shift large contingent liabilities onto future budgets and taxpayers. Defined contribution plans are one option, as are reforms that retain a defined benefit structure but incorporate greater risk-sharing between employers and employees. Different options may be preferable in different states and for different kinds of employees. But the status quo, in which billions of dollars in unfunded pension liabilities are left off the books, is not sustainable.

Endnotes

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- 4 BBC. "Pension projections cut by FSA to stop 'false impressions'." November 2, 2012.
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- 14 See: http://nebraska.municipalbonds.com/bonds/yield_curve/
- 15 Brown, Jeffrey R., and David W. Wilcox. "Discounting State and Local Pension Liabilities," *American Economic Review* 99 (May 2009): 538-42.
- 16 Even within Treasuries, however, disagreements loom. For instance, some economists point out that yields on U.S. Treasury securities — which are free from credit risk — are low in part because they are highly liquid and freely tradable, an attribute that pension liabilities neither share nor need. See Munnell, Alicia H., Richard W. Kopcke, Jean-Pierre Aubry, and Laura Quinby. 2010. "Valuing Liabilities in State and Local Plans." Issue in Brief SLP-11. Chestnut Hill, MA: Center for Retirement Research at Boston College. On the other hand, most public pension benefits are at least partially protected against inflation, which U.S. Treasury securities are not. Economists Joshua Rauh, of Northwestern University, and Robert Novy-Marx, of the University of Rochester, assume that these two effects are roughly offsetting and therefore use Treasury interest rates to value public pension liabilities. They discount pension liabilities at the yield on Treasury Inflation Protected Securities (TIPS) plus market expectations of inflation.
- 17 Office of the State Actuary. "Washington State 2009 Actuarial Valuation Report." October 2010; and Office of the State Actuary. "2010 Risk Assessment: Moving Beyond Expectations." August 31, 2010.



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