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Public Sector Pensions in Nebraska

Are Cash Balance Plans the Answer?

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Table of Contents

Section	Page
Summary	2
Introduction	3
Background on the Nebraska NPERS	
Cash Balance Plan	3
Employee Attractions and Retention	4
Rate of Return Subsidy	5
Implications for Plan Funding	6
Transparency	7
Pure Defined Contribution Pensions	8
Summary and Conclusions	9
Endnotes	9

Summary

Nebraska presents what could be a model for public sector pension reform, the so-called “cash balance” plan that offers some of the better aspects of both traditional defined benefit pensions and the defined contribution, 401(k)-type plans that dominate in the private sector. In this study we examine the factors that make cash balance plans attractive as well as examining some of their potential shortfalls.

Cash balance plans offer far greater portability than defined benefit pensions, allowing public employers to attract young mobile employees and removing current disincentives for mid-career employees to leave. However, cash balance plans share with defined benefit pensions a set of accounting rules that economists almost universally believe to understate pension liabilities and hide the investment risks that are borne by taxpayers. In the case of Nebraska's cash balance plans, this arises through the government’s guarantee of a 5 percent annual return on account balances regardless of the returns available in the market. Such a guarantee, which resembles a financial product known as a “put option,” is easily priced and shows the true costs of the Nebraska cash balance plan to be far greater than currently understood. While the cash balance plan claims to be 95 percent funded, when the market value of the rate of return guarantee is included the plan is only around 50 percent funded. Claims by pension managers that market values do not apply to government plans are not supported by the vast majority of economists. A pure defined contribution plan in which participants bear the investment risk would be more transparent in terms of the costs imposed on government budgets and the taxpayer.

Introduction

Pension plans for state and local government employees are in a state of flux. Traditional defined benefit pensions, which are quickly disappearing for private sector workers, remain in place for the vast majority of full-time public employees. But costs are rising for DB pensions due to a combination of benefit increases in flush times, chronic underfunding by sponsoring governments, and investment returns over the past decade that have fallen well below projected levels.¹

As a result, some have proposed shifting public employees to the defined contribution, 401(k) model that reigns in the private sector. DC pensions are by definition fully funded so long as the employer makes his required contribution, and market risk is borne and managed by employees. This has direct benefits for government budgets and taxpayers, but there are indirect benefits as well: the transparency of DC pensions makes government obligations easier for policymakers and taxpayers to monitor and manage and there are fewer opportunities for gaming of DC pensions or for benefit increases to be introduced by stealth.

That said, DC plans in the private sector have significant shortcomings: participation, being voluntary, is generally lower than in traditional DB plans. Many individual investors are poorly prepared to manage their risk and return of their account investments. And annuitization of account balances — which provides a steady guaranteed income throughout retirement — is uncommon.²

For these reasons, some have proposed a new model: the cash balance plan. Cash balance CB pensions are defined benefit plans that mimic certain aspects of private sector DC plans. CB plans work through what is referred to as a “notional personal account.” That is, participants in a CB plan are attributed “contribution credits” which earn interest through “interest credits.” However, the actual contributions made by an employee, and on his behalf by his employer, are invested elsewhere and may earn very different rates of interest. Thus, while a CB plan may look much like a DC pension, it is the employer—not the employee—who is the trustee of the assets and who bears the investment risk. For this reason, CB plans resemble traditional DB pensions.

However, CB plans tend to have shorter vesting periods than DB pensions and allow much greater portability across jobs. In this way they resemble DC pensions and may allow government employers to better compete for highly-qualified employees who do not seek lifetime employment with the government. For shorter-term employees, the portability of a DC pension plan trumps the stability of a DB plan. Thus, some reformers look to CB plans for help in employee recruiting as much as in controlling pension costs.

Background on the Nebraska NPERS Cash Balance Plan

Pensions for Nebraska state government workers are managed by the Nebraska Public Employees Retirement Systems (NPERS), which administers several different retirement plans. Nebraska state employees hired since 2003 join a cash balance retirement plan, which includes features of both a traditional defined benefit pension and a 401(k)-style system. Nebraska employees hired prior to 2003 were enrolled in a DC pension plan, which is very unusual for a public sector pension. Other states, including Kansas, Maryland, Montana and Pennsylvania, have at least analyzed the idea of shifting to a cash balance approach.

Employees contribute 4.8 percent of their salaries to the Nebraska plan on a pre-tax basis. Employers contribute an additional 7.5 percent of pay, for total contributions of 12.3 percent. The government invests those contributions and manages them similarly to ordinary state and local DB pension assets. Roughly two-thirds of these assets are held in U.S. or foreign stocks, with most of the remainder in fixed income investments. Nebraska projects a future average return on these assets of 7.75 percent.

However, employee contributions are credited not with the actual rate of return that is achieved on the investments but with a return that is established through a formula that is defined in law. The interest credit rate equals the greater of 5 percent or the applicable federal mid-term rate plus 1.5 percent. The mid-term rate is equal to the average yield on U.S. Treasury securities with maturities of between 3 years and 9 years. As of October 2011, for instance, the mid-term rate was 1.2 percent, meaning that the minimum return of 5 percent would be applicable.

When the plan is considered to be adequately funded, an interest credit greater than 5 percent may be granted. These bonus payments, referred to as “dividends” have occurred in five of the last eight years, although none have been paid since 2008.

At retirement, employees have a choice of several benefit options. They can receive their contributions back in the form of an annuity, similar to those paid by traditional DBplans, as a lump sum, or the balance can be rolled over into an IRA or similar private account. There are a number of annuity options, which include provisions for a survivor and for fixed annual increases to help adjust for inflation. In addition, participants may call on their account balances should they become disabled.

Employee Attraction and Retention

It is sometimes argued that without defined-benefit pensions it would be more difficult for government to attract and retain quality employees. For instance, a study conducted by the actuarial firm Segal on behalf of the Nevada Public Employees Retirement system states, “Only a DBplan can be structured to attract and retain employees for a productive career, and to incent employees to retire when it suits the employer.”³

However, many traditional public sector DBpensions generate incentives that are perverse, to say the least. In fact, DBpensions however generous they may be on average — can interfere with the government’s ability to attract and retain *quality* employees, due to some peculiar incentives embedded into a DBpension’s benefit formula. Under a DBplan, the value of benefits accrued in a given year increases with the tenure of the employee. Since benefits are based upon final earnings, in any given year the employee not only earns an additional year of benefits, but raising his wage also re-values benefits based upon his *past* earnings. This produces a pattern of benefit accrual that is flat in the early decades of a worker’s career but rises sharply thereafter.

Podgursky and Costrell show using public school teacher pensions that the typical participant is “under water” until his late 40s, meaning that he has contributed more to the program than the benefits he has yet accrued.⁴ This is despite the fact that, on average, public sector DBplans are far more generous than private sector pensions. An

individual in his 40s could leave literally hundreds of thousands of dollars on the table by leaving public employment. Beginning around 50, pension wealth net of contributions rises rapidly through around age 55, but then declines and by age 60 has become negative. Those who remain in public employment past age 60 pay a significant “tax.”

How does this affect the ability to attract and retain *quality* employees? For potential hires who may wish to remain in public employment for only a decade or so, a DBpension is a clear money loser. A public employee who works ten years, Podgursky and Costrell show, may have combined employer/employee contributions of \$100,000 but based on the pension benefit formula has accrued very little “pension wealth” that he could take with him to another job. These shorter term employees, who often are the most able and ambitious, would far prefer a DC pension plan.

DBplans also have problems when it comes to employee retention. DBpensions offer powerful incentives to remain in public employment once the individual has attained a decade or so of tenure, but this often serves to prevent the employee who wants and should leave from doing so. The burned-out teacher or the physically ailing public safety officer might prefer to shift to a different job, and the public might be served by them doing so. But the cost to leaving public employment at, say, age 40 can range from around \$200,000 to over \$500,000 in Podgursky and Costrell’s calculations. Under a DC or CB plan, the worker could take his savings with him.

Finally, employers might wish to convince their most able employees to *delay* retirement, but there is a significant employee cost to doing so. Using the Missouri teachers pension plan, Podgursky and Costrell show that an employee who delayed retirement from age 60 to 65 would give up over \$150,000 in pension wealth. The reason for this is that most employees are prevented from claiming benefits at the same time that they work, and annual adjustments to benefits for those who do delay claiming are not sufficient to account for giving up a year of benefits.

A cash balance plan helps address some of these issues as it offers the portability that a DBpension lacks. In Nebraska, participants in the CB plan vest in their contributions after only three years of service. Under DBplans, vesting may be delayed as long as 10 years. A young, mobile worker could work for the government of Nebraska for five or 10 years

without suffering a financial loss for doing so. Likewise, a middle aged employee who wished to change jobs would not leave hundreds of thousands of dollars in pension wealth behind. And an older worker who remained on the job would continue to build retirement wealth rather than losing it.

To the degree that employers wished to truly fine tune incentives to reduce employee turnover, that does not imply that they need turn to a DB pension plan. Instead, government employers could simply design a salary schedule where the increase in pay based on job tenure varies in order to give employees the incentive to remain with the government rather than switch to a different employer. Thus, CB pension plans may be more in tune with 21st Century workforce needs than the DB plans of decades past.

Rate of Return Subsidy

While CB pensions have important advantages over DB plans in terms of portability, they share an important weakness of public sector DB pensions: investment risks borne by the taxpayer that pension accounting rules fail to disclose. This section will explain and quantify those costs.

Perhaps the most important aspect of cash balance plans is that they provide an explicit rate of return subsidy over private sector investments of similar risk. And unlike DB plans, where this subsidy is masked through complex benefit calculations, in CB plans the subsidy is clear as day. In Nebraska, participants receive a guaranteed return on their contributions and those of their employer equal to 1.5 percentage points above the government bond yield, with a minimum return of 5 percent, no matter how low the return on guaranteed private sector investments may fall. In addition, participants may receive a return above 5 percent in times when the plan's underlying investments do particularly well.

It is intuitively obvious that a 5 percent-plus guaranteed return is far a better deal than a typical private sector 401(k) plan, where to receive a guaranteed rate of return participants must invest in U.S. Treasury securities, currently yielding around 2.8 percent over 20 years with no upside potential. What may not be clear is that it actually is not difficult to calculate the value of this implicit subsidy, which also counts as a hidden obligation to the government

and the taxpayer.

The rate of return setup under Nebraska's CB plan closely resembles a financial product known as a "put option." A put gives the holder the right to sell some underlying asset for a given minimum price at a future date. The value of that option depends upon the risk of the underlying asset to which it applies — in this case, the investment portfolio held by the Nebraska Investment Council — and the riskless rate of return, which in most cases is the yield on U.S. Treasury securities. From 1997 through 2010, the standard deviation of annual investment returns — a common measure of investment risk — was about 13.8 percent. Likewise, as of October 2011 U. S. Treasuries yielded around 0.1 percent over 1 year and 2.8 percent over 20 years.

Consider a simple example. A Nebraska employee with a salary of \$50,000 this year has a total CB contribution of \$6,150, on which he is guaranteed a 5 percent return. That is, one year from today the government guarantees that his contributions will be worth no less than \$6,458, regardless of how the plan's actual investments perform. This is a classic put option. But how much is it worth?

On paper, it is worth nothing. Nebraska shifted from a pure DC plan in which there is no rate of return guarantee to a CB plan in which participants receive a minimum return of 5 percent. According to pension accounting rules, this comes at no additional cost to the government or the taxpayer. This is a view that financial economists believe is absurd. But using the common Black-Scholes options pricing formula, we can find the answer.

We begin by assuming a purchase price of \$6,150, the annual contribution for a worker earning \$50,000. The "strike" or guaranteed price would be \$6,458, the riskless return 0.1 percent and the standard deviation of investment returns 13.8 percent. Given these parameters, a put option guaranteeing a 5 percent return over one year would cost around \$518. In private markets, this is what buyers would be willing to pay for that guarantee and what sellers would demand to provide it. So, in addition to the implicit employer contribution of 7.5 percent of wages, Nebraska is providing its employees with an implicit put option that in this case is worth around 1 percent of pay. Financial economists almost universally believe that the cost of this implicit guarantee should be placed "on the books" and considered as part of employees' overall compensation.

Certainly private sector workers — not to mention the Nebraska employees who remain in the pure DC plan — would be very happy to receive such a guarantee on their 401(k) investments.

The typical response from public pension managers is that pensions can think “long term” and so the measured costs of these rate of return guarantees don’t apply. After all, the typical employee doesn’t hold his investments for only one year but for around 20 years, and over longer periods returns even out such that these guarantees are effectively costless to the employer. This is the so-called principle of “time diversification,” which public pension actuaries sometimes cite in defense of their accounting rules. Unfortunately, that thinking is totally at variance with the prices actual financial markets charge as the time period of a guarantee grows longer.

To illustrate, let’s recalculate our example over a 20-year time period; based on a 5 percent return compounded over 20 years, the guaranteed end balance rises to \$16,318. The standard deviation of annual returns stays at 13.8 percent, but the riskless return rises to 2.8 percent based on Treasury yields of that duration. Contrary to pension’s claims, however, the cost of the guarantee goes *up* rather than down — over a 20-year period, it would cost \$10,000 to purchase a put option guaranteeing that an initial investment of \$6,150 can be claimed for no less than \$16,318. Over this time period, the implicit subsidy from Nebraska’s government to public employees is worth around 20 percent of salaries — a very large increase.

Why is this the case? Why is it that the conventional wisdom that stocks grow *less* risky over time is wrong? To be technical, pensions and public pension actuaries rely on the fact that the standard deviation of returns — which, again, is a common measure of market risk — declines over longer holding periods. But this ignores the fact that the effects of compounding trump the effects of lower risk. Indeed, a simple internet search on the phrase “time diversification” will often pair it with the words “fallacy,” “myth” and other such hints that caution should be used in applying the theory to multi-billion dollar investments. Even the investment firm Vanguard — well-known as an advocate of buy-and-hold investing — states that “there is little evidence to support the notion that time moderates the perceived volatility inherent in risky assets.”⁵

To illustrate, consider an investor holding stocks over

various time periods. If that investor holds stocks for one year and receives a rate of return one standard deviation below the mean, he would end up with around 19 percent less than someone who received the average return. Over five years, a person who received a return one standard deviation below the mean would end up with 35 percent less, and over 10 years 45 percent less. And on and on.

What this shows is that the effect of a relatively low return compounded over many years trumps the decline in the variation in annual returns. The standard deviation of annual returns may decline over longer holding periods, but the standard deviation of the total return — that is, the actual end values of the investment — grows larger, and it is the total return that matters. This explains why guarantees against low market returns — which should be less expensive over long periods, if the time diversification argument is correct — actually grow *more* expensive.⁶

Implications for Plan Funding

These issues have important implications for how we view the funding health of the Nebraska CB program. Nebraska reports that as of January 1, 2011 the CB plan held “actuarial assets” of approximately \$714 million and had liabilities of approximately \$763 million.⁷ Together, these make the plan around 93.6 percent funded.

In reality, the actual market value of Nebraska’s assets was only around \$689 million. The actuarial value “smooths” returns over time, which may be acceptable for the purpose of deciding annual contributions but gives a misleading view of the actual funding health of a plan at any given time. Using the market value of assets would reduce the Nebraska CB plan’s funding ratio to about 90.4 percent.

But these figures exclude the value of the rate of return guarantee on CB account balances. To approximate this, we take the current value of account balances of \$766 million and project it forward 25 years. For an ongoing pension with many older participants, the average benefit liability takes place around 15 years in the future.⁸ However, Nebraska’s CB plan is quite new, meaning that most of its liabilities will take place in the more distant future. To approximate that, we assume a longer average duration for the rate of return guarantee. Assuming a 5 percent minimum return, this future figure equals \$2,594 million. That is the amount that current account balances are guaranteed to equal after 15 years. We

calculate the value of the implicit put option using a riskless return of 2.44 percent (the average of Treasury yields over 10 and 20 year durations) and an assumed volatility of investment returns of 13.8 percent. The value of this rate of return guarantee is \$581 million. The current assumed rate of return for Nebraska's defined benefit plans is 8 percent while the assumed rate for cash balance plans is 7.75 percent.

Adding this to the current pension liabilities of \$751 billion produces a total of \$1,332 million. Utilizing the \$689 million market value of assets makes the Nebraska CB plan currently around 52 percent funded. Plan managers will almost certainly protest that this figure is incorrect. What they cannot deny, however, is that this is how financial economists and financial markets would value the plan's liabilities. Were the CB plan to contract with an insurance company to take over its pension obligations — a practice that is not cost-effective in the U.S. due to IRS tax rules but which is common in the United Kingdom⁹ — the figures we calculate here would be a best guess as to how much an insurance company would charge. Put simply, an insurer is not going to guarantee participants a 5 percent minimum return for free. Public pension accounting rules act as if they could or would.

This being pointed out, pensions and public pension actuaries fall back on a second argument that government is “different” and therefore can ignore the costs of these implicit rate of return guarantees. This argument finds very little support among economists. First, part of the “government is different” argument rests on government having longer time horizons which, as the above discussion shows, does not reduce the cost of guaranteeing against low market returns. Second, even to the degree that government operates differently than a private corporation, this does not make risks and the costs associated with them go away. Economic research has shown that government can ignore risk for investments that are small and uncorrelated with the tax base.¹⁰ Hundreds of billions of dollars in stocks and other risky assets definitely do not meet this criterion.

Third, it is generally the position of economists to view government — like a corporation — as a “pass through” entity in which risks and rewards flow to various stakeholders, such as taxpayers, bond holders, public employees, beneficiaries of government programs, and so forth. As the Congressional Budget Office points out, “The government does not have a capacity to bear risk on its

own.”¹¹ Rather, government *transfers* risk between different stakeholders. The implication of this, as CBO has argued in contexts ranging from student loan guarantees, to bank deposit insurance, to guarantees against market risk for Social Security personal accounts, is that governments should value risk the same way that their stakeholders do, using market signals and market prices.¹²

Moreover, even if the government could generate high returns without risk, it does not mean that this implicit subsidy to employees should remain off the books. Labor economists believe in a principal called “equalizing differences” which argues that if one aspect of employee compensation is increased — say, by giving workers a rate of valuable return guarantee on their pension contributions — that other aspects would be reduced. However, we cannot know whether this has taken place unless we have an accurate accounting of the value of the implicit subsidy under the Nebraska CA plan.

Transparency

Even then, however, cash balance plans have significant advantages over traditional defined benefit pensions. A key advantage is transparency. While CB plans should calculate and disclose the value of the rate of return guarantee they grant to public employees, the simple fact that this guarantee is made explicit may cause CB plans to act more responsibly than traditional DBpensions.

Public sector DBplans base their contributions upon the rate of return they expect to receive on the plan's investments. In most cases this is around 8 percent; Nebraska is slightly lower at 7.75 percent. What this means from the employee's point of view is that the plan guarantees them an average return of 8 percent on their contributions and their employer contributions. This is a truly massive undisclosed subsidy given that private sector workers with 401(k)-type plans can currently earn guaranteed returns through Treasury securities of well less than 4 percent. Over the course of a full working lifetime, public sector DBpensions offer benefits multiples higher than a typical private sector worker could expect to receive. As shown above, the actual return a worker receives under a DBplan can vary based on the length of their work career, but the overall average will equal the interest rate assumed

by the plan.

In theory, CB plans could offer the same 8 percent rate of return guarantee as DBplans. There is nothing in pension accounting that prohibits or even discourages CB plans from doing so, since the cost of these guarantees is neither calculated nor disclosed. The only difference between a DBplan and a DC plan is in the distribution of returns between short- and long-tenured employees, which matters to employees but not to the plan's financing.

But, the sheer implausibility of explicitly guaranteeing 8 percent returns, year after year, in an interest rate environment when the riskless return on Treasuries ranges from approximately zero over the short-term to only around 3 percent over 30 years may encourage policymakers to act more responsibly.

Pure Defined Contribution Pensions

An alternative to both traditional DB pensions and cash balance plans is a pure defined contribution pension, but this does not necessarily mean a plan identical to what most private sector workers participate in through a 401(k) or 403(b) plan. In addition to the ubiquitous 401(k) plan used in the private sector, federal employees invest through the DC Thrift Savings Plan, which addresses many of the shortcomings of 401(k) plans. In addition, many state university employees participate in DC pensions through TIAA-CREF. There are DC models in existence that function well.

The main advantages of DC plans are portability (to the employee) and transparency (to the taxpayer). Like a CB plan, a DC pension can be shifted from job to job as the assets belong to the employee. Vesting periods are brief when it comes to employer matching funds and non-existent when it comes to an employee's own contributions. There is a simple fairness in giving employee's ownership in the funds they have themselves contributed. In addition, a DC approach may help in recruiting mobile employees who do not plan to stay in public employment over a full working career.

DC plans are also far more transparent than either DB or CB pensions. The employer provides a match to employee contributions based on a set formula. There is no further

obligation on the part of the employer and no opportunity for policymakers to understate costs through actuarial assumptions or by exploiting accounting rules. Unlike DBplans, at the end of each year it is very clear to employees and taxpayers whether the government has met its obligations. And because the employer payment is stable, there is less risk of pension costs varying greatly from year to year.

DC pensions have been criticized on a number of fronts. Unlike DBplans, which are effectively mandatory, many employees fail to sign up for voluntary DC pensions. Likewise, many employees fail to choose an investment for their contributions and are defaulted into a very low-risk fund, such as a money market account. Moreover, some of those who do choose an investment fail to monitor it over time, such that they take too little risk when young and too much when they are nearing retirement. Investment management fees in 401(k) plans may be high, reducing the returns employees receive on their contributions. Finally, most private sector DC pension plans do not offer annuities as an option at retirement, making it more difficult for employees to convert their account balances into an income that lasts as long as they live.

But the federal Thrift Savings Plan addresses these issues. The TSP now automatically enrolls new hires in the program, with a default contribution rate of 3 percent of salaries. While the default investment vehicle is a low-risk Treasury bond fund, TSP is considering shifting toward automatic investment in a "life cycle" fund. These funds, which are already available as an option for participants, automatically shift from stocks to bonds as the worker nears retirement. This prevents those who fail to monitor their investments from taking too little — or too much — risk. TSP's life cycle funds, like its other investment options, are based on so-called "index funds" that track returns on various market indices, such as the S&P 500, small company stocks, or corporate bonds. These index funds are offered at extremely low cost, such that management fees are not an issue. And finally, the TSP offers a variety of annuity options at retirement, allowing retiring federal workers to easily and inexpensively convert a lump sum into a lifetime income — including provisions for survivors' benefits and inflation adjustments. Overall, federal employees appear happy with the TSP. It could serve as a

model for DC pensions for state and local government employees as well.

Summary and Conclusions

Cash balance CB pensions combine aspects of both traditional defined benefit plans with those of the defined contribution pensions that dominate in private employment. CB plans offer important advantages over DB plans in being more attractive to young, mobile employees and in reducing “job lock” that prevents burned out or physically ailing mid-career workers from shifting to jobs that better suit them. CB plans also are more attractive in retaining workers who are eligible for retirement, who would suffer significant financial losses if they continued to work while under a DB plan.

CB plans also offer greater financial transparency than DB plans by making their rate of return guarantees explicit and easier to understand. This transparency may encourage policymakers to be more responsible in granting rate of return guarantees that future taxpayers may be called upon to fulfill.

However, CB pensions are subject to the same accounting flaws that hide costs for traditional DB plans. We show here that Nebraska’s CB plan, which is reported to be 95 percent funded, is only around 50 percent funded under accounting that measures both the market value of the plan’s assets and the value of the 5 percent minimum rate of return guarantee granted to participants. While public pensions dismiss this so-called market valuation, they do so at the taxpayer’s peril. Market approaches have been endorsed by Nobel Prize winning economists, the Federal Reserve and the Congressional Budget Office, making defenders of current pension accounting rules an increasingly beleaguered minority. At the very least, pensions should disclose the market value of plan liabilities in order to better inform policymakers, taxpayers’ and financial markets of the true extent of the government’s liabilities.

A better approach might be to shift public employees toward defined contribution pension plans, which currently serve most private sector workers. DC plans are by far the most transparent and the least susceptible to gaming by employees and policymakers alike. And with design innovations based on federal government employees’

Thrift Savings Plan, public sector DC pensions can serve as a model for private sector 401(k) plans to follow.

Endnotes:

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5 Vanguard Investment Counseling & Research. “Time Diversification and Horizon-Based Asset Allocations.” 2008.

6 Bodie, Zvi, “On the Risk of Stocks in the Long Run,” *Financial Analysts Journal*, May-June 1995.

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8 See M. Barton Waring. “Liability-relative investing.” *Journal of Portfolio Management* 30(4).

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10 Arrow, Kenneth J. and R.C. Lind. “Uncertainty and the Evaluation of Public Investment Decisions”, *American Economic Review*, Vol. 60, 1970.

11 Congressional Budget Office. “Estimating the Value of Subsidies for Federal Loans and Loan Guarantees.” August 2004. This article contains an extensive discussion of the treatment of risk of government programs, extending beyond federal loan guarantees. See also *Budget of the United States Government, Fiscal Year 2004: Analytical Perspectives*, “Railroad Retirement Board Investments,” p. 471; and Congressional Budget Office, “Evaluating and Accounting for Federal Investment in Corporate Stocks and Other Private Securities,” January, 2003.

12 For background, see Deborah Lucas and Marvin Phaup. “The Cost of Risk to the Government and Its Implications for Federal Budgeting.” Forthcoming in *Measuring and Managing Federal Financial Risk*, published by National Bureau of Economic Research.

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