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Unfunded Liabilities of State and Local Government Employee Retirement Benefit Plans

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by Courtney Collins and
Andrew J. Rettenmaier

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Investors breathed a tentative sigh of relief in recent months as they watched their retirement accounts make up for lost ground. Just a few months earlier, as they watched their 401(k)s weather dramatic stock market swings, many may have wished they were covered by a defined benefit pension plan from their employer (or union).

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Executive Summary

Many state and local governments offer employees defined benefit pension plans, which promise a set lifetime retirement income based on wages and longevity. In contrast, income from defined contribution retirement plans — such as 401(k)s — depends on past contributions, the rate of return on those contributions and future returns. Pension plans are perceived as relatively risk-free because they are prefunded, to some degree, and their benefit payouts are not dependent on the stock market. In addition, taxpayers act as de facto insurers for government pension plans.

Many state and local government pension plans' liabilities are calculated using discount rates that are not commensurate with the risk they may pose to taxpayers. Accounting standards allow pension funds to calculate their liabilities using a discount rate comparable to the expected rate of return on the funds' assets. This typically high discount rate tends to reduce the size of a pension plan's accrued liabilities. However, pensioners have a durable legal claim to receive their benefits and consequently, it is more appropriate to use a lower discount rate in calculating the plans' accrued liabilities.

Due to the use of high discount rates, the liabilities of state and local government pension plans are underestimated. For example, recent reports by the Pew Center on the States and others indicate that assets will cover about 85 percent of the pension benefits owed to participants. But other studies that adopted lower discount rates have found liabilities may actually be 75 percent to 86 percent higher than reported. As a result, taxpayers' role as insurer may be much greater than anticipated.

In addition to pension benefits, state and local governments often also provide other retirement benefits, especially postretirement health care benefits. These nonpension postemployment benefits include such things as health insurance, dental and vision insurance, and prescription drug plans. Unlike pension plans, most of these nonpension benefit plans are completely unfunded. That is, assets are not being set aside to fund the obligations. The

Pew Center on the States reports that nonpension benefit unfunded liabilities across all states were about $537 billion in 2008. Our estimates of the reported unfunded liabilities of state and local governments for pensions and other postemployment benefits total $1.03 trillion, but when these unfunded liabilities are recalculated using a more appropriate discount rate, the total unfunded accrued liabilities is much higher.

We analyzed 153 state and local pension plans, representing more than 85 percent of liabilities for state and local pensions and other benefits, and recalculated their liabilities using a lower discount rate. Our calculations show:

- Unfunded pension liabilities are approximately $2.5 trillion, compared to the reported amount of $493 billion.
- Unfunded liabilities for health and other benefits are $558 billion, compared to the reported $537 billion.
- Thus, total unfunded liabilities for all benefit plans are an estimated $3.1 trillion — nearly three times higher than the plans report.

To put these liabilities in context, state and local governments' reported unfunded obligations under pension and other benefit plans amounting to 7.1 percent of U.S. gross domestic product (GDP) in 2008. When adjusted using a more appropriate discount rate, however, states' unfunded obligations were 22 percent of U.S. GDP. All but 10 states and the District of Columbia have total adjusted unfunded liabilities above 15 percent of their state GDP, and four states — Alaska, Hawaii, New Jersey and Ohio — have adjusted unfunded liabilities above 35 percent of their state GDP.

About the Authors

Dr. Courtney A. Collins is an assistant professor of economics at the Stetson School of Business at Mercer University. Her fields of specialization are public economics, economics of education and applied microeconometrics. Her current research interests include state and local pension funding, class size reduction policies and student ability tracking programs. Dr. Collins previously worked as a Graduate Student Research Associate with the Private Enterprise Research Center at Texas A&M University. She has coauthored several studies with Dr. Andrew Rettenmaier examining policy issues such as public pension liabilities and Medicare spending.

Dr. Andrew J. Rettenmaier is the Executive Associate Director at the Private Enterprise Research Center at Texas A&M University. His primary research areas are labor economics and public policy economics with an emphasis on Medicare and Social Security. Dr. Rettenmaier and the Center's Director, Thomas R. Saving, presented their Medicare reform proposal to U.S. Senate Subcommittees and to the National Bipartisan Commission on the Future of Medicare. Their proposal has also been featured in the *Wall Street Journal, New England Journal of Medicine, Houston Chronicle* and *Dallas Morning News*.

Dr. Rettenmaier is the co-principal investigator on several research grants and also serves as the editor of the Center's two newsletters, PERCspectives on Policy and PERCspectives. He is coauthor of a book on Medicare, The Economics of Medicare Reform (Kalamazoo, Mich.: W.E. Upjohn Institute for Employment Research, 2000) and an editor of Medicare Reform: Issues and Answers (University of Chicago Press, 1999). He is also coauthor of Diagnosis and Treatment of Medicare (Washington, D.C.: American Enterprise Institute Press, 2007). Dr. Rettenmaier is a senior fellow with the National Center for Policy Analysis.

Introduction

Investors breathed a tentative sigh of relief in recent months as they watched their retirement accounts make up for lost ground. Just a few months earlier, as they watched their 401(k)s weather dramatic stock market swings, many may have wished they were covered by a defined benefit pension plan from their employer (or union). Such pension plans promise a set lifetime retirement income, based on wages and longevity with an employer, whereas the income from defined contribution plans — such as 401(k)s — depends on past contributions, the rate of return on those contributions and future returns. Pension plans are perceived as safe, but the value of the benefits they promise depends on how well they are funded and, importantly, on how well they are insured. In the case of state and local government pensions, taxpayers play the role of insurer.

Besides pensions, state and local governments often provide other retirement benefits, primarily in the form of health care coverage. These nonpension postemployment benefits include such things as health insurance, dental and vision insurance, and prescription drug plans. Some government employers also offer life insurance. But most of the costs are due to health care. Previously, government entities only reported the annual cost of retiree nonpension benefits, but in 2004 the Government Accounting Standards Board (GASB) addressed the concern that employees' accrued benefits were reaching alarming magnitudes but were not reported in the governments' financial statements. The GASB issued statements 43 and 45 requiring state and local governments to report health care and other nonpension benefit liabilities, though they are not required to prefund them.

Plans' unfunded liabilities are larger than reported.

Unlike the pension plans, health care and other benefits are almost entirely unfunded. That is, assets are not being set aside to fund the obligations. Recent estimates indicate that reported liabilities for health care and other benefits across all states are over $500 billion — an amount that rivals the reported unfunded obligations of pension plans.

Recent Estimates of State and Local Government Pension and Other Postemployment Benefit Liabilities

The GASB allows government pension plans to use the expected rate of return on their assets to discount their accrued liabilities. Several recent studies have raised concerns about the use of these discount rates because they are typically high and may not reflect the risks of the liabilities being calculated. A discount rate is used to determine the current value of future obligations. A high discount rate tends to reduce the size of a pension plan's accrued liabilities. Recent reports by state and local government pension plans indicate that their assets will cover about 85 percent of the accrued pension benefits owed to participants. However, using lower discount rates, which are more appropriate given the nature of pension liabilities, recent studies estimate that liabilities are 75 percent to 85 percent higher than reported. Consequently, the ratio of assets to accrued benefit payouts is 37 percent to 45 percent, rather than 85 percent. Thus, the recognized role of taxpayers as insurers is much larger under alternative estimates.

Pew Center Estimates. In February 2010, the Pew Center on the States published "The Trillion Dollar Gap," a report detailing unfunded pension and other postemployment benefit obligations by state. The study provides aggregate state-level data from 231 pension plans and 159 health care and other benefit plans. In addition to measuring the liabilities, it reports the extent to which each state is meeting its required annual funding for the plans.

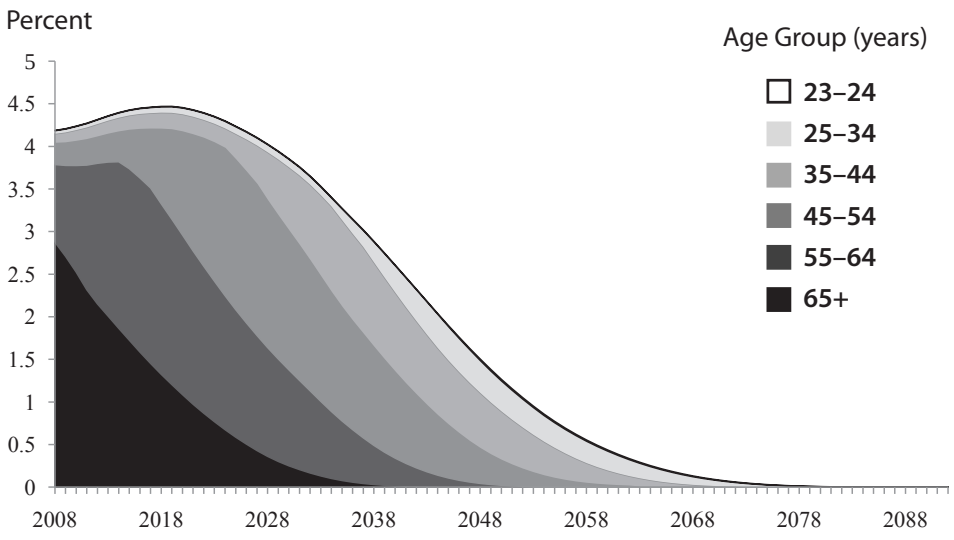
According to the Pew study, there is a "trillion dollar gap" in funding state and local government employee retirement benefits:

- In 2008, total pension liabilities amounted to about $2.77 trillion and reported assets were approximately $2.31 trillion; thus, 84 percent of pension liabilities are

FIGURE I

Age Composition of Accrued Social Security Liabilities Over Time

(as percentages of gross domestic product)



Source: Authors' calculations based on *2008 Social Security Trustees Report.*

funded, leaving unfunded liabilities of $452 billion.

- In contrast, total liabilities for retiree health and other benefits were $587 billion, but assets only amounted to $32 billion; thus, 5 percent of health benefits are funded, leaving unfunded liabilities of $555 billion.[1]

- Thus, total accrued retiree pension and nonpension benefits across the states total $3.35 trillion but only $2.35 trillion in assets have been set aside.

Public Fund Survey for Fiscal Year 2008. The Public Fund Survey from the National Association of State Retirement Administrators reports assets, liabilities and unfunded liabilities for 125 of the largest state and local pension plans. In 2008, these plans accounted for about 85 percent of all plan participants and assets. The survey reported total assets were about $2.58 trillion and total liabilities were about $3.02 trillion, for a funding ratio of 85 percent. The unfunded liability was $442 billion.[2] These amounts are similar in magnitude to those reported in the Pew study, with the discrepancies due to different reporting dates and plans surveyed.

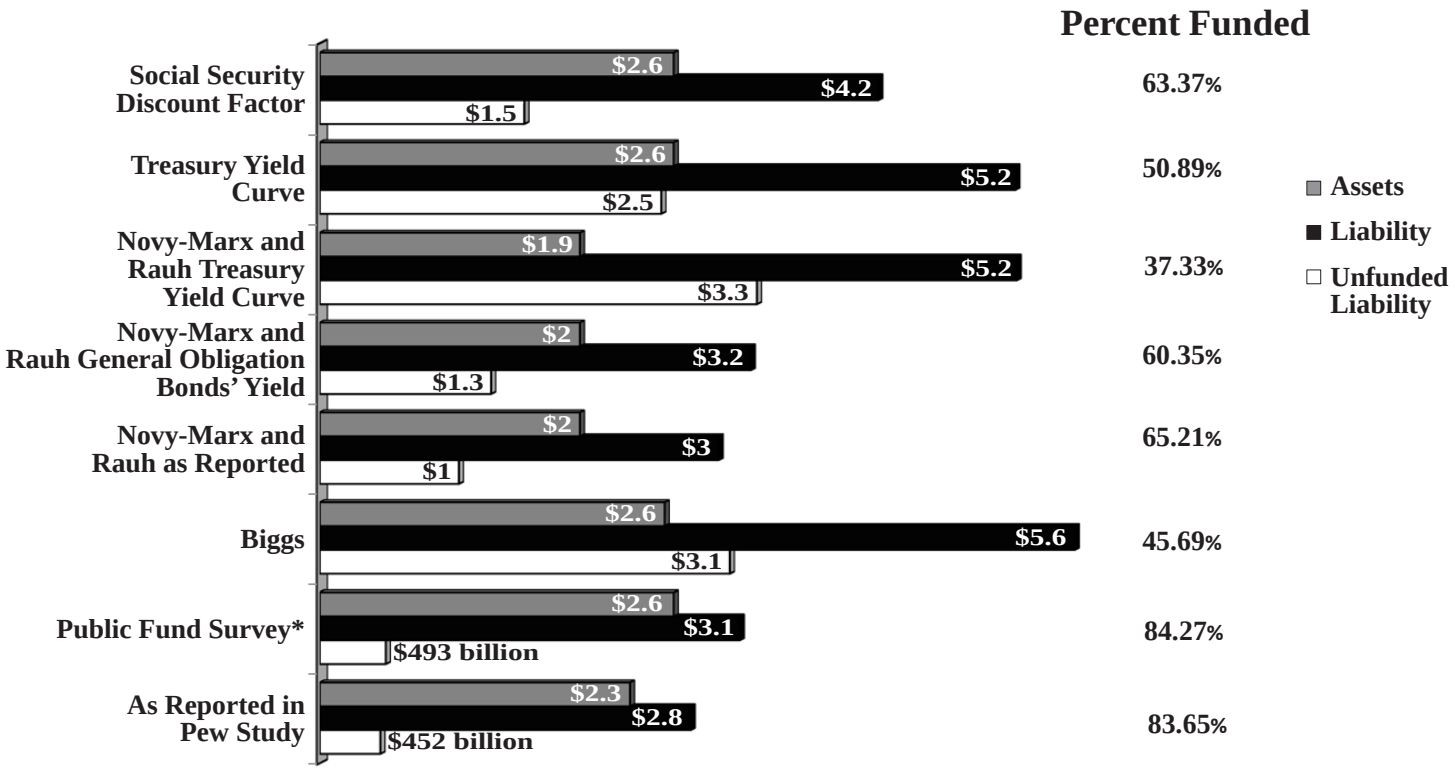
Alternative Estimates of State and Local Pension Liabilities. How risky are accrued pension liabilities? Can state and local governments default on their accrued pension obligations? These questions are separate from whether state and local governments can change future accruals for current participants or the benefit formula for future plan participants. Jeffrey Brown and David Wilcox note that state and local pensioners enjoy substantial legal standing, making the receipt of benefits almost risk free.[3] Thus, from the perspective of taxpayers, the appropriate discount rate is the government borrowing rate. This rate matches the risk to the taxpayers of the underlying accrued pension liability.

Robert Novy-Marx and Joshua Rau recently estimated the pension liabilities for 116 state-level pension plans using two alternative discount rate series.[4] The plans reported aggregate pension liabilities of $2.98 trillion. Novy-Marx and Rau estimated the plans' total assets are $1.94 trillion, producing a funding ratio of 65 percent. However, they recalculated the liabilities using discount rates based on the interest rates state governments pay on their own bonds and based on the term structure of U.S. Treasury securities. When recalculated using state-specific discount rates, the pension liabilities increase 7.7 percent to $3.21 trillion, meaning there are $1.27 trillion in unfunded liabilities. When recalculated using discount factors derived from the U.S. Treasury securities' yield curve, the aggregate liabilities rise almost 75 percent to $5.2 trillion, and the funding ratio drops to only 37 percent.[5] The unfunded liabilities using this discount factor increase to $3.3 trillion.

Andrew Biggs also recalculated government pension plans' liabilities but used a different method.[6] He first estimated the likelihood that individual pension plans' assets

FIGURE II

Comparison of Aggregate State and Local Pension Liabilities Across Studies, 2008 (in trillions)



Sources: Pew Center on the States, "The Trillion Dollar Gap: Underfunded States Retirement Systems and the Roads to Reform," February 2010. Available at http://downloads.pewcenteronthestates.org/The_Trillion_Dollar_Gap_final.pdf. Keith Brainard, "Public Fund Survey: Summary of Findings for FY 2008," National Association of State Retirement Administrators, October 2009. Available at http://www.publicfundsurvey.org/publicfundsurvey/pdfs/Summary_of_Findings_FY08.pdf. Andrew G. Biggs, "An Options Pricing Method for Calculating the Market Price of Public Sector Pension Liabilities," American Enterprise Institute, Working Paper No. 164, February 26, 2010. Robert Novy-Marx and Joshua D. Rauh, "Public Pension Promises: How Big Are They and What Are They Worth?" Working Paper, December 2009. And authors' calculations.

* The Public Fund Survey set of pension plans has been updated and ammended.

will cover accrued benefits and found that the typical plan has a 16 percent probability of covering expected payouts. Likening the implied pension guarantees to a put option — the right of a holder to sell a certain amount of stock — he recalculated the liabilities using an option pricing method.[7] Using this method, and a nominal discount rate of 3.6 percent, he found that liabilities rise to an estimated $5.6 trillion, resulting in a funding ratio of 45 percent.[8] Unfunded liabilities equal about $3.1 trillion under Biggs' calculations.

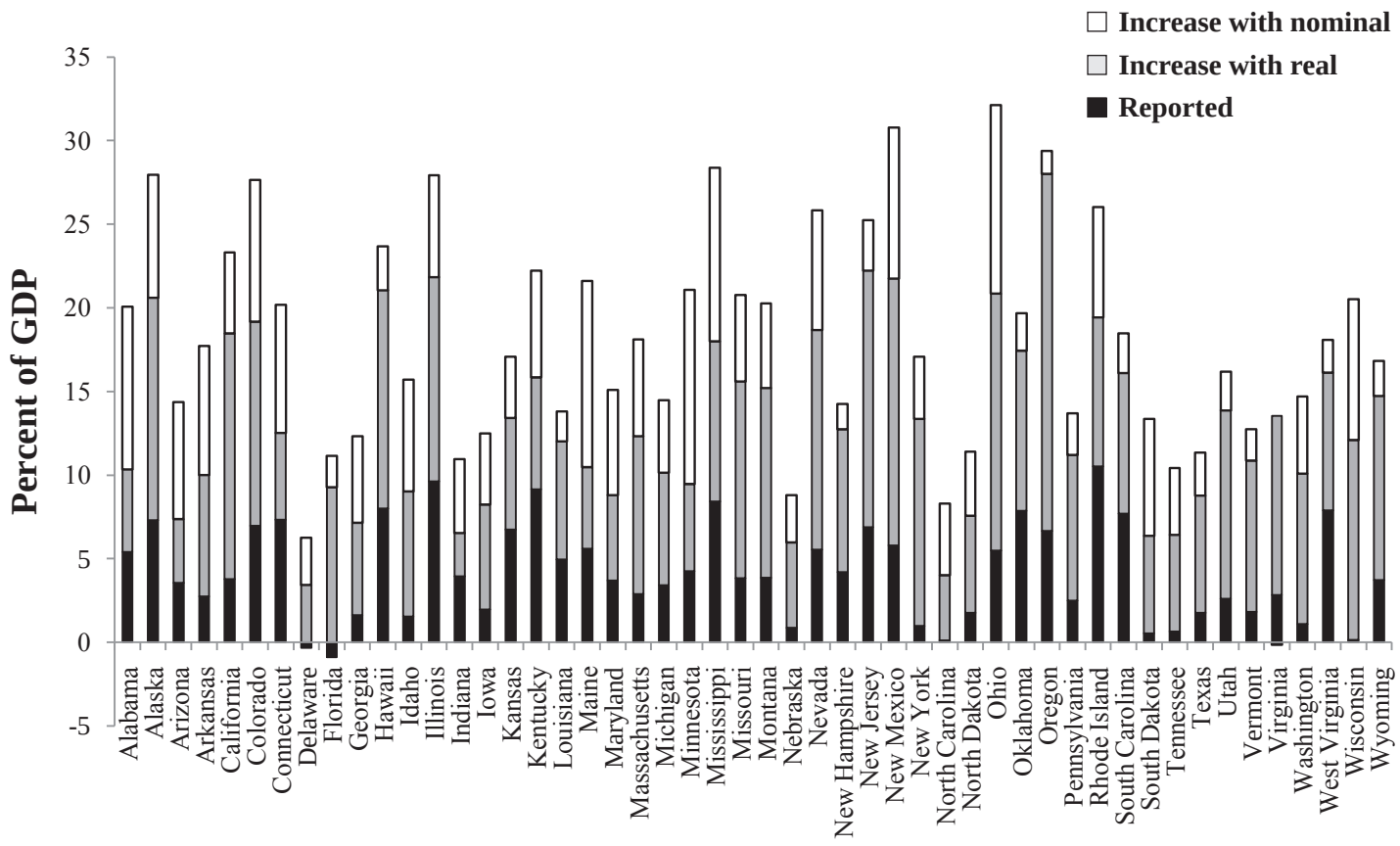
New Estimates of State and Local Pension Plan Liabilities

We analyzed a total of 153 plans, including the 125 plans examined in the 2008 Public Fund Survey.[9] Based on the plans' data, their total pension liabilities are $3.1 trillion and total pension assets are $2.6 trillion, for a funding ratio of 84 percent. Their unfunded liabilities are about $493 billion. Using other discount rates to calculate the liabilities requires estimating the future annual accrued benefit payments for each plan.

The reported liabilities for each plan can be thought of as

FIGURE III

Unfunded Pension Liabilities as a Percentage of State GDP in 2008 (reported and calculated using real and nominal yield curves)



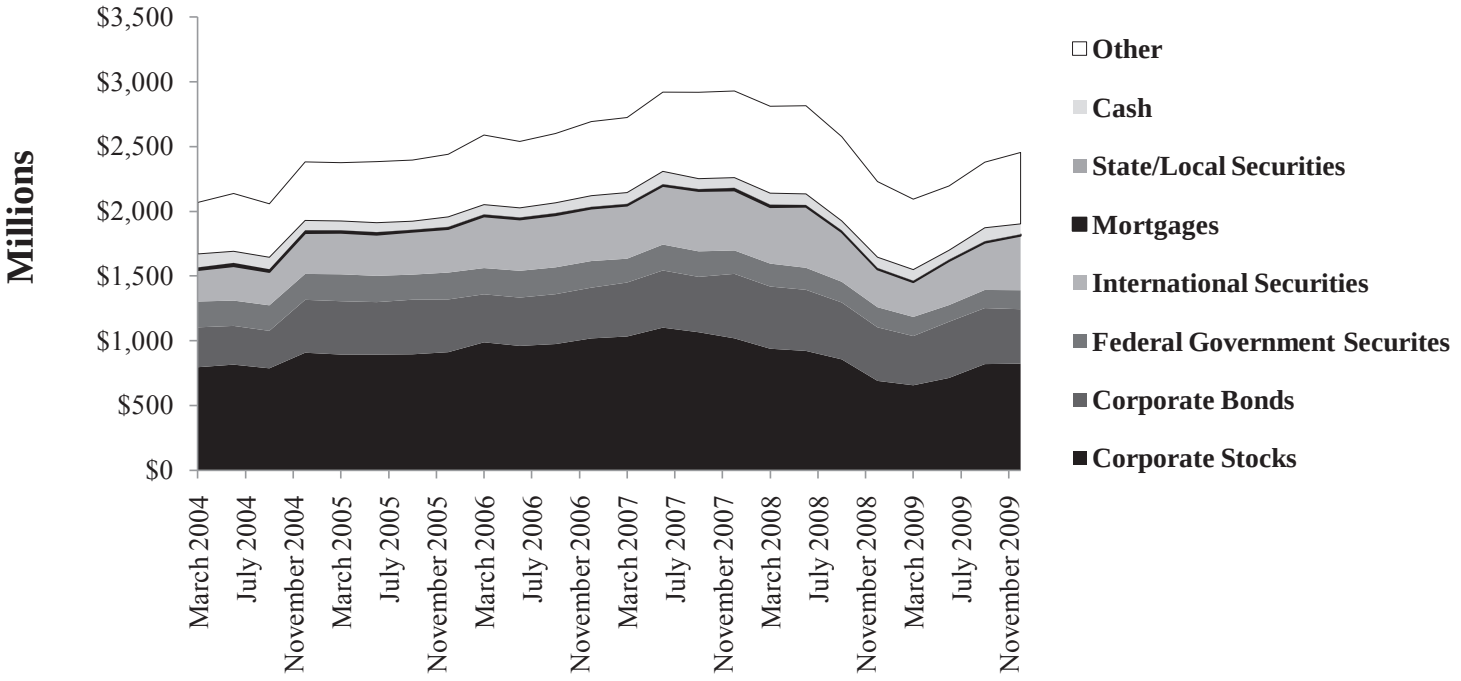
Sources: Keith Brainard, "Public Fund Survey: Summary of Findings for FY 2008," National Association of State Retirement Administrators, October 2009. Available at http://www.publicfundsurvey.org/publicfundsurvey/pdfs/Summary_of_Findings_FY08.pdf. And authors' adjustments and calculations.

the present value of future annual benefit payments based on accrued benefits as of 2008. The studies mentioned previously also estimate future annual benefit streams for each of the plans they consider. For example, to generate plan-specific future accrued benefit series, Novy-Marx and Rauh collected data on the plans' benefit formulas, composition of participants (including wages, ages and years of service), mortality and job tenure assumptions, cost of living assumptions and salary growth. They used these data to produce a stream of annual benefits calibrated to yield the reported liability using the reported discount rate assumption.[10] They then discounted the plan-specific benefit series using their two discount rate assumptions.

For our estimates, we identified an annual benefit payment series for each pension plan using an estimate of the plan's initial benefit payments in 2008, actuarial liability and investment return combined with estimates of annual accrued Social Security benefits by age group.[11] The time path of annual accrued Social Security benefits are used as an initial proxy for the time path of workers' accrued pension benefits in the government plans. Ultimately we derived a time

FIGURE IV

Composition of State and Local Pension Plans' Assets



Source: U.S. Census Bureau, Government Division Finances of Selected State and Local Government Employee Retirement Systems, Table 1.

series of annual benefit payments that results in the reported liability when discounted at the reported rate of return on investments

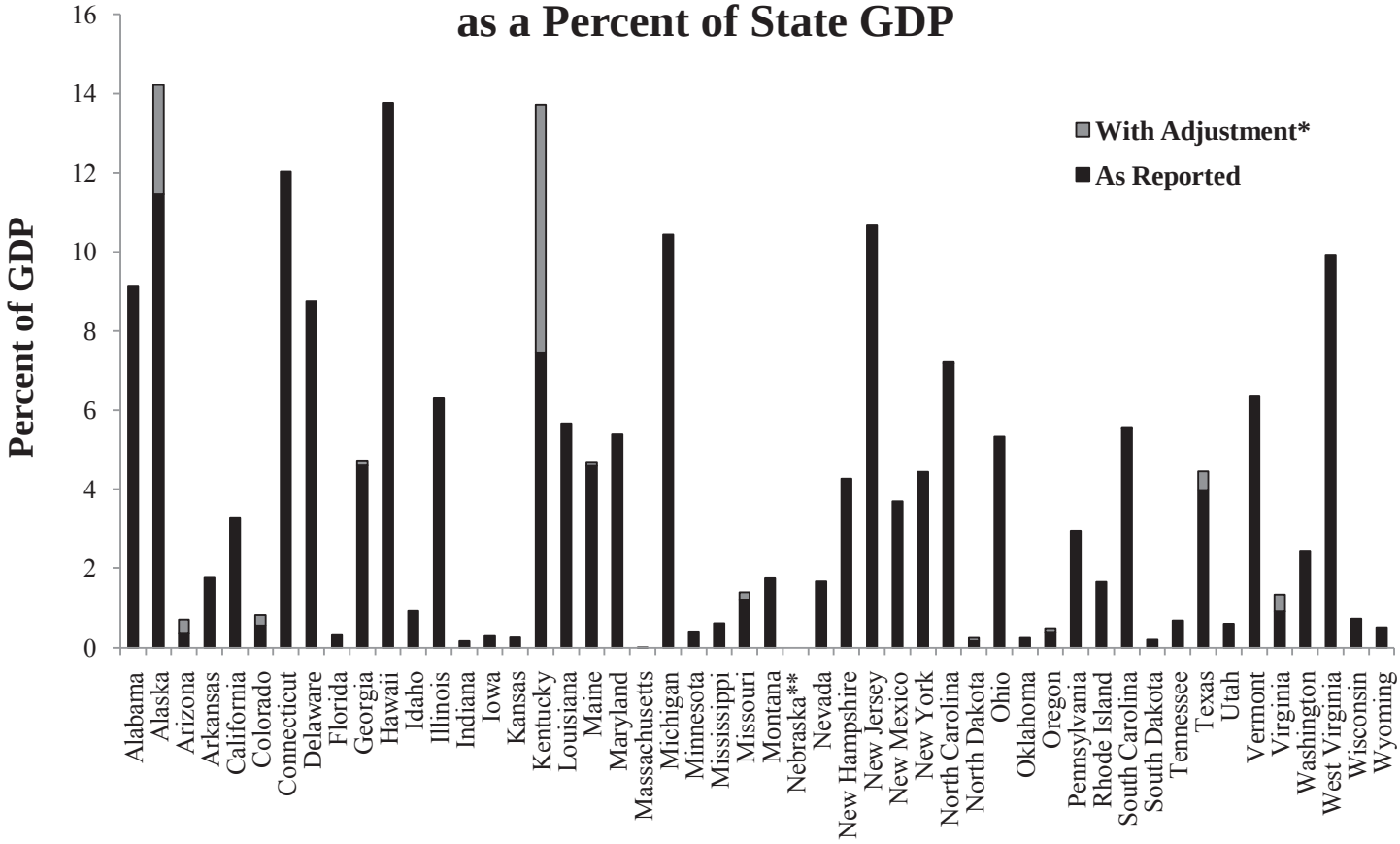
Figure I presents the age composition of accrued Social Security benefits based on the 2008 Trustees Report — the same year as the Public Fund Survey data.[12] The figure shows the age composition of the Social Security benefits that workers accrued as of 2008 and the payout of those benefits over time. It assumes there is no change in law affecting the level of benefits and it does not include additional benefits accruals. For each pension plan we varied the age composition of the accrued Social Security benefits series (converted to nominal dollars) to produce an index that begins at one in 2008. Each plan's initial benefit payments were then indexed for future years. The age composition was varied for each plan until the present value of the indexed series calculated using the reported investment rate of return equaled the reported pension liability.[13] The final series for each pension plan was then used to recalculate the liability with alternative discount rates.

Using the Appropriate Discount Rate. The appropriate discount rate depends on the nature of the liability. We recalculated the liabilities using four discount rate series: two nominal rates and two real (inflation-adjusted) rates. The two nominal series are considered first for comparability with other estimates. The first series is the discount rate series from Table VI. F6 in the 2008 Social Security Trustees Report. This series is based on the Trustees' ultimate real discount rate assumption of 2.9 percent and the ultimate inflation rate assumption of 2.8 percent per year. The other discount factor series follows Novy-Marx and Rauh's use of the term structure of the nominal yields on U.S. Treasury securities. Our term structure is based on monthly averages from July 2004 to August 2008.[14]

Figure II compares our aggregate estimates of the pension funds' liabilities to the estimates in the other

FIGURE V

Unfunded Other Postemployment Benefit Liabilities as a Percent of State GDP



* Plans using discount rates of 7 percent or higher were recalculated using discount factor based on the nominal Treasury yield curve.
** Nebraska does not report other postemployment benefit liabilities.
Sources: States' and plans' comprehensive annual financial reports for reported unfunded liabilities and authors' recalculation of liabilities for the subset of plans with reported discount rates of 7 percent or higher.

studies, including the Pew study and the Public Fund Survey. Our estimate of the total liability based on the nominal Social Security discount factor is $4.2 trillion, with a net unfunded liability of $1.5 trillion. The funding ratio of assets to liabilities is 63 percent. Recall that the liabilities were recalculated for the plans in the Public Fund Survey, for which the reported aggregate liability was $3.1 trillion. Thus the lower nominal discount rate of approximately 5.8 percent (compared to the modal, or most frequent, discount rate of 8 percent) produces a liability that is a third larger.

Using the discount factor based on the yield curve, our estimate of the total liability is $5.2 trillion, or 66 percent larger than the actuarial estimates in the plans' annual reports. The net unfunded liability is $2.5 trillion. This increase in the total liability relative to the reported liability is in the range of the increase estimated by Novy-Marx and Rauh (75 percent increase using the yield curve) and Biggs (86 percent increase using the option pricing method and a nominal discount rate of 3.6 percent).

We also estimated the liabilities using real (inflation-adjusted) discount rates and real estimates of future pension payments. The use of real discount rates is based on the observation that the discount rates used by the individual pension plans assume higher inflation rates than the Social Security Trustees assume. The nominal discount rates in our previous

estimate were also higher than the implied inflation rate based on a comparison of the nominal Treasury yields and the yields on Treasury Inflation-Protected Securities. The most frequent nominal discount rate among the pension plans is 8 percent and the most frequent inflation assumption is 3.5 percent. Thus, the most frequent real rate of return is in the range of 4.5 percent.

However, the nominal Treasury yields relative to the yields on Treasury Inflation-Protected Securities indicate that the implied real interest rate for the period from 2004 to 2008 was less than 2 percent, and the anticipated inflation rate was about 2.35 percent. Because the inflation rate anticipated by the pension plans is higher than the rate implied by the relative yields on the Treasury Inflation-Protected Securities, the nominal Treasuries and the inflation rate assumed by the Trustees, the recalculated liabilities are higher than they would be if the inflation estimates were the same.

The recalculated aggregate pension liability based on the real Social Security discount factor is $3.9 trillion; it is $4.5 trillion based on the yield curve from the Treasury Inflation-Protected Securities. While not as high as the liabilities using the nominal returns, these two estimates indicate that the unfunded liability is $1.2 trillion (based on the real Social Security discount factor) to $1.9 trillion (based on the Treasury Inflation-Protected Securities yield curve), or more than 2.5 times the reported aggregate unfunded liability of $493 billion.

Figure III depicts the relationship between three measures of unfunded pension liabilities and each state's gross domestic product (GDP) in 2008. The unfunded liabilities by state are the sums across all plans in the state from the updated Public Fund Survey.[15] The three unfunded liabilities are the reported unfunded actuarial accrued liability, the unfunded liability based on the yield curve derived from the Treasury Inflation-Protected Securities, and the unfunded liability based on the nominal yield curve. The last estimate is most comparable to the estimates by Novy-Marx and Rauh and Biggs, and is reflected by the total height of each bar.

Reporting the estimates based on the real discount factors paired with the real accrued benefit series along with the estimates based on the nominal discount factors paired with the nominal accrued benefits series shows how the alternative inflation rate expectations affect the calculation. The states with the top five unfunded liabilities by this measure are Ohio, New Mexico, Oregon, Mississippi and Alaska. Ohio, New Mexico and Mississippi were also in the top five states by this metric in Novy-Marx and Rauh and Biggs. However, when ranked by the reported unfunded liability as a percent of GDP only Mississippi appears in the top five in all four lists. This illustrates the sensitivity of the outcomes to alternative discount rate assumptions, and therefore the importance of providing a variety of estimates in public reports.

Effect of the Stock Market Decline on Unfunded Liabilities. Before turning to the nonpension benefits, it is important to recognize how the stock market decline since 2008 affects pensions' unfunded liabilities. The liabilities, assets and the resulting unfunded liabilities are based on 2008 estimates, with most estimated by June 2008. The dramatic drop in the stock market during the latter part of 2008 that continued through the beginning of 2009 increases the unfunded liabilities reported for 2009. Figure IV depicts Census Bureau data on the aggregate assets in state and local retirement plans:

- Total assets in June 2008 were $2.8 trillion, but fell 25 percent to $2.1 trillion by March 2009.
- By June 2009 total assets increased back to $2.2 trillion, or a 22 percent decline over the year.
- If the 22 percent decline in aggregate assets were recognized for 2009 the reported funding ratio would decline from 85 percent to 65 percent, assuming no change in the liabilities.

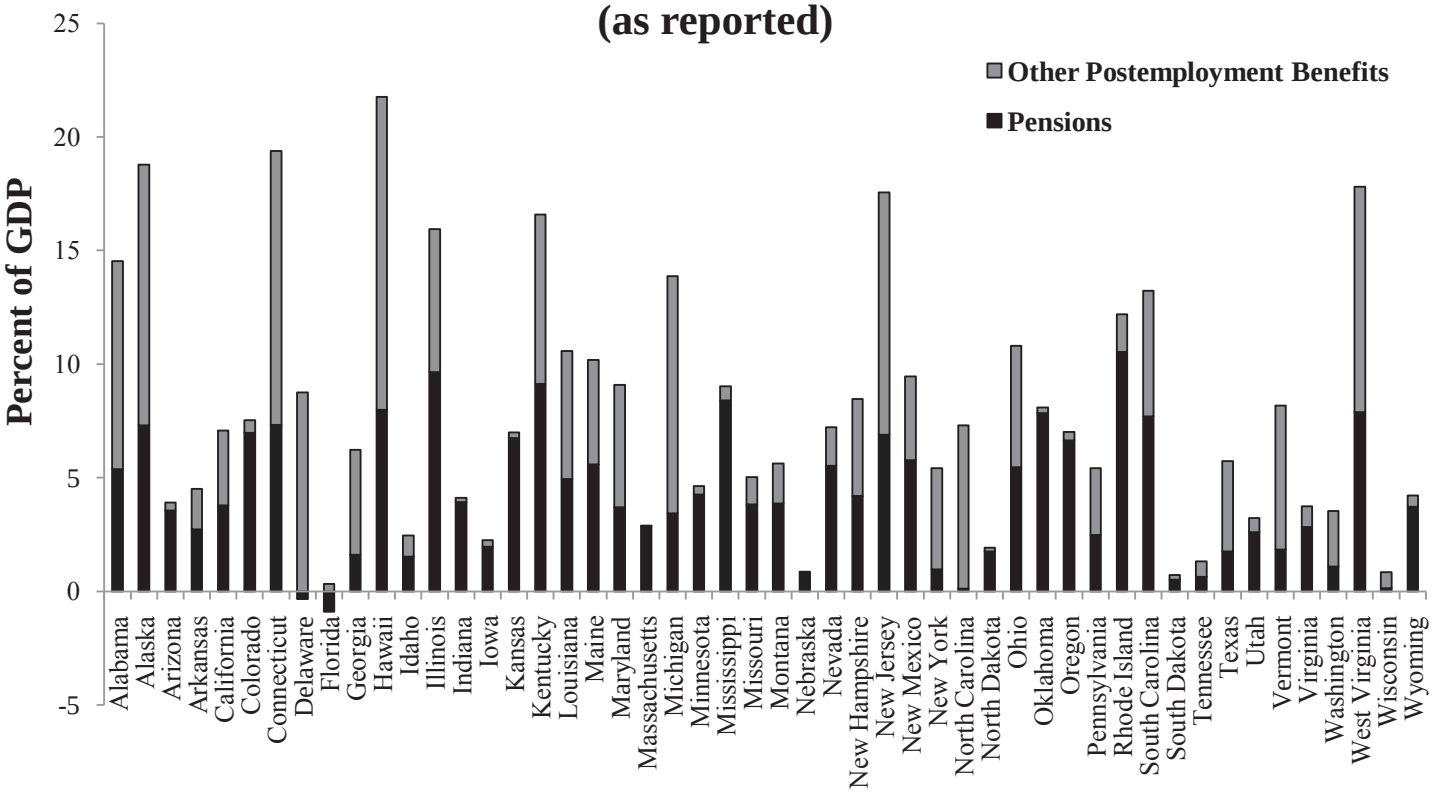
When the liabilities are calculated using the nominal Treasury yield, the funding ratio in 2008 was 65 percent. If the decline for 2009 is recognized, then the funding level declines to 40 percent. Finally, the figure indicates that total pension assets rose to about $2.5 trillion by December 2009, or about 13 percent below the June 2008 level.

New Estimates of Nonpension Postemployment Benefit Liabilities

In 2004, the GASB issued two statements addressing the concern

FIGURE VI

Unfunded Pension and Other Postemployment Benefits Liabilities as Percent of State GDP (as reported)



Sources: Pensions are from Keith Brainard, "Public Fund Survey: Summary of Findings for FY 2008," National Association of State Retirement Administrators, October 2009. Available at http://www.publicfundsurvey.org/publicfundsurvey/pdfs/Summary_of_Findings_FY08.pdf . And authors' adjustments. Other postemployment benfits are from states' and plans' comprehensive annual financial reports.

that government obligations for retiree health benefits and other postemployment benefits were large and, for the most part, unfunded.

Reporting requirements for government pension plans have existed since 1994, but until 2004 there were no comparable standards for reporting funding for other retiree benefits. Because most governmental entities report only annual cash outlays for these benefits, the full cost was substantially underreported. The new GASB statements provide guidelines for determining governments' full obligations and calculating the necessary annual contributions to ensure that the promised funds will be available for retirees in the future.[16]

The GASB now requires governments to report several different values, including the actuarial accrued liability, the actuarial value of assets, the unfunded actuarial accrued liability, the annual required contribution and the net obligation. Governments may choose among six different actuarial methods to calculate these values, but must report the method used and any other actuarial assumptions. Governments must publish a schedule of funding progress and a schedule of employer contributions in an annual report. These new requirements provide a more complete picture of the full magnitude of nonpension benefit obligations, and allow for comparisons across state and local governments.[17]

Estimated Liabilities for Retiree Health Benefits and Other Retiree Benefits. The Pew Center study identified $587 billion in total retiree nonpension benefit liabilities and $555 billion in unfunded liabilities, given that only $32 billion

in assets are set aside. In addition to nationwide aggregates, the study gives funding levels by state. This provides the opportunity for cross-state comparisons to determine which states' programs are particularly well-funded and which states have the greatest unfunded obligations. The Pew study shows that 20 states' health benefits are completely unfunded. Most of the remaining states' funding levels range from 0.01 percent to 50 percent. Only two states — Alaska and Arizona — have funding ratios above 50 percent.

The Pew study provides a comprehensive view of funding at the state level; however, it would also be useful to examine funding at a more disaggregated level. Most states' totals are aggregated from several different reporting sources. For example, a single state might have different plans for teachers, judges, state police and other state employees. The state would report liabilities and costs for each of the plans.

Individual reports were obtained for all of the available plans listed in the Pew study and liabilities were documented for each of these groups, as well as state totals. In most cases, state totals match closely with the Pew numbers.[18]

What Discount Rate Should Be Used to Calculate Retiree Health Benefit Liabilities? As we have seen, a key variable in assessing the present value of actuarial liability is the discount rate. The choice of the discount rate significantly influences the size of the overall liability. All else equal, discounting future liabilities at a higher rate results in a smaller present value estimate, as seen in the case of pension fund accounting. The GASB provides guidelines for the selection of a discount rate which reflects the assumed rate of return on investments. The choice of rates is largely determined by the way in which the plan is funded. Most retiree health plans are funded on a pay-as-you-go basis, meaning there is no trust accruing assets to fund future benefits. These plans must use a much lower discount rate — usually 4 percent or 4.5 percent — than plans that are prefunded. Prefunded plans with dedicated trusts for future payments may use a higher rate equal to the return on those investments. Discount rates associated with prefunded plans are typically around 8 percent. As noted, state and local pension plans, all of which have related trust funds, are usually discounted at the higher rate of about 8 percent.

The difference in the overall estimated liability when using the low rate versus the high rate is substantial. For example, consider the state of New Hampshire, which reports its total liabilities for retiree health care benefits under a variety of different assumptions. The net actuarial accrued liability using a prefunded plan with an 8.5 percent discount rate is $1.33 billion. The comparable liability associated with a pay-as-you-go plan and 4.5 percent discount rate is $2.56 billion, almost twice the original amount.[19] Similarly, the reported unfunded liability for the Teachers Retirement System of Texas is $21.6 billion based on the current discount rate of 5.25 percent, but is only $14.2 billion (or 34 percent lower) when an 8 percent rate is applied.[20]

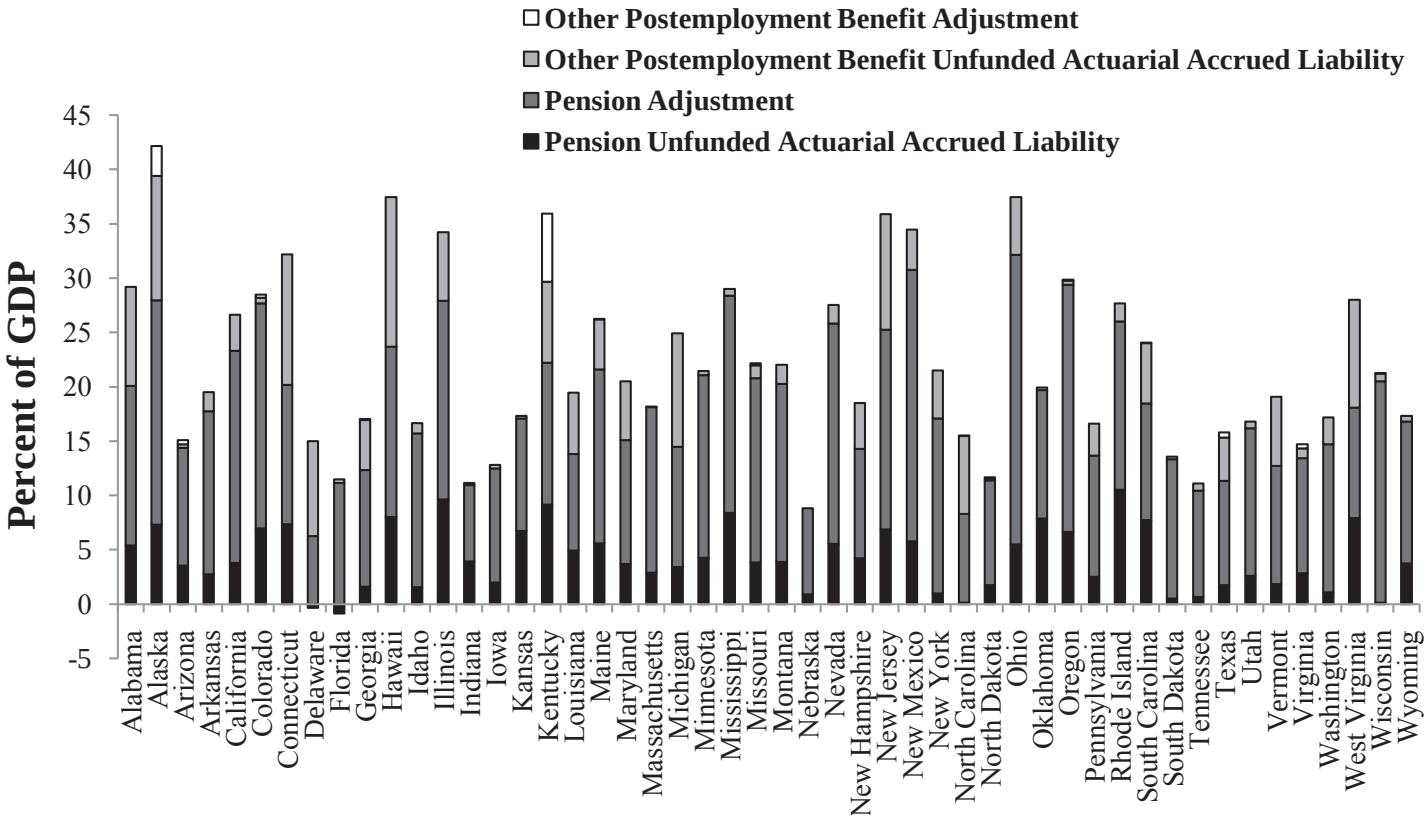
As discussed, there has been a good deal of debate among experts regarding the proper discount rate in determining accrued pension liabilities. The rationale for using a lower discount rate more in line with the government borrowing rate to calculate pension liabilities is that those liabilities are legally binding. Retirees may not have as durable a claim to health benefits, but those benefits pose extra risks to taxpayers in the form of greater uncertainty about the size of future health care costs. This uncertainty suggests that a lower rate is also appropriate in calculating retiree health benefits, which is consistent with the prevalent use of the 4 percent and 4.5 percent nominal discount rates for the pay-as-you go plans.

If actuaries used a lower discount rate for all plans, regardless of funding method, the liabilities for health benefits that are partially prefunded would be much larger than current estimates. However, since the majority of health benefit plans are funded on a pay-as-you-go-basis, the change in discount rates to match the government borrowing rate makes a much smaller impact on the total liability than for pension plans.

Only 22 percent of the health and other benefit plans use a discount rate of 7 percent or higher. The liabilities for this set of plans were recalculated using a procedure similar to the one described earlier for pension plans.[21] Health benefit unfunded liabilities based on the nominal Treasury yield curve are

FIGURE VII

Unfunded Pension and Other Postemployment Benefit Liabilities as a Percent of State GDP in 2008 (as reported and adjusted)



Sources: Pensions are from Keith Brainard, "Public Fund Survey: Summary of Findings for FY 2008," National Association of State Retirement Administrators, October 2009. Available at http://www.publicfundsurvey.org/publicfundsurvey/pdfs/Summary_of_Findings_FY08.pdf. And authors' adjustments and calculations. Other postemployment benfits are from states' and plans' comprehensive annual financial reports and authors' recalculation of liabilites for subset of plans with reported discount rates of 7 percent or higher.

$558 billion, compared to reported health benefit unfunded liabilities of $537 billion. Figure V illustrates how these unfunded liabilities, as a percentage of state GDP, would change if the discount factor based on the nominal Treasury yield curve were used for those plans.[22] Notably:

- Half of the states have reported health benefit unfunded liabilities of less than 2 percent of GDP.
- Eight states report unfunded liabilities in excess of 8 percent of GDP — Alabama, Alaska, Connecticut, Delaware, Hawaii, Michigan, New Jersey and West Virginia.
- However, when the liabilities of the plans using a discount rate of 7 percent or higher are recalculated, Kentucky also exceeds the 8 percent of GDP threshold.

Combining Unfunded Pension and Nonpension Liabilities. Figure VI presents the reported unfunded pension and nonpension benefit liabilities for state and local governments as percentages of the states' GDPs.[23] Before adjusting the discount rate:

- Seven states — Alaska, Connecticut, Hawaii, Illinois, Kentucky, New Jersey and West Virginia — have total

unfunded pension and nonpension benefit liabilities above 15 percent of GDP.

- Nine states have reported unfunded liabilities less than 2 percent of their GDP — Florida, Idaho, Iowa, Massachusetts, Nebraska, North Dakota, South Dakota, Tennessee and Wisconsin.[24]
- Across all states, the combined reported unfunded liabilities are equal to 7.2 percent of GDP.

Figure VII depicts the reported and adjusted unfunded pension and nonpension benefit liabilities by state as a percent of GDP. The rankings of states before and after adjusting are highly correlated:

- Seven of the top 10 highest unfunded liability states in the reported rankings are also in the top 10 in the adjusted rankings.
- At the lower end of the distribution, six states with the lowest 10 unfunded liabilities as a percent of GDP in the reported rankings remain in the lowest 10 based on the adjusted rankings.
- All but 10 of the states and the District of Columbia have total adjusted unfunded liabilities above 15 percent of GDP and four states — Alaska, Hawaii, New Jersey and Ohio — have total adjusted liabilities above 35 percent of GDP.
- Across all states and the District of Columbia the adjusted unfunded liabilities are approximately 22 percent of U.S. GDP. [See the table.]

To put these liabilities in context, states' official debt obligations were 7.1 percent of GDP in 2008. Thus, the unadjusted unfunded liabilities associated with state and local governments' commitments to pay retirement benefits to former employees are about equal to the states' official debt, but the adjusted unfunded liabilities are almost three times the debt. The appendix table shows unfunded liabilities in dollar amounts by state as reported and based on our estimates. Total unfunded liabilities for all benefit plans are $3.1 trillion based on our estimates, compared to $1.03 trillion as reported — a difference of more than $2 trillion.

Conclusion

Many state and local governments calculate their plans' liabilities using discount rates that are not commensurate with the risks they carry for taxpayers. As a result, those liabilities are greatly underestimated. The sensitivity of the final liability estimates to the choice of discount rates emphasizes the necessity of transparency in governments' financial statements. It is a simple matter for actuaries who prepare government reports to recalculate the promised benefits under a different discount rate assumption and include these estimates along with the original ones. Several states and local governments already do a good job of presenting alternative estimates under different assumptions. New Hampshire, for example, reports other postemployment benefit liabilities under both high and low discount rate assumptions corresponding with a prefunded plan and a pay-as-you-go plan, respectively.

Under any reasonable assumptions, the fundamental result remains: There is a substantial difference between promised retirement benefits and the assets set aside to satisfy those obligations. What should state and local governments do about it? One possibility is to make up the difference and use taxpayers' money to fulfill the liabilities. Alternatively, employer and employee contribution rates could be increased to help shrink future unfunded liabilities.

State and local governments could also begin to change the standards of their postemployment health benefits for new workers. While governments are contractually bound to fulfill the coverage they have already promised to current workers and retirees, they could alter guidelines for new employees. For example, raising the age at which workers become eligible for retiree health care coverage or increasing the premiums of health plan members would reduce future accruals and obligations.

An additional option is to begin to replace defined benefit pension plans with defined contribution plans, such as 401(k)s. States could honor what current employees have already paid into their defined benefit plans, but then switch to 401(k) plans after a certain date or for newly hired workers. [1]In addition to relieving taxpayers from the burden of insuring pensions, individual defined contribution plans are portable across employers and would allow employees more freedom in switching from one job to another.

TABLE I:
Adjusted Unfunded Benefit Liabilities as Percent of Gross Domestic Product (in millions)

State	Total Adjusted Unfunded Liabilities (pension and nonpension benefits)	Gross Domestic Product (2008)	Percent of Gross Domestic Product
Alabama	$49,665	$170,000	29%
Alaska	$20,197	$47,900	42%
Arizona	$37,502	$248,900	15%
Arkansas	$19,182	$98,300	20%
California	$491,307	$1,846,800	27%
Colorado	$70,791	$248,600	28%
Connecticut	$69,611	$216,200	32%
Delaware	$9,079	$61,800	15%
Florida	$78,759	$744,100	11%
Georgia	$67,714	$397,800	17%
Hawaii	$23,904	$63,800	37%
Idaho	$8,778	$52,700	17%
Illinois	$216,855	$633,700	34%
Indiana	$28,384	$254,900	11%
Iowa	$17,352	$135,700	13%
Kansas	$21,267	$122,700	17%
Kentucky	$56,215	$156,400	36%
Louisiana	$43,204	$222,200	19%
Maine	$13,058	$49,700	26%
Maryland	$56,008	$273,300	20%
Massachusetts	$66,116	$365,000	18%
Michigan	$95,335	$382,500	25%
Minnesota	$56,382	$262,800	21%
Mississippi	$26,609	$91,800	29%
Missouri	$52,691	$237,800	22%
Montana	$7,905	$35,900	22%
Nebraska	$7,331	$83,300	9%
Nevada	$36,120	$131,200	28%
New Hampshire	$11,114	$60,000	19%
New Jersey	$170,467	$474,900	36%
New Mexico	$27,532	$79,900	34%
New York	$246,267	$1,144,500	22%

Table continued on next page

Source: Authors' calculations.

TABLE I (Continued):
Adjusted Unfunded Benefit Liabilities as Percent of Gross Domestic Product (in millions)

State	Total Adjusted Unfunded Liabilities (pension and nonpension benefits)	Gross Domestic Product (2008)	Percent of Gross Domestic Product
North Carolina	$62,087	$400,200	16%
North Dakota	$3,638	$31,200	12%
Ohio	$176,595	$471,500	37%
Oklahoma	$29,166	$146,400	20%
Oregon	$48,235	$161,600	30%
Pennsylvania	$91,946	$553,300	17%
Rhode Island	$13,114	$47,400	28%
South Carolina	$37,588	$156,400	24%
South Dakota	$5,011	$37,000	14%
Tennessee	$28,025	$252,100	11%
Texas	$193,183	$1,223,500	16%
Utah	$18,426	$109,800	17%
Vermont	$4,853	$25,400	19%
Virginia	$58,472	$397,000	15%
Washington	$55,383	$322,800	17%
West Virginia	$17,256	$61,700	28%
Wisconsin	$51,083	$240,400	21%
Wyoming	$6,113	$35,300	17%
District of Columbia	$2,605	$97,200	3%
Total 50 states + D.C.	$3,105,479	$14,165,300	22%

Source: Authors' calculations.

APPENDIX TABLE I:
State and Local Government Employees' Unfunded Retirement Benefit Liabilities (in millions)

State	Reported Pension	Real Yield Curve Discount Rate Pension	Nominal Yield Curve Discount Rate Pension	Reported Other Postemployment Benefit	Nominal Yield Curve Discount Rate Other Postemployment Benefit*
Alabama	$9,165	$17,579	$34,115	$15,550	$15,550
Alaska	$3,505	$9,872	$13,387	$5,488	$6,810
Arizona	$8,834	$18,327	$35,731	$894	$1,771
Arkansas	$2,692	$9,835	$17,433	$1,749	$1,749
California	$69,915	$340,959	$430,551	$60,756	$60,756
Colorado	$17,340	$47,646	$68,736	$1,389	$2,055
Connecticut	$15,859	$27,060	$43,592	$26,019	$26,019
Delaware	-$202	$1,921	$3,669	$5,410	$5,410
Florida	-$6,633	$62,363	$76,355	$2,404	$2,404
Georgia	$6,443	$28,410	$48,981	$18,321	$18,732
Hawaii	$5,107	$13,441	$15,115	$8,789	$8,789
Idaho	$810	$4,751	$8,284	$490	$490
Illinois	$61,063	$138,416	$176,909	$39,946	$39,946
Indiana	$10,039	$16,682	$27,942	$442	$442
Iowa	$2,665	$11,162	$16,947	$405	$405
Kansas	$8,279	$16,476	$20,950	$317	$317
Kentucky	$14,291	$24,782	$34,756	$11,660	$21,459
Louisiana	$10,978	$26,687	$30,661	$12,543	$12,543
Maine	$2,782	$5,206	$10,734	$2,284	$2,324
Maryland	$10,094	$24,075	$41,275	$14,733	$14,733
Massachusetts	$10,492	$45,010	$66,105	$11	$11
Michigan	$13,099	$38,801	$55,413	$39,922	$39,922
Minnesota	$11,193	$24,890	$55,371	$1,011	$1,011
Mississippi	$7,720	$16,515	$26,039	$570	$570
Missouri	$9,085	$37,089	$49,408	$2,852	$3,283
Montana	$1,391	$5,457	$7,273	$632	$632
Nebraska	$722	$4,973	$7,331	no information reported	no information reported
Nevada	$7,258	$24,503	$33,909	$2,211	$2,211
New Hampshire	$2,519	$7,640	$8,555	$2,559	$2,559
New Jersey	$32,732	$105,579	$119,817	$50,650	$50,650
New Mexico	$4,620	$17,385	$24,586	$2,946	$2,946
New York	$11,187	$152,968	$195,448	$50,819	$50,819
North Carolina	$511	$16,029	$33,212	$28,742	$28,875
North Dakota	$549	$2,360	$3,558	$51	$80
Ohio	$25,795	$98,295	$151,438	$25,157	$25,157
Oklahoma	$11,492	$25,529	$28,806	$360	$360
Oregon	$10,739	$45,248	$47,470	$610	$765
Pennsylvania	$13,725	$61,964	$75,685	$16,261	$16,261
Rhode Island	$4,986	$9,206	$12,325	$789	$789
South Carolina	$12,053	$25,193	$28,899	$8,638	$8,689

Table continued on next page

*Other post employment benefit liabilities are recalculated for plans with a reported discount rate greater than or equal to 7 percent.

Source: Authors' calculations.

APPENDIX TABLE I (Continued):
State and Local Government Employees' Unfunded Retirement Benefit Liabilities (in millions)

State	Reported Pension	Real Yield Curve Discount Rate Pension	Nominal Yield Curve Discount Rate Pension	Reported Other Postemployment Benefit	Nominal Yield Curve Discount Rate Other Postemployment Benefit*
South Dakota	$193	$2,357	$4,935	$76	$76
Tennessee	$1,603	$16,203	$26,279	$1,746	$1,746
Texas	$21,430	$107,316	$138,620	$48,732	$54,562
Utah	$2,870	$15,229	$17,756	$670	$670
Vermont	$467	$2,762	$3,238	$1,615	$1,615
Virginia	$11,254	$53,797	$53,227	$3,639	$5,244
Washington	$3,523	$32,580	$47,478	$7,905	$7,905
West Virginia	$4,867	$9,936	$11,148	$6,108	$6,108
Wisconsin	$321	$29,066	$49,330	$1,710	$1,753
Wyoming	$1,316	$5,204	$5,939	$174	$174
Total 50 states	$492,736	$1,884,731	$2,544,722	$536,755	$558,148
District of Columbia	-$103	$104	$2,605		
Total 50 States + D.C.	$492,633	$1,884,836	$2,547,328		

*Other post employment benefit liabilities are recalculated for plans with a reported discount rate greater than or equal to 7 percent.

Source: Authors' calculations.

Endnotes

1. Pew Center on the States, "The Trillion Dollar Gap: Underfunded State Retirement Systems and the Roads to Reform," February 2010. Available at http://downloads.pewcenteronthestates.org/The_Trillion_Dollar_Gap_final.pdf.

2. Keith Brainard, "Public Fund Survey: Summary of Findings for FY 2008," National Association of State Retirement Administrators, October 2009. Available at http://www.publicfundsurvey.org/publicfundsurvey/pdfs/Summary_of_Findings_FY08.pdf.

3. Jeffrey R. Brown and David W. Wilcox, "Discounting State and Local Pension Liabilities," *American Economic Review: Papers and Proceedings*, Vol. 99, No. 2, May 2009, page 542.

4. As mentioned earlier, the GASB allows pension plans to discount future accrued benefits to the present using the rate of return expected on the plans' assets. However, as Novy-Marx and Rauh note, "Discounting liabilities at an expected rate of return on the assets in the plan runs counter to the entire logic of financial economics: financial streams of payments should be discounted at a rate that reflects their risk." They later comment, "The way the liabilities are funded is irrelevant to their value." Robert Novy-Marx and Joshua D. Rauh, "Public Pension Promises: How Big Are They and What Are They Worth?" Working Paper, December 2009, pages 2 and 18.

5. The U.S. Treasury securities' yield curve reflects the relationship between interest rates and the term to maturity of government bonds.

6. Biggs uses data from the Public Fund Survey supplemented with additional background data from the Center for Retirement Research at Boston College. Andrew G. Biggs, "An Options Pricing Method for Calculating the Market Price of Public Sector Pension Liabilities," American Enterprise Institute, Working Paper No. 164, February 26, 2010.

7. The option pricing method basically values the guarantee to pay the accrued benefits and takes into account the variation in asset returns, the time to maturity, the present value of assets and the future value of the accrued benefits to be paid.

8. The option pricing method does not rely on a time series of future accrued benefit payments, but rather future liabilities enter the option pricing model as a single number equal to the capitalized value of the current liability 15 years in the future. The capitalized value is determined using the plan-specific discount rate. However, Biggs first simulates the likelihood that each plan's funding will be sufficient to pay accrued benefits. For this exercise he estimates the series of annual accrued benefit payments for each plan. The annual payments are estimated using a profile that identifies annual accrued pension payments as a percent of the accrued liability. The profile used to translate the accrued liability into an annual series of benefit payments is derived from Aaron Meder and Renato Staub, "Linking Pension Liabilities to Assets," UBS Global Asset Management Working Paper, 2006.

9. Our analysis begins with the state and local plans identified by Keith Brainard in "Public Fund Survey: Summary of Findings for FY 2008." The survey identifies the actuarial value of the plans' assets, liabilities and unfunded liabilities. In the cases in which the valuation date reported in the Public Fund Survey was prior to 2008, we update the data using information from the states' or the plans' comprehensive annual financial reports. We also add several plans in the process of our data collection, yielding a total of 153 total plans.

10. Robert Novy-Marx and Joshua D. Rauh, "The Liabilities and Risks of State-Sponsored Pension Plans," *Journal of Economic Perspectives*, Vol. 23, No. 4, 2009, pages 2, 13-16.

11. The initial benefit payments are estimated from the 2006 State and Local Pension data file available from the Center for Retirement Research (CRR) at Boston College. See "State and Local Pension Data," Boston College Center for Retirement Research. Available at http://crr.bc.edu/frequently_requested_data/state_and_local _pension_data_4.html. The ratio of benefit payments to accrued liabilities for each plan in the 2006 Center for Retirement Research file is applied to the 2008

accrued liabilities to impute benefit payments for 2008. Where data is missing, the average ratio is used and in some cases the actual benefit payments from the comprehensive annual financial reports are used. This data is also the source for the investment return. When the discount rate is missing, the average discount rate is used. The actuarial liability is from the 2008 Public Fund Survey except for the cases we update to 2008.

12. Andrew J. Rettenmaier and Thomas R. Saving, "Thinking About Tomorrow," National Center for Policy Analysis, Policy Report No. 317, December 2008, Figure VII and associated discussion. See the 2008 Social Security Trustees Report for the underlying assumptions used to produce the annual estimates. The Social Security accrued benefit series is similar to the series Biggs used, however, our methodology derives a series that is calibrated to the plans' initial benefit payments and ultimately yields present values equal to the plans' reported liabilities.

13. The series reported in Figure I are used to produce two groups: the "young" who are 35 to 54 years of age and the "old" who are 55 years of age and above. We produce an annual spending series by adding the two series together, but vary the proportion of young each time. The series is indexed to its initial value in 2008 and then multiplied by the 2008 benefit payments for the plan being calibrated. The present value of the series is calculated and the process is repeated until the present value approximates the reported present value. For several pension plans in which the initial benefit payments were either large or small relative to the accrued liability the composition of the "old" and "young" series was modified.

14. The nominal term structure is based on the average monthly yields on 1, 2, 3, 5, 7, 10, 20 and 30-year constant maturity Treasury securities. The averages are based on monthly data from July 2004 to August 2008 with the exception of a start date of February 2006 for the 30 year bonds. The start date was chosen for compatibility with the start of the Treasury Inflation-Protected Securities series.

15. See Robert Novy-Marx and Joshua D. Rauh, "Public Pension Promises: How Big Are They and What Are They Worth?" Table IV and Andrew G. Biggs, "An Options Pricing Method for Calculating the Market Price of Public Sector Pension Liabilities," for similar presentations.

16. Statement 43 addresses financial reporting for the benefit plans, and Statement 45 addresses both accounting practices and financial reporting for government employers providing these benefits.

17. The requirements were implemented in three phases based on a government's total annual revenue, starting with Statement 43: Governments with revenue less than $10 million were required to implement Statement 43 in 2007. Governments with revenue between $10 million and $100 million were required to implement it in 2006. Governments with annual revenue exceeding $100 million were required to implement the standard in 2005. The effective dates for Statement 45 followed the same pattern but began one year later.

18. Several cases in which the totals are not an exact match are caused by a difference in the year of the report. We try to obtain data from fiscal year 2008 where available; some of the data from the Pew study is one year earlier.

19. The Segal Group, Inc., "State of New Hampshire: Actuarial Valuation and Review of Other Postemployment Benefits as of December 31, 2006," July 11, 2008. Available at http://admin.state.nh.us/comm/GASB-OPEB-NHas%20of%20 12_31_2006-FINAL.pdf. These numbers reflect total liabilities as of January 1, 2007. Both estimates assume a projected unit credit actuarial cost method.

20. Gabriel Roeder Smith & Company, "TRS-Care Retiree Health Plan, Teachers Retirement System of Texas," November 5, 2008. Available at http://www.trs.state.tx.us/about/documents/trscare_actuarial_valuation_report.pdf.

21. Initial benefit payments for the subset of plans with reported discount rates of 7 percent or higher were collected from the states' or plans' annual reports. Future benefit flows were imputed using an index derived from estimates of accrued Medicare benefits (see Andrew J. Rettenmaier and Thomas R. Saving, "Thinking About Tomorrow," Figure XII). As with

the estimation of the pension plans' future benefit series, the age composition of the index was varied until the present value of the imputed benefit series using the reported discount rate yielded the reported other postemployment benefit liability. The present value of this series was then computed using the discount factors based on the nominal Treasury bonds' yield curve.

22. Denominating the liabilities by state GDP places the liabilities within the context of the states' economies. However, denominating the unfunded liabilities by the present value of the states' expected GDP over the duration of the liability would provide a better indication of the states' abilities to cope with the liabilities.

23. Note that combining the pension and other postemployment benefit liabilities in this way excludes some plans, particularly at the local level.

24. Nebraska's comprehensive financial report notes that the state has no other postemployment benefit obligations once an employee reaches 65 years of age.

The NCPA is a nonprofit, nonpartisan organization established in 1983. Its aim is to examine public policies in areas that have a significant impact on the lives of all Americans — retirement, health care, education, taxes, the economy, the environment — and to propose innovative, market-driven solutions. The NCPA seeks to unleash the power of ideas for positive change by identifying, encouraging and aggressively marketing the best scholarly research.

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The NCPA is probably best known for developing the concept of Health Savings Accounts (HSAs), previously known as Medical Savings Accounts (MSAs). NCPA President John C. Goodman is widely acknowledged (*Wall Street Journal*, WebMD and the *National Journal*) as the "Father of HSAs." NCPA research, public education and briefings for members of Congress and the White House staff helped lead Congress to approve a pilot MSA program for small businesses and the self-employed in 1996 and to vote in 1997 to allow Medicare beneficiaries to have MSAs. In 2003, as part of Medicare reform, Congress and the President made HSAs available to all nonseniors, potentially revolutionizing the entire health care industry. HSAs now are potentially available to 250 million nonelderly Americans.

The NCPA outlined the concept of using federal tax credits to encourage private health insurance and helped formulate bipartisan proposals in both the Senate and the House. The NCPA and BlueCross BlueShield of Texas developed a plan to use money that federal, state and local governments now spend on indigent health care to help the poor purchase health insurance. The SPN Medicaid Exchange, an initiative of the NCPA for the State Policy Network, is identifying and sharing the best ideas for health care reform with researchers and policymakers in every state.

NCPA President John C. Goodman is called the "Father of HSAs" by *The Wall Street Journal*, WebMD and the *National Journal*.

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The NCPA helped shape the pro-growth approach to tax policy during the 1990s. A package of tax cuts designed by the NCPA and the U.S. Chamber of Commerce in 1991 became the core of the Contract with America in 1994. Three of the five proposals (capital gains tax cut, Roth IRA and eliminating the Social Security earnings penalty) became law. A fourth proposal — rolling back the tax on Social Security benefits — passed the House of Representatives in summer 2002. The NCPA's proposal for an across-the-board tax cut became the centerpiece of President Bush's tax cut proposals.

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A major NCPA study, "Wealth, Inheritance and the Estate Tax," completely undermines the claim by proponents of the estate tax that it prevents the concentration of wealth in the hands of financial dynasties. Actually, the contribution of inheritances to the distribution of wealth in the United States is surprisingly small. Senate Majority Leader Bill Frist (R-TN) and Senator Jon Kyl (R-AZ) distributed a letter to their colleagues about the study. In his letter, Sen. Frist said, "I hope this report will offer you a fresh perspective on the merits of this issue. Now is the time for us to do something about the death tax."

Retirement Reform.

With a grant from the NCPA, economists at Texas A&M University developed a model to evaluate the future of Social Security and Medicare, working under the direction of Thomas R. Saving, who for years was one of two private-sector trustees of Social Security and Medicare.

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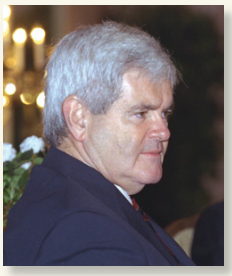

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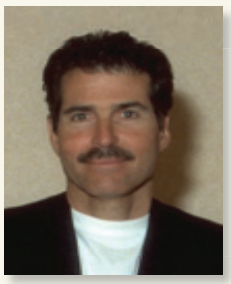

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