Examining the Whole Picture: Retiree Health Obligations and the Long-Term Budget Outlook for the State and Local Government Sector*

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Abstract

While state and local government pension obligations have been analyzed in great detail, much less attention has been paid to the costs of the other major retiree benefit provided by these governments: retiree health insurance. The first portion of the paper uses the information contained in the annual actuarial reports for state government retiree health plans to reverse engineer the cash flows underlying the liabilities given in the report. We then gross these flows up to account for local government workers. Obtaining the cash flows allows us to construct liability estimates which are consistent across governments in terms of the discount rate, actuarial method and assumptions concerning medical cost inflation and mortality. We find that the total liability of state and local governments for the future provision of retiree health care exceeds $1 trillion. In some states, such as Illinois and Connecticut, the liability is over 100 percent of annual total revenues of the public sector. Relative to pension obligations discounted at the same rate, we find that unfunded retiree health care liabilities are ½ the size of unfunded pension obligations. We also find that using assumptions concerning the growth in health care costs that are arguably more realistic than those employed by most states actually reduces the size of the liability in most cases. Pushing in the opposite direction, we find that using plausibly more realistic mortality assumptions increases the size of liability. The second portion of the paper places retiree health care obligations into context by examining the budget pressures associated with retiree health on a continuing, largely pay-as-you go basis. We find that the states, on average, could permanently fund their retiree health obligation by contributing an additional ½ percent of total revenue toward the benefit each year. Finally, we place the retiree health care problem in context by modeling the long-run structural budgets of state and local governments. We find that growth in Medicaid expenditures driven mostly by excess cost growth in medical care presents a substantially larger source of pressure than either pensions or retiree health care.

I. Introduction

One of the most important concerns facing state and local governments is their long-term fiscal imbalances. While state and local pension obligations have been analyzed in great detail, much less attention has been paid to the costs of the retiree health insurance benefits promised to state and local retirees and workers. Furthermore, there has been only limited analysis of the fiscal condition of the sector as a whole, which may be influenced by population aging and continued rapid growth in health spending in ways that could alleviate or exacerbate the challenges associated with the sector's pension and retiree health obligations.

This paper seeks to begin to fill this void. Our first task is to develop a comprehensive set of projections of the retiree health obligations facing the state and local government sector. We build on past work which has carefully analyzed the present value of retiree health care liabilities for state and local workers (Clark 2010; Clark and Morrill 2010, 2011; Pew 2012) by projecting the annual cash flows which underlie these present values. While such cash flows have been constructed for retiree pension obligations (Novy-Marx and Rauh, 2011, 2013), we are the first to construct them for retiree health insurance. We reverse engineer the cash flows using the information provided in the retiree health care liability reports mandated by the Government Accounting Standards Board (referred to henceforth as the "GASB reports".) Many of our GASB reports cover only state employees and we therefore use supplemental information to gross up these cash flows so that they cover the entire state and local sector. We also develop a methodology to account for new entrants into the state and local government workforce that enables us to project the retiree health obligations on a "current policy" basis, rather than assuming that these programs are terminated for new employees. Our state-specific modeling of retiree health obligations allows us to modify some of the important assumptions—including health care cost inflation, life expectancy, and the discount rate—and impose a common actuarial methodology in order to compare the retiree health obligations across states on a consistent basis.

In addition, we project each state's overall budget along the lines of Auerbach and Gale (2012, 2011) which helps us to put these retiree health obligations in context. We use state-specific population projections from the Census Bureau to project state-specific GDP growth, education spending, and Medicaid spending, and fold in Novy-Marx and Rauh's (2013) estimates of pension cash flows.[1] We assume that state and local tax revenue and all other categories of spending rise with state GDP. We are thus able to compare the magnitude and timing of the retiree health obligations to those related to pensions and Medicaid, and also assess whether there may be other changes in state and local spending—for example, lower demand for education spending—that might offset some of the fiscal pressures associated with retiree health insurance.

[1] We thank Robert Novy-Marx and Josh Rauh for generously sharing their calculations of pension cash flows by state.

More broadly, our construction of the long-term budget outlook for the state and local sector allows us to assess the overall importance of demographic change and health care costs on state and local budgets. Because our basic assumptions in projecting the state budgets hew to those used by the Congressional Budget Office (CBO) in their long-run budget projections, our projections of state and local budgets are directly comparable with theirs, and indeed, can be combined with theirs to present a picture of the long-run fiscal outlook for the government sector as a whole.

II. The Present Value of Retiree Health Care Obligations

We estimate the annual cash flows for state and local government retiree health care obligations in two primary steps. First, we construct the cash flows for state government employees using detailed information on these liabilities. Second, we scale up the state cash flows to account for liabilities at the local government level. The scaling is based upon the best available information on a state-by-state basis.

State Government Employees

For each state, we collected the 2011 fiscal year report required by GASB statements 43 and 45 which details the liabilities of the state retiree health insurance plan.[2] Henceforth, we refer to these reports with the shorthand of "GASB reports". The reports generally provide enough detail to construct a reasonable projection of the cash flows of the retiree health plan. Specifically, for each state we collect the following 12 data objects: (1) the age distribution of current retirees by gender, (2) the age and years of service matrix for the current workforce, (3-5) expected rates of turnover, disability, and death by age and gender, (6-7) matrices for retirement and quit/termination probabilities by age, years of service and gender, (8) the eligibility requirements for retiree health insurance, (9) take up rates for retiree health insurance, (10-11) employer and retiree costs for retiree health insurance by age and gender, and (12) the assumed health care cost inflation rate. For many states, some of this information, particularly on retirement and other termination rates, was available only in the Comprehensive Annual Financial Reports (CAFRs) or the actuarial statements for the state employee pension plans rather than in the GASB reports directly. In other states, some of the necessary information was not included in either the pension or retiree health report, including data elements such as the age distribution or gender mix of current retirees or current workers; for these states, we used information from supplemental sources or information from an adjacent state with a similar retiree health plan.

Some states issue multiple reports for different types of employees. For example, state university employees often are covered in a report distinct from the report for general state employees. Our state reports are the single report in each state which includes general state

[2] In some cases we obtained the 2012 report or the 2010 report. In these cases we adjust our cash flow estimates to place them on a 2011 fiscal year basis.

employees. In many cases this report also covers some or all of the local government workers in a state.

We collected numerous additional state reports and these are used in the process of grossing up the state reports (see below). The general employee report for New York City (NYC) reveals liabilities larger than any single state save New Jersey. We therefore, in addition to the 50 states, also calculate the cash flows for NYC. Finally, neither Nebraska nor Oklahoma declared any liabilities for retiree health care in 2011 and, as a result, we do not calculate cash flows for these states.

Present Value of Benefits (PVB)

We use this information to construct the present value of benefits (PVB) cash flows. The PVB is a liability measure which includes both obligations already accrued, as well as obligations associated with the future service of current employees (who are assumed to retire according to actuarial assumptions). The methodology used to construct these cash flows is straightforward. For current retirees, we simply use the mortality tables to age the population each year, and use the information on current employer retiree health insurance costs, cost sharing and expected medical inflation to calculate the state government cost for all surviving retirees over time. For current workers, the procedure is considerably more cumbersome in practice but not more difficult conceptually. We age the workforce each year (incrementing years of service as well as age) and use the probabilities of retirement, disability, death, and quits/termination by age and years of service to create a matrix of newly-retired workers by year. We then use information on take-up rates, cost sharing, and health cost inflation to calculate the retiree health obligations for future retirees by year.

Actuarially Accrued Liabilities (AAL)

We also calculate cash flows for the Actuarially Accrued Liability (AAL), which is simply the present value of the retiree health obligations that have already been accrued by current workers and retirees. GASB allows states and localities to use a variety of methods to calculate the AAL, the two most common being the Projected Unit Credit (PUC) method and the Entry Age Normal (EAN) method. We calculate both concepts for each state. Under the PUC method, the share of benefits already accrued is equal to the ratio of the years of service already completed to the years of service that will be completed by retirement.[3] The EAN method is based on the idea that employers invest a fixed fraction of an employee's compensation each year so that the retiree health benefits will be fully funded at the time of retirement; the rate at which the benefits are

[3] States differ in how they define the years of service at retirement—some states base it on the years of service that will have been completed at the time a worker is first eligible to retire with benefits, whereas others base it on years that will have been completed when the employee actually retires. When replicating the states' calculations for purposes of calibration, we use whichever method the state specified.

funded thus depends on both the rate of salary growth as well as the discount rate. Under the EAN method, the AAL is simply the value of such an account at any given time. As we explain below, we use these AALs primarily as a check on the accuracy of our cash flows and to compare the financial burden of retiree health benefits to those of pension benefits, rather than as a measure of any sort of termination liability. Unlike the case of pension benefits, state and local governments have little to no legal obligation to continue to provide retiree health benefits, and thus state and local workers and retirees general have very limited legal entitlements to retiree health insurance (Clark 2009). There are numerous ways in which states could terminate or curtail their retiree health insurance liabilities, and thus the "accrued" liabilities do not represent any sort of minimum financial obligation.

Calibration

Our cash flows inevitably contain some error, primarily due to incomplete data in many of the reports which required the use of assumptions or data from neighboring states. For instance, in some states retirees can choose between several different health insurance plans. The GASB reports, however, do not always provide information on the percent of retirees choosing a given plan and we are forced to make assumptions about the percentages. To address this and other sources of error, we compare the present value of our projected cash flows to the present value for these flows given in the GASB report. We then calibrate our projected cash flows such that we match the stated present value calculated with the state-chosen discount rate. Following Novy-Marx and Rauh (2009, 2011) we calibrate using a geometric series that starts at one:

$$C_t^{cal,m} = C_t^m * (1 + \lambda^m)^{t-1} \quad (1)$$

where $C^m{}_t$ is our cash flow estimate, $C_t^{cal,m}$ is the calibrated cash flow estimate, λ is the parameter chosen to satisfy equation (1), t indexes year and m indexes the three actuarial methodologies underlying the cash flows: PVB, EAN and PUC. The calibration uses state-level variation in stated present values to proxy for unobserved variation in other variables, holding constant the year t liabilities. The geometric series is appealing because it implicitly assumes that any errors due to unobserved data accumulate and intensify over time—a possibility we view as likely.

We calibrate out retiree and active cash flow streams separately. All states report a present value for either the EAN or PUC methodology. Some states provide the PVB present value, others do not. When available, we calibrate directly to the stated present value based on the methodology upon which the cash flow is based — i.e. we calibrate the PVB stream to the stated PVB present value. When the report does not contain the present value corresponding to the methodology underlying our cash flow, we use the EAN or PUC to calculate the calibration factor (depending on which AAL measure is provided in the report).

We calculate the calibration factors using state-chosen values for medical cost inflation, mortality and other projections. Once we have generated the calibration factors, however, we can produce alternative cash flows based on different underlying assumptions, by recalculating the retiree health obligations under the different assumption (i.e. different medical cost inflation) and then applying the calibration factor.

Our uncalibrated estimates are, on average, fairly accurate and the calibration therefore does not play a large role in the present value liabilities we report for the U.S. Our average error for the total AAL liabilities (using the state-chosen actuarial method) is -3.4 percent. The absolute mean error is a bit larger at 12.3 percent. For the PVB liabilities, our average error is 4.2 percent and the absolute mean error is 7.0 percent (calculated over the 33 states and NYC which report a PVB).

Local Governments

The provision of public sector retiree health care to local government workers varies both by state and by type of local government worker (Clark 2010, Clark and Morrill 2010). In some cases there is centralized provision at the state level. This is often the case for K-12 teachers and other local education employees. In other cases, the benefit is provided directly by the local government—e.g. municipality, county, school district, etc.—that had employed the retiree. In at least a few instances (Pennsylvania, for example), there is hybrid provision with retirees simultaneously receiving both centralized provision and local provision.

Collecting and processing the GASB OPEB reports for local governments in the manner done for the state reports is infeasible. To cite two admittedly extreme examples, Massachusetts and Pennsylvania have 87 and 1,422 entities, respectively, which potentially provide retiree health care. Instead, we collect information on the *aggregate* state AALs for the two principal types of local government workers: K-12 education and other. The first step is determining who provides retiree health care to these workers. We use the state GASB reports as a starting point. In practice, though, the reports are often insufficient or misleading in determining who covers the two types of local workers.[4] We therefore rely on additional sources of information, such as publications and web sources addressed to recipients of retiree health care and Chapter 6 of Clark and Morrill (2010). In many instances, we contacted public officials to collect the information.

The second step involves obtaining the information on the aggregate local AALs for the two classes of workers. Our preferred sources of this information are GASB OPEB reports (covering local workers), state government CAFRs and pension fund CAFRs. These sources, though, are generally only useful for states in which the provision of local retiree health care is centralized or

[4] E.g. several state GASB reports contain significant amounts of actuarial information for teachers which might be construed as suggesting that teachers are covered by the state retiree health plan. Further research, however, reveals that the state plan covers only the negligible number of teachers employed directly by the state (or grandfathered into the state plan) while the vast majority of teachers in the state are not covered by the state plan.

for very large local governments such as the City of Chicago and Cook County, Illinois. For non-centralized states and states for which we failed to locate the above reports, we rely on the best source of information available. Many decentralized provision states have commissioned reports which provide the aggregate AAL across the localities within the state. In other cases, non-government actors have produced similar reports.

Once we have obtained the aggregate AALs, we gross up the state government cash flows to reflect the local obligations. Specifically, we multiply the state government cash flow at all points in time by (1+s) where s is the local scaling factor: $s = s_e + s_o$, s_e=(aggregate local education AAL / state AAL), and s_o=(aggregate local non-education AAL / state AAL). For instance, if the aggregate AAL for teachers plus the aggregate AAL for other local workers sums to 100 percent of the state reported AAL, then s=1. By grossing up in this manner, we are assuming that the state workers provide a reliable proxy for the local workers in terms of the factors, such as the age-service distribution of active workers and the mortality of retirees, that determine the *contour*, or slope, of the retiree health care cash flows. We are also implicitly assuming that aspects of the retiree health plan that influence the contour, such as the relative generosity of the pre and post-Medicare benefit, are similar across state and local governments.

For some states, we were unable to locate any information on AALs for education and/or other local workers. (In many of these cases public officials in the state confirmed that no systematic collection of information has occurred on local OPEB obligations.) In these instances, we use Census Bureau counts of local government education and non-education employment and similar counts of state government employment. Specifically, we set the scale factor s equal to the ratio of the count of local employees in question (education or non-education) to the count of employees covered in the state GASB report. For example, if we are lacking information on the aggregate AAL for non-education workers and the state GASB report covers only state workers, we set s_o equal to the number of local workers divided by the number of state workers. As before, we are assuming that the state workers provide a reliable proxy for the local workers in terms of factors which determine the contour of the cash flows. In addition, though, we are further assuming that the per-active worker generosity of the program can be proxied for by the state cash flows. The validity of this assumption rests on the fact that state and local governments must compete for workers in the same labor market. We acknowledge, though, that the procedure is imperfect.

We handle state government employees not covered in the primary state GASB in an analogous fashion to our treatment of local workers. When we are able to obtain an AAL for the group, we base s on this. Otherwise, we rely on the ratio of the number of state government employees in the relevant category—e.g. higher education—to the number of workers covered by the general state report.

Appendix Table A1 contains the scaling factors for all of the states as well as detailed information on the sources of information underlying these scaling factors. The table also covers

a few cases in which the state retiree health plan covers some, but not all, of one of the local worker categories. (This typically arises when localities have the choice of opting into the state retiree health program.) These situations are handled on a case-by-case basis as discussed on Table A1. In all cases, we have sought to obtain the best estimates possible for a given state, as opposed to enforcing uniformity in the method at which these estimates are derived across the states.

Results

Figure 1 presents some simple plots of the nominal liabilities for retiree health that we calculate from the GASB reports. Panel A shows the total annual PVB and the AAL for the entire U.S., and Panel B decomposes these into a set of projections for retirees and current workers (actives). As would be expected, the liabilities for the existing retirees fade over time. (Only one estimate is shown for retirees because the PVB equals the AAL for this group as all obligations for retirees are fully accrued.) Liabilities for current active workers rise over time, driven by actives moving into retirement and the increase in the cost of providing medical care. The obligations peak somewhere around 2040 for most states. At this point, mortality begins to dominate medical cost inflation and the annual liability begins to fall. The fact that costs for Medicare-eligible retirees (age 65+) are generally less than costs for pre-Medicare retirees also plays a role.

Table 1 reports the AALS and PVBs of the retiree health insurance obligations for our estimate of the joint retiree health obligations of state and local governments, using the EAN method to calculate the AAL and imposing a uniform discount rate of 5 percent across the states. The 5 percent discount rate is equal to the rounded average of the state-chosen discount rates and is used only to impose uniformity (i.e. it does not reflect a position on what is the appropriate discount rate.)[5]

Column (1) of the table reports the scaling factor that we used to gross up the state obligations and assets to capture the retiree health obligations of local governments. For some states, like Delaware, New Jersey, and Hawaii, all local workers receive their retiree health benefits through the state plan, and no grossing up is necessary. In other states, like Minnesota and Florida, the state retiree health plan covers only a small fraction of the state and local workers who receive retiree health insurance.

[5]Appendix Table 2 presents our estimates for the state plans alone, before we apply our grossing up factors, and using the AAL method and discount rate assumption in the GASB reports. These are similar to presentations of stated liabilities which have been made by Clark and Morrill (2010, 2011) and Pew (2012).

As shown in the row at the bottom of the second page of Table 1, labeled "U.S.", the scaling factor *s* equals 1.2 for the nation as a whole.[6] The scaling factor can be decomposed into the portion based on the reported retiree health liabilities of local governments (as well as reported state liabilities outside the primary plan) and the portion due to inflating based on census public employee counts: The portion due to stated liabilities is 0.66 and the portion due to employee counts is 0.52. Thus, for the U.S. as whole, 46 percent of the state and local government cash flow is based directly on our reverse engineering of the state reports, 30 percent is based on scaling up the estimated cash flows on the basis of reported local government liabilities, and the remaining 24 percent is based on scaling up on the basis of employee counts. The 24 percent due to employee count scaling is clearly the portion of our estimates subject to the most uncertainty. In order to assess the likely accuracy of the employee count scaling, we examine the 9 states for which we account for local education liabilities by scaling up on the basis of stated liabilities in CAFRs or local education GASB reports. For these states, we recalculate the local education liabilities using the employee count method. The results are encouraging as the employee count scaling method produces an aggregate liability equal to 93 percent of the aggregate liability produced using the local liability scaling method. On average, the employee count method appears to produce a reasonable scaling factor.[7]

For the U.S. as a whole, we estimate that accrued state and local government retiree health care liabilities exceed 1.1 trillion dollars. In contrast, PEW (2012) focusing only on state-administered plans and utilizing the state chosen discount rate and actuarial methodology, estimates accrued liabilities of $660 billion. Most retiree health plans are largely unfunded, so there are generally only modest differences between the AALs and the unfunded AALs (UAALs), defined as the AAL less the assets in a dedicated trust fund. Specifically, we estimate that for the U.S. as a whole, retiree health benefits are 98 percent unfunded, although Ohio, Arizona, and Oregon are only about 60 to 70 percent unfunded.[8] Similarly, PEW (2012), focusing on state-run plans, estimated that they were 95 percent unfunded. Turning to the right-hand side of Table 1, using the broader PVB concept, which incorporates liabilities associated with the future accruals of current workers, results in a liability estimate of $1.5 trillion.

Retiree health obligations for state and local workers vary tremendously across the states, with the present value of accrued actuarial benefits ranging from a low of nearly 0 percent of state and

[6] The 1.2 scaling factor for the U.S. can be calculated as the weighted average of the scaling factors across the states, with the weights equal to each state's AAL liability. The scaling factor is extremely similar if the weights are instead set equal to each state's PVB liability.

[7] The 9 states are the states for which we account for the local education liabilities in isolation – i.e. not as part of a general scaling up including more than just local education. See Appendix Table 1. Unfortunately, the manner in which we collected the non-education local scaling factor makes conducting this exercise for the non-education local liabilities cumbersome. We intend to conduct the exercise in a future draft.

[8] In most cases we do not observe assets associated with local workers who are not covered by the primary state plan. In these instances we assume the percent unfunded is equal to percent unfunded in the primary state plan. This likely overstates the level of assets at the local level as local plans appear to generally hold lower level of assets than state plans. In any case, the level of funding is sufficiently low that assumptions over local asset levels are unlikely to significantly influence the results.

local revenue (Idaho) to a high of 110 percent (Illinois). Figure 2 shows the distribution of the PVBs and UAALs across the states. More than half of our states have PVBs that are less than 50 percent of 2011 revenues, but a number of states have PVBs approaching or exceeding 100 percent of revenues. A similar pattern is found with the unfunded accrued liabilities (UAALs): many states have seemingly small obligations, but there are a few states with more significant unfunded liabilities.

Expenditures for retiree health care are not available in any of the standard datasets covering state and local government budgets produced by the Census Bureau. (The expenditures are lumped together with a variety of other types of expenditures.) Thus, our estimates of these annual expenditures are of substantial interest. We find that in 2011, total outlays--including any deposits or withdrawals from trust funds--equaled around $31 billion, equal to nearly 1 percent of total state and local government revenue.

One way of gauging the severity of the fiscal stress associated with retiree health obligations is to compare them with the much more thoroughly studied obligations of state and local pension plans as measured in Novy-Marx and Rauh (2013). The benefits provided by retiree health plans are typically much smaller than those provided by pension plans, both because the average retiree pension is larger than average health expenditures and because the cost of retiree health insurance falls sharply at 65 once retirees become eligible for Medicare. On the other hand, continuing rapid growth in health costs mean that retiree health expenditures rise at a faster pace than pension benefits.

In order to place the pension and retiree health and pension benefits on the same footing, we discount both types of streams using a 5 percent discount rate. (Below we explore variations in the discount rate.) On average across the states, the present value of retiree health benefits is 20 percent of the present value of pension benefits.[9] However, as shown in the top panel of Figure 3, there is a wide variation across the states. In 19 states, the retiree health PVB is less than 10 percent of the pension PVB; in 7 states, the retiree health PVB is 50 percent or more of the pension PVB.

But most state and local pension plans are significantly better funded than the retiree health plans. Comparing the unfunded liabilities, we find that the retiree health UAAL is 47 percent of the pension UAAL. As shown in the bottom panel of Figure 3 and on Appendix Table A3, in 10 states the retiree health UAAL is 75 percent or more of the pension UAAL. Thus, while the fiscal strains associated with retiree health obligations are, on average and for almost all states, smaller than those associated with pensions, they are not insignificant. Furthermore, Figure 4 shows that there is some correlation between the size of the unfunded pension liability and the size of the unfunded retiree health liability, with states like Illinois, New Jersey, Connecticut, Hawaii and Michigan all showing sizable unfunded liabilities as a share of revenue for both

[9] The state-by-state comparisons of pensions and retiree obligation are reported in Appendix Table A3.

types of employee post-retirement benefits. On the other hand, a number of the states with large unfunded pension liabilities have relatively small unfunded retiree health liabilities, including Virginia, California, and Ohio.

PEW (2012) finds a much greater relative importance of retiree health obligations. While we find that unfunded retiree health care liabilities amount to around 50 percent of unfunded pension liabilities, they estimate a ratio of nearly 85 percent. The difference is potentially accounted for by a number of factors. On one hand, PEW only considers state- run retiree plans. As pensions have a higher propensity to be state run than do retiree health plans, this difference works to make our ratio larger than PEWS and therefore cannot explain the discrepancy. On the other hand, PEW's liability estimates are based on the state-chosen discount rate. As states typically use a substantially higher discount rate for their pension obligations than for their retiree health care obligations, using the state-chosen rate works to raise PEW's estimate of the ratio of health to pension benefits relative to our estimates (which hold the discount rate constant across the two types of liabilities).

Alternate Assumptions

As noted above, once we have projected the cash flows for each state and calibrated them, we can easily adjust any of the input assumptions and recalculate the PVB under the alternative assumptions. For example, Table 2 shows that the PVBs are quite sensitive to the assumed discount rate. For the US as a whole, using the federal government borrowing rate (the rate on the zero-coupon Treasury yield curve) to discount the cash flows yields a PVB that is about 20% higher than using a corporate borrowing rate (the rate on the AA Nonfinancial corporate yield curve). The sensitivity of the AALs, which are more heavily weighted toward current benefits (as many of the far off future benefits are as yet unaccrued) is just a bit less, with the AAL using the federal rate just 17 percent over the AAL using a corporate rate. Appendix Table A4 presents the state-by-state results under the discount rates considered on Table 2.

In the pension and retiree health care comparison above, we use a uniform 5 percent discount rate in order to compare the magnitude of the pension and health care liabilities on a consistent basis. Financial economics, though, argues that liabilities should be discounted at a rate that reflects their risk. Pensions have strong legal protections and there are historical examples of municipalities defaulting on debt obligations while preserving their pension obligations (Brown and Wilcox 2009). These facts argue for discounting public pensions with a risk-free rate (Novy-Marx and Rauh 2009, 2011). The situation is somewhat less clear for retiree health care obligations. First, these obligations have substantially weaker legal protections than do pension promises (Clark 2009). Second, numerous states and localities have reduced the generosity of, or even eliminated, the benefit in recent years. It is thus not clear that these employee benefits should be viewed as a promise which will be provided in all states of the world. If retiree health

insurance is viewed as a benefit provided at the discretion of the government in question, as opposed to as a promise, a discount rate in excess of the risk free rate should be used. If the pension AALs are discounted by the risk-free rate implied by the Treasury yield curve, while the health AALs are discounted with a uniform 7 percent rate reflecting their far less certain nature, the ratio of health-to-pension liabilities for the nation falls from 47 percent to 26 percent.

Table 3 examines the sensitivity of the retiree health benefit liabilities to the assumption about health care cost growth. The assumptions underlying the GASB reports almost universally assume that health care costs will slow over time, but often to a rate that continues to exceed inflation and compensation growth. In contrast, both CBO and the Center for Medicare and Medicaid Services (CMS) assume that health cost growth will slow over time to a rate more closely in line with per capita GDP. CBO, for example, assumes that the "excess cost growth" in Medicaid and private insurance premiums—defined as the excess of health cost growth per beneficiary over GDP per capita—declines gradually from 1.6 percent in 2011 to 0 percent by 2087.[10] In addition to differences in "excess" cost assumptions, states also differ in their assumptions about long-term inflation, which likely also contributes to differences in expected health inflation.[11]

Applying the CBO's assumptions for medical cost inflation to the retiree health liabilities allows us to compare the cash flows across the states on a consistent basis. Doing so lowers our measure of the PVB and AAL for state and local retiree health liabilities by an average of 10 percent. There is significant heterogeneity, though, across the states in terms of the effect. In three states (Michigan, Ohio, and West Virginia), the CBO health cost assumption boosts the PVBs slightly. In the remainder of the states the PVBs decline. In 7 states, the decline is quite large, exceeding 25 percent.[12]

Most state projections of retiree health obligations assume that life expectancy remains constant over the forecast horizon—an assumption at odds with historical experience and with the methodology used by the actuaries for the Social Security Administration and CBO.[13] Table 4 reports the effect of allowing life expectancy to increase over time. We use the state's own estimate of mortality rates for 2011, but then allow these mortality rates to decline over time according to the rate of decline assumed in each of the three sets of assumptions used by Social Security (low, intermediate, and high—where low assumes the smallest increase in life expectancy, and high the largest). Allowing life expectancy to increase raises the present value of the retiree health obligations. Assuming that life expectancy increases according to Social

[10] See Congressional Budget Office, The 2012 Long-Term Budget Outlook, June 2012 and Table 6 in the Supplemental Material at http://www.cbo.gov/publication/43288.
[11] Of course, states vary in how they determine health cost inflation and it is not clear if they would adjust their expected health cost inflation one-for-one with differences in their long-term inflation rates.
[12] Appendix Table A5 presents these results on a state-by-state basis.
[13] CBO uses Social Security's mortality assumptions in their long-run budget projections.

Security's intermediate assumptions boosts the average AAL and PVB by about 7 percent; this increase rises to 13 percent under the assumption of faster life expectancy increase.[14]

Table 5 reports our preferred estimates of the present value of retiree health obligations, using the EAN methodology, CBO excess cost growth, the intermediate assumptions for life expectancy, and a 5 percent discount rate. These assumptions seem reasonable to us, and also allow us to easily compare our projection for the state and local sector as a whole to CBO's projection for the federal sector. As can be seen from the last line of the table, on average, our assumptions result in a slightly lower estimate of the retiree health obligations than that gleaned from the state reports—with the unfunded accrued liability 5 percent lower, and the present value of benefits 15 percent lower. However, the table reveals significant heterogeneity across states: Harmonization increases 10 states unfunded AAL by 30 percent or more, while it decreases 9 states UAAL by 20 percent or more.

III. The Sustainability of Retiree Health Care Benefits

The existence of unfunded accrued liabilities tells us little about the sustainability of retiree health benefits or about the fiscal pressures associated with them. To a large extent, states and localities operate their retiree health insurance as a pay-as-you-go program, and all programs with a pay-as-you-go component—including Social Security and Medicare—have unfunded accrued liabilities. But these programs are only unsustainable if their costs rise at a faster pace than the underlying stream of revenue with which they are funded. Programs can become unsustainable if (1) there are demographic changes that increase the growth in outlays and/or lower the growth of revenues (2) benefits rise faster than the underlying source of revenue because of increasing benefits promised over time or (3) a program that had been fully or partly financed experiences a drop in the value of the assets (thus increasing the size of the unfunded portion).

The aging of the baby boom appears to play a surprisingly small role in the increase in retiree health outlays over time, at least on average. Figure 5 plots the sum of the annual retiree health obligations across the states for *current* workers and retirees as a share of national GDP, as projected by CBO. The figure uses our harmonized discount rate and mortality assumptions, but compares a variety of health care cost assumptions. The red line shows the trajectory of retiree health obligations under the assumption of 0 excess health costs—health costs per beneficiary simply rise with GDP per worker. Under that assumption, retiree health obligations decline a bit as a share of GDP between now and 2030; in contrast, social security obligations as a share of

[14] Many experts argue that Social Security's intermediate projection underestimates the likely increase in life expectancy (e.g. National Research Council 2012).

GDP rise about 20 percent (from 5 percent of GDP to 6 percent of GDP) in that same time period.[15]

These graphs are based on the cash flows that we estimated from the GASB report, and do not account for the future benefits of any employees hired after 2011, nor for any demographic changes in the future workforce. In order to assess the fiscal pressure retiree health obligations are likely to impose in the long run, it is necessary to construct a projection that includes these workers, and it is also necessary to construct a projection of state GDP and tax revenues. We do this by (1) projecting population by state; (2) using these population projections to construct projections of GDP and state and local employment; (3) using the projections of total state and local employment to create a stream of new state and local government workers, and feeding these workers through our machinery to predict future retiree health benefits.

Population Projections

We use the Census Bureau's most recent set of state population projections from 2000-2030 by age and sex, which were based on the 2000 census and released in 2005, and extrapolate them beyond 2030. Unfortunately, the Census Bureau has stopped producing these estimates, and thus our estimates are somewhat dated. Nonetheless, the basic population dynamics, which are summarized in Table 6, are not likely to have changed for most states. For the country as a whole, the adult share of the population declines by 5 percentage points by 2030, the kid share of the population declines by 1 percentage point, and the aged share of the population—the share of population aged 65 or greater—increases by 6 percentage points. The aged dependency ratio—the ratio of the aged population to the working age population—rises 14 percentage points for the country as a whole, from 23 percent in 2011 to 37 percent. There is some variation across the states, although most exhibit this basic pattern. Figure 6 plots the distribution across the states in the change in the adult population (top panel) and the change in the aged dependency ratio (bottom panel). Almost half the states show an increase in the aged dependency ratio of between 12 and 15 percentage points, but some states (Utah and Texas, for example) have somewhat smaller increases, while other states (Montana, Wyoming, and New Mexico) show much larger increases.

Our calculations beyond 2030 assume a gradual convergence (over 55 years) between each state's age-specific population growth rates and the national ones produced by the Social Security administration. Specifically, we calculate the percentage difference between each state's growth rates for kids, adults, and the elderly and the national growth rates for these groups from 2025 to 2030, and assume that this difference dissipates at a constant rate between 2030 and 2085, so that, by 2085, all states have the same growth rates for kids, adults, and the elderly.

[15] The annual pension outlays calculated by Novy-Marx and Rauh 2013, which are based on very similar demographic data, also show no demographic bulge for current workers.

We then add up the total population of kids, adults, and elderly, and apply a multiplicative calibration factor to adjust each year's population so that the totals match the Social Security total population.

State GDP Projections

We use the population projections to develop our baseline state GDP projection. Our methodology is as follows. We take CBO's projection of nominal national GDP by year and divide it by our projection of the population aged 20 to 64 to get a measure of GDP per adult population, which, assuming no changes in adult labor force participation, should be proportional to GDP per worker. For each state, the growth rate of GDP per year is assumed to be equal to the growth rate of the adult population, taken from our population projections, plus the growth rate of GDP per worker, which we assume does not vary across the states. Thus, we assume that there is no convergence or divergence in state rates of productivity growth, and deviations in the growth rate of GDP across states stem only from differences in demographics. States with more slowly growing working age populations are expected to grow more slowly than other states. As shown in Table 7, using this methodology results in an average nominal GDP growth rate of 4.4 percent per year, with estimates by state ranging from lows of around 3¼ percent (West Virginia) to 6 percent (AZ). Figure 7 shows the distribution of our projected GDP growth rates across the states.

We acknowledge the significant uncertainty surrounding our state GDP estimates. Unforeseen events can alter the trajectory of growth in a given state. For instance, our estimates suggest that, among the 50 states, North Dakota will have the lowest average rate of GDP growth going forward. However, the recent and rapid growth in the state due to the boom in shale oil raises the possibility that this prediction will be incorrect. More generally, although both our assumption about the rate of convergence between the state-specific Census population growth rates and the national ones and the assumption of no convergence or further divergence of productivity growth across regions seem reasonable to us as a baseline projection, they are nonetheless ad hoc and worthy of further study.[16]

Projecting New State and Local Government Workers

Once we have our state population and GDP projections, the methodology to create new workers is straightforward. We assume that state and local payroll rises with projected state GDP. Under the assumption that wage growth in the state and local government sector rises with productivity growth in the general economy, we can then calculate the total workforce of the sector by state, which is just equal to the existing workforce covered by retiree health insurance in 2011 multiplied by the growth rate of the adult population. To create new entrants to the workforce,

[16] We plan to perform some sensitivity analysis to these assumptions in the next draft of the paper.

we simply add employees to the remaining existing workforce year by year in order to hit this total target workforce. We assume that new employees enter the workforce at the same ages as the existing workforce—that is, we use the age distribution of those with less than 1 year of service from the GASB reports to determine the age distribution of new workers. Once these workers are added to the stock of existing workers, we simply assume that they flow through the work years with the same termination, disability, mortality, and retirement probabilities as the existing workforce.

Figure 8 shows our projection of the state and local labor force for the workers covered by the state GASB reports. The top panel shows our workforce projection. The total workforce (the blue line) rises slowly over time in step with our projected rise in the adult population by state. Over time, the existing workers quit or move into retirement, and are replaced by newly hired workers. The bottom panel of the figure shows the streams for retirees. Given the GASB report assumptions on employee turnover and eligibility, the share of current workers eventually receiving retiree health benefits is quite low. Even including retirees from newly-hired workers, there is no large bulge in the population of retirees, despite the significant increases in the share of the elderly population in all the states. As a comparison, Figure 9 compares the ratio of retirees to workers in our projections to those projected for Social Security, where the social security line reports the ratio of beneficiaries to covered workers over time from the 2013 Trustees Report.

There are several possible explanations for this difference between our retiree health demographics and those of Social Security. First, it is clear that many states and localities have already taken measures to lower the costs of their retiree health benefits: these include eliminating the programs for newly-hired workers, increasing the years of service required to qualify, and increasing employee contributions (which lowers projected take-up, thus lowering our projection of future beneficiaries.) Second, it is possible that more general changes in the labor market have had an impact on retiree health benefits. For example, increased labor mobility over time may have lowered the probability that a given worker will be eligible for retiree health insurance and the increase in two-worker households may have lowered the probability that retirees elect spousal coverage. Finally, states may be systematically overestimating quit and firing probabilities or underestimating take-up. We find the lack of a demographic bulge puzzling and think it is worthy of further study.

Retiree Health Financing over the Long Run

With our projections of flows into retirement from newly-hired workers, we can now project retiree health costs on an on-going basis. It is unclear whether excess cost growth should be considered a factor over the long run, because the answer depends on the incidence of these costs. In a perfectly competitive labor market, workers would be paid their marginal product, and changes in excess cost growth would affect the mix of compensation, but not the total amount. Of course, even under this assumption, excess cost growth for existing retirees, and to a

lesser extent, existing workers, needs to be taken into account, as it might have already been "paid for" in the form of lower wages during the working years (and, in any case, it reflects the expected costs of retiree health benefits under current policy). But for future workers, it might make sense to assume that total compensation is invariant to excess health costs, and so any increase in retiree health benefits would be offset by lower compensation elsewhere.[17] Under that assumption, these estimates can be viewed as upper limits on the total fiscal stress associated with retiree health liabilities.

Figure 10 presents our estimate of national retiree health costs over the long run as a share of total revenue of the state and local government sector, where total revenues are assumed to rise with state GDP. The blue line displays 2012 outlays for retiree health (including any contributions to trust funds). The red, green, and purple lines represent the projected retiree health costs under three different assumptions about excess health costs: our baseline, which uses CBO health cost growth, an alternative in which health costs grow with wages and there is no excess cost growth, or a third alternative in which excess cost growth is a constant 1.6 percentage points up until 2100 (the CBO value for 2012)[18].

One way to concisely summarize the imbalances represented in the figure is to calculate the percentage change in revenues that would be required to set the present value of costs equal to the present value of revenues. Call the present value of state *i*'s revenues $PVR_j = \sum_{2012}^{\infty} \frac{Rev_{j,t}}{(1+i_t)^{t-2012}}$, the present value of retiree health costs $PVC_j = \sum_{2012}^{\infty} \frac{Costs_{j,t}}{(1+i_t)^{t-2012}}$, the current spending on retiree health benefits as a share of revenues as c_j, and the assets held in a retiree trust fund A_j.

Then, r_i, the constant change in revenues or expenditures as a share of total revenues that would put the retiree health program into long-run balance satisfies:

$$(\mathrm{r}_j + c_j)PVR_j + A_j = PVC_j$$

or

$$r_j = \frac{PVC_j - A_j}{PVR_j} - c_j.$$

The value we choose for c_j, is quite important, as we are calculating fiscal stress as the excess needed over what is currently being contributed. Our current methodology is to set the

[17] Health insurance costs for current workers also rise with excess costs, yet we do not model payroll costs as rising over time because of this factor.
[18] Health costs have to eventually slow to the rate of GDP growth or they will end up comprising 100% of GDP.

contribution, c_j, equal to the value in 2011. This may be somewhat problematic as 2011 was an unusual year both in terms of state contributions to trust funds and in terms of the level of state and local revenues. In future work, we will examine the effect of using an average value of retiree health expenditures over several years—including pre-recession years.

Table 8 tabulates the required revenue increases by state under the three assumptions about excess cost growth. Nationally, we calculate that a 0.6 percentage point increase in revenues, starting in 2012, would, under the CBO health cost assumption, produce enough revenues such that retiree health expenditures would be financed in perpetuity. Without excess cost growth, our calculations suggest that no adjustment would be necessary—a reflection of the lack of demographic bulge discussed earlier. With continued excess cost growth (and assuming that the value of future retiree health benefits rises as health costs rise and other compensation does not decline), the adjustment would be much larger, about 1.7 percent of revenues. There is, of course, considerable heterogeneity across the states with the required adjustment for the some states, with the states experiencing the greatest increases in expenditures requiring an adjustment of 1 percent to 2.5 percent of total revenue.

These calculations represent only one possible way in which states could manage these costs. For example, if states wanted to move toward full funding, the increase in revenues necessary would be greater at first, but lower later. States may wish to prefund for a number of reasons. For instance, the benefit may be viewed as less risky, and hence more valuable, by current workers if it is pre-funded. On the other hand, if states do continue to finance these programs on a mostly pay-as-you-go basis, they could simply allow expenditures on retiree health to increase over time, financing them with additional revenues or cuts in other state and local spending. In any case, these statistics present a useful way of comparing the size of the problem across the states. In addition, they take into account the different expected growth rates of states (which is reflected in the present value of revenues).

IV. State and Local Long-Term Budget Projections

A further gauge of the severity of the financial stress associated with state and local government retiree health obligations is to compare them to the more general fiscal conditions facing the state and local sector. States facing other sources of fiscal stress—like rapidly growing Medicaid expenditures--would find it more difficult to deal with retiree health liabilities than states in otherwise good fiscal conditions. In this section of the paper, we develop the broader long-term budget projections for the state and local sector, using the state-specific population and GDP projections.

We examine state and local governments within a state as a single, aggregated unit. For most budget items, we define "current policy" as the policy that maintains the budget item's share of state GDP over time. Thus, revenues such as taxes and fees are generally assumed to rise proportionally with state GDP. We divide expenditures into demographically-sensitive and

demographically-insensitive categories. Demographically-sensitive categories are expenditures likely to respond to a shift in the age distribution of a state. In addition to pension benefits and retiree health care, the demographically-sensitive expenditure categories consist of Medicaid, K-12 Education and Higher Education. We also account for excess cost growth in Medicaid. These expenditures rise over time according to the methodology described below.

All other expenditures are assigned to the demographically-insensitive category and are assumed to increase with state GDP. This assumption of constant GDP shares seems to be a reasonable estimate of a current policy baseline and is the assumption used by the Congressional Budget Office (CBO) for their long-run projections of federal discretionary spending.[19]

Pension Projections

We also needed to supplement the pension cash flows provided to us by Novy-Marx and Rauh to account for new workers, as their flows only account for current workers and retirees. Given that our goal is to project government deficits in the state and local sector under a current policy framework, we would prefer to project pension benefits on a continuing basis. Unfortunately we lack the machinery to produce the pension benefits for new workers in the manner done for the retiree health liabilities. As a substitute, we handle new workers along the lines of Novy-Marx and Rauh (2013). Specifically, we assume that workers hired in years after the baseline year are ineligible for the traditional defined benefit pension (DB) plan and instead are placed on a defined contribution (DC) plan. Under the DC plan, the state places 10 percent of the employee's annual wage into a private retirement account each year. Furthermore, in states in which workers were not covered by Social Security, the new workers are placed onto Social Security and the state is assumed to cover both the employer contribution and, through a wage increase, the employee contribution. To construct the flow of new workers, we use state and local pension-covered payroll (taken from Census Government Finance Statistics) as a share of state GDP in 2011 as the basis of our projection. We then assume that total employment increases with the growth rate of the adult population, and assume that the share of workers who are newly-hired is the same as for the retiree health calculations discussed above.

Medicaid Projections

Population aging can affect state Medicaid expenditures because per capita Medicaid spending varies by age. One often cited statistic is that two-thirds of Medicaid spending is allocated to the disabled and the elderly, suggesting that population aging will result in a large boost to Medicaid outlays. [20] However, Medicaid spending on the elderly alone is a much smaller share of overall spending—just 21 percent in 2010—so, nationally, demographic change is not likely to be a

[19] We assume that total compensation rises with GDP, thus implicitly assuming that any excess cost growth in the health insurance costs of *existing* workers is offset by lower wages or other benefits.
[20] For example, see Center on Budget and Policy Priorities, "Policy Basics: Introduction to Medicaid," http://www.cbpp.org/cms/index.cfm?fa=view&id=2223. May 8, 2013.

major driver of state Medicaid expenditures. But there is a lot of variation across states in the extent of aging and the distribution of Medicaid expenditures by age, so it is possible that the effects of demographic change on Medicaid could vary among the states.

Our procedure to estimate the effects of state-specific effects of population aging is as follows. For each state, we calculate per capita Medicaid expenditures in fiscal 2009 for three demographic groups: children, non-elderly adults, and the aged.[21] Our measure of per capita Medicaid spending for a demographic group is equal to total state Medicaid expenditures allocated to the group (for example, total Medicaid spending on children) divided by that group's population (for example, total number of children in a state). Per capita expenditures for each demographic group will vary across states both because of differences in the level of per enrollee Medicaid spending on the group and because of differences in the proportion of the group population that is enrolled. We then adjust the base year per capita spending by demographic group to account for the likely effects of the ACA on state Medicaid spending, assuming that all states choose to take up the ACA's Medicaid expansion.[22]

Our estimates of the effect of aging on Medicaid spending by state assume that per capita expenditures by demographic group are constant over time; average per capita Medicaid expenditures change because the share of the population in each demographic group changes.[23] Define mk_i, ma_i, and me_i as the state-financed per capita Medicaid spending in state *i* in the base year for children, non-elderly adults and the elderly, respectively. Define pk_{it}, pa_{it}, and pe_{it} as the

[21]Kaiser State Health Facts provides the state share of Medicaid spending by eligibility category: children, nonelderly disabled, nonelderly adults, and the elderly for each state (www.statehealthfacts.org). The disabled category excludes all Medicaid beneficiaries ages 65 or older, but includes both disabled nonelderly adults and disabled children. Although there is no published age distribution of disabled Medicaid beneficiaries, the age distribution of the nonelderly SSI population –which is 20 percent children and 80 percent nonelderly adults--should be a reasonable proxy. (Distribution of Supplemental Security Income (SSI) Beneficiaries by Age, Kaiser Family Foundation State Health Facts, 2010. http://kff.org/medicaid/state-indicator/distribution-of-total-ssi-by-age/).

[22] Our methodology to adjust for the ACA is as follows. We use the estimates of the effects of the ACA on Medicaid spending by state over the 2013-2022 period from Holahan, Buettgens, Carroll, and Dorn (2012). The ACA is expected to increase Medicaid expenditures by expanding eligibility for non-elderly adults and by increasing take-up among those already eligible for Medicaid under current law. We assume that all of the increase in Medicaid expenditures associated with the eligibility expansion is spent on adults, and that the increase in expenditures related to higher take-up rates is allocated to both children and adults in proportion to their pre-ACA expenditures. We adjust the Urban Institute's estimates so that they reflect the costs to states once the ACA is fully phased in. (The federal share of expenditures for the newly-eligible population is 100 percent for the first three years of the program, and then declines gradually to 90 percent; we calculate the cost to the states as if their share were 90 percent.) We then calculate the percentage increase in state expenditures by demographic group and adjust our baseline data accordingly, so that it represents what spending would have been in fiscal 2009 had the ACA been in effect.

[23] By assuming that spending by age group is constant, these calculations ignore the fact that the oldest old account for most of the Medicaid spending for the aged, as they are the largest users of long-term care. Allowing Medicaid expenditures on the aged to rise with the 85+ population actually reduces the impact of demographic change on Medicaid spending between now and 2030, because the retirement of the baby boom generation actually lowers the average age of the elderly until about then.

population shares of children, adults, and the elderly in state *i* at time *t*. Then, average per capita state Medicaid spending m_{it} is just:

$$m_{i,t} = mk_i \cdot pk_{i,t} + ma_i \cdot pa_{i,t} + me_i \cdot pe_{i,t}$$

Define sk_i, sa_i, and se_i as the shares of Medicaid spending allocated to kids, adults, and the elderly in the base year. Then, then the percentage change in per capita Medicaid in state *i* at time *t* relative to the base year is:

$$\frac{m_{i,t} - m_{i,0}}{m_{i,0}} = \frac{mk_i(pk_{i,t} - pk_{i,0}) + ma_i(pa_{i,t} - pa_{i,0}) + me_i(pe_{i,t} - pe_{i,0})}{mk_i \cdot pk_{i,0} + ma_i \cdot pa_{i,0} + me_i \cdot pe_{i,0}}$$

$$= sk_i\left(\frac{pk_{i,t} - pk_{i,0}}{pk_{i,0}}\right) + sa_i\left(\frac{pa_{i,t} - pa_{i,0}}{pa_{i,0}}\right) + se_i\left(\frac{pe_{i,t} - pe_{i,0}}{pe_{i,0}}\right)$$

Table 9 presents our estimates of the effects of aging across the states in 2030. The first column reports our estimate of the impact of aging alone on Medicaid spending by 2030. We also report our estimates of the share of Medicaid allocated to each group in 2009 (with our ACA adjustment); the percentage changes in population shares by 2030 were reported in Table 6. On average, aging has a relative small effect on Medicaid, increasing expenditures 6 percent by 2030, relative to 2011. However, the effect of aging varies across the states. For example, aging boosts spending in North Dakota by 11 percent, whereas it lowers spending by 8 percent in New Mexico.

An alternative method of projecting the effects of aging on Medicaid spending would be to divide spending on the elderly into two components: spending on long-term-care and spending for other services, and calibrate the growth in elderly long-term care spending based on the share of the projections of the growth in the 85 plus population. This methodology actually shows a slightly smaller effect of aging by 2030, because the growth in the 85 plus population lags behind the growth of the 65 plus population. Given that the effects of aging on Medicaid expenditures are relatively small, and the differences between the two methodologies are likewise small, we have chosen to use the simpler method presented in the table.

Finally, Medicaid expenditures are likely to rise over time because of population growth and health cost growth. If relative health costs rise with per capita GDP, Medicaid spending would be constant as a share of GDP over time, save for the effects of the changing age distribution of the population. But per-person health costs have historically increased at a rate faster than per capita GDP— excess health cost growth discussed above. For our baseline projection, we use CBO's estimate of excess cost growth in Medicaid over the 2010-2030 period, which averages about 1½ percentage points. Thus, by 2030, the combined effects of aging and excess health cost growth increase state Medicaid spending as a share of GDP by about 45 percent on average.

Education Projections

We use a very similar methodology to project education spending. We assume that teachers' wages ($w_{Teachers}$) are proportional to the average wage in a state (w):

$$w_{Teachers\ j,t} = \xi w_{j,t}$$

and the number of teachers (*Teachers*) is proportional to the number of school-aged children in that state (*Kidpop*, assumed to be the number of people ages 6 to 18):

$$Teachers_{j,t} = \varpi Kidpop_{j,t}.$$

Also, as described above, state *GDP* is proportional to the wage bill, the wage times the number of workers, and the number of workers is assumed proportional to the working-age population:
$GDP_{j,t} = \phi w_{j,t} L_{j,t} = \phi w_{j,t} \mu Adultpop_{j,t}$

Under these assumptions, education spending as a share of GDP for state j at time t can be written as follows:

$$\begin{aligned}\frac{\text{Educ Spending}_{j,t}}{GDP_{j,t}} &= \frac{w_{Teachers\ j,t} \times Teachers_{j,t}}{GDP_{j,t}} \\ &= \frac{\xi w_{j,t} \times \varpi Kidpop_{j,t}}{\phi w_{j,t} L_{j,t}} = \frac{\xi w_{j,t} \times \varpi Kidpop_{j,t}}{\phi w_{j,t} \mu Adultpop_{j,t}} \\ &= z \frac{Kidpop_{j,t}}{Adultpop_{j,t}}\end{aligned}$$

Under these assumptions, K-12 education spending as a share of GDP moves with the ratio of school-aged children to adults. Similarly, spending for higher-education is assumed to move with the proportion of college-aged people, assumed to be ages 19 to 24**.**

Deficit Projections

With these projections of GDP and expenditures on Medicaid, education, retiree health, and pensions, and given our assumption that all other spending and all revenues rise with GDP, we can now project budget deficits by state. We model what we shall refer to as the general government deficit, which is the deficit for all government activity outside of the pension and OPEB trust funds. The state and local government general government deficit for state *s* in year *t*, $Def_{s,t}$ is defined simply as the difference between revenues and expenditures, excluding revenues and outlays from the two employee retirement trust funds. This projected deficit needs to be interpreted carefully. State and local governments operate under balanced budget rules which generally prevent them from borrowing for non-capital expenditures (National Conference of State Legislatures, 2010; Poterba, 1994). States cannot, in practice, run long-term, structural deficits. Thus, the deficit measures should be viewed as a quantification of the extent of budget stress under which the governments will find themselves, conditional on the validity of our

assumptions. Stated differently, the deficits capture the extent to which governments will have to cut expenditures and/or raise taxes in the future to address structural budget shortfalls. For this reason, we do not model a direct link between expenditures and revenue and government debt and assets (other than those in the pension and retiree health care trust funds). Thus, we assume that states do take measures each year to maintain balance in their operating accounts, and do not account for the interest payments that would be due were the sector actually to run the deficits implied by our projections. Although we do not formally model total state debt, we are implicitly assuming that states continue to issue and retire debt for capital expenditures at a rate which maintains a constant ratio of debt servicing costs to GDP and provides a constant ratio of funds to GDP available for new capital expenditures.[24]

Pension and retiree health care trust funds are generally not available for funding general government expenditures. They can generally only be used to fund retiree benefits. These trust funds are therefore considered to be outside of the general government budget and do not contribute to the calculation of annual deficits. Specifically, employee contributions to the pension trust fund are not considered to be government revenue when calculating the deficit. Nor are the annual returns on assets in the trust fund counted as revenue for the deficit calculation. Similarly, benefit payments from the trust fund are not considered as expenditures for the deficit calculation. Only government contributions into the trust fund are considered as expenditures, as are benefit payments made directly by the state when the trust fund has been exhausted.

The modeling of the trust funds is straightforward. Each year these funds receive inflows attributable to employee and employer contributions, as well as the return on stock of existing assets. We use the CBO's projection of federal borrowing rates to proxy for these returns.The return equals 2.9 percent in 2013, rises to 5 percent by 2018, and plateaus at 5.5 percent starting in 2025.[25] The funds have outflows each year equal to the value of the retiree benefits provided that year. Once the funds are exhausted, they are assumed to remain exhausted in perpetuity.

In order to focus on structural, as opposed to cyclical, budget considerations, deficits as a percent of state and local total revenue are normed to equal zero in the base year. Specifically, from each year's calculation of the deficit as a percent of revenue, we subtract the base year deficit as a percent of revenue. Thus, our budget is in perfect balance in the baseline year. This removes from the deficit the large cyclical impact of the recent financial crisis and recession. The normalization also addresses the possibility that data inconsistencies across the various data

[24] As defined by the Census Bureau, government revenue does not include the proceeds from bond sales and, similarly, expenditures do not include payments made to retire debt. Debt servicing costs, though, are included in expenditures. Expenditures made with bond proceeds, such as outlays for capital construction, are also booked as expenditures.

[25] The issue of how to account for risk in long-term budget projections is a difficult one. By using the federal government borrowing rate, we are implicitly projecting a risk-adjusted budget, assuming that any increments to the federal rate received by states and localities on their investment represents a return for holding risk.

sources may introduce persistent error into the deficit calculations. Any such error should be removed by the normalization. We acknowledge, though, that if a portion of a state's measured deficit in the base year reflects a structural budget shortfall, then our normalization may somewhat understate the magnitude of the long-run structural deficit. The presence of balanced budget rules should limit the scope of this concern, however.

Results

Figure 11 plots our projected path of deficits in the state and local sector as a share of projected state and local revenue. The dashed blue line represents the total deficit for the sector. It indicates that by end of the period displayed, 2060, state and local governments will need to cut expenditures, or raise taxes, by an amount equal to 9 percent of their total revenue in order to eliminate the structural budget deficit. The green line in the figure shows the deficit caused by retiree health obligations, using the states' own assumptions about excess cost growth. The red line shows the deficit attributable to state and local pensions. As discussed above, we assume that neither pension plans nor retiree health plans show any deficits until their trust funds are exhausted.

Pension deficits begin to drop off sharply around 2025 as state pension funds begin to be exhausted. A comparison of the green and red lines shows the effects of the trust funds: Because retiree health obligations are mostly unfunded, they exert pressure on state and local budgets long before the pension plans do, even though the size of the pension problem is greater in the long run. Finally, the yellow line shows the effect of changes in Medicaid and Education. The combination of an older population and excess cost growth in Medicaid spending present a much larger challenge to state and local governments than retiree health and pensions combined. This is unsurprising given that Medicaid accounts for a full 20 percent of state government outlays in the base year. And, although Medicaid's direct impact is only on state budgets, it seems reasonable to assume that pressures on state budgets will end up affecting local government finances as well, as higher Medicaid spending crowds out state grants to local governments.

Figure 12 divides the states up by quartiles based on the maximum deficit over the 2011-2060 period. The states with the smallest deficits, shown in Panel D, face most of their pressure from Medicaid excess costs, with neither pension nor retiree health benefits presenting too much of a challenge. The overall structural deficit in these states is relatively small, hitting a maximum of around 5 percent of revenues on average. The states with largest deficits, shown in Panel A, face challenges in all areas—retiree health, pension, and Medicaid—and have large deficits equal to around 11 percent of revenues from about 2030 onward.

Conclusion

The retiree health obligations of state and local governments have received much less attention than the pension obligations. We estimate that accrued state and local government retiree health care liabilities exceed 1.1 trillion dollars, roughly ½ of the value of accrued pension obligations. Surprisingly, our calculations suggest that there will be no significant rise in the ratio of state and local government retirees receiving health insurance to state and local government workers, so that the expected increase in expenditures for retiree health insurance as a share of GDP stems mostly from excess cost growth in health care rather than demographic change. Indeed, the effect of demographic change on state budgets as a whole is not particularly large. Medicaid expenditures, for example, rise just 6 percent on average between now and 2030 because of population aging. But even under the assumption that excess cost growth in Medicaid diminishes over time, Medicaid expenditures are projected to rise sharply, presenting a substantially larger source of pressure than either pensions or retiree health care.

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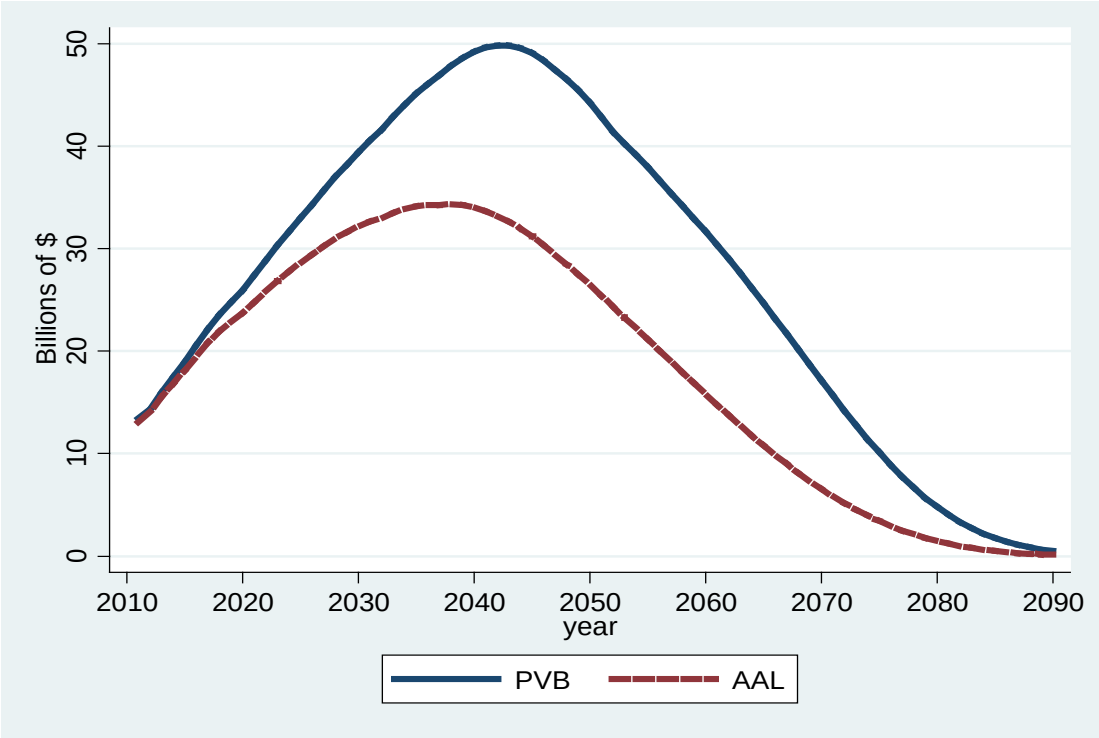
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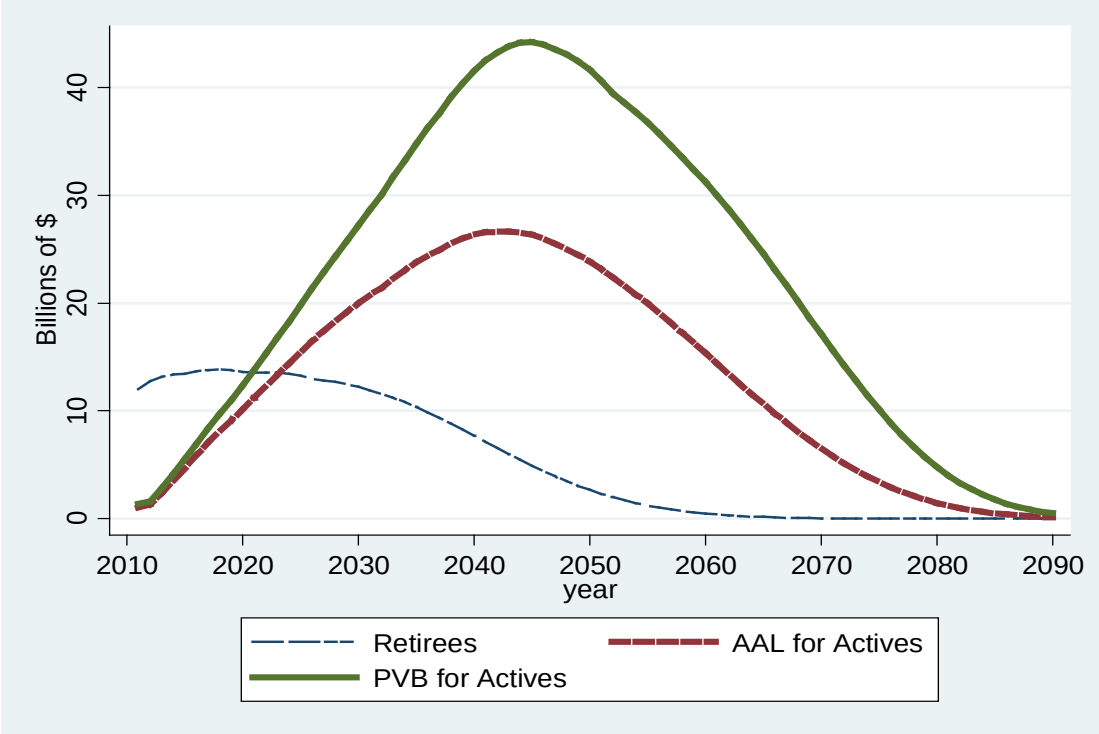
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Figure 1

Panel A: Total Retiree Health Care Liabilites, by Year



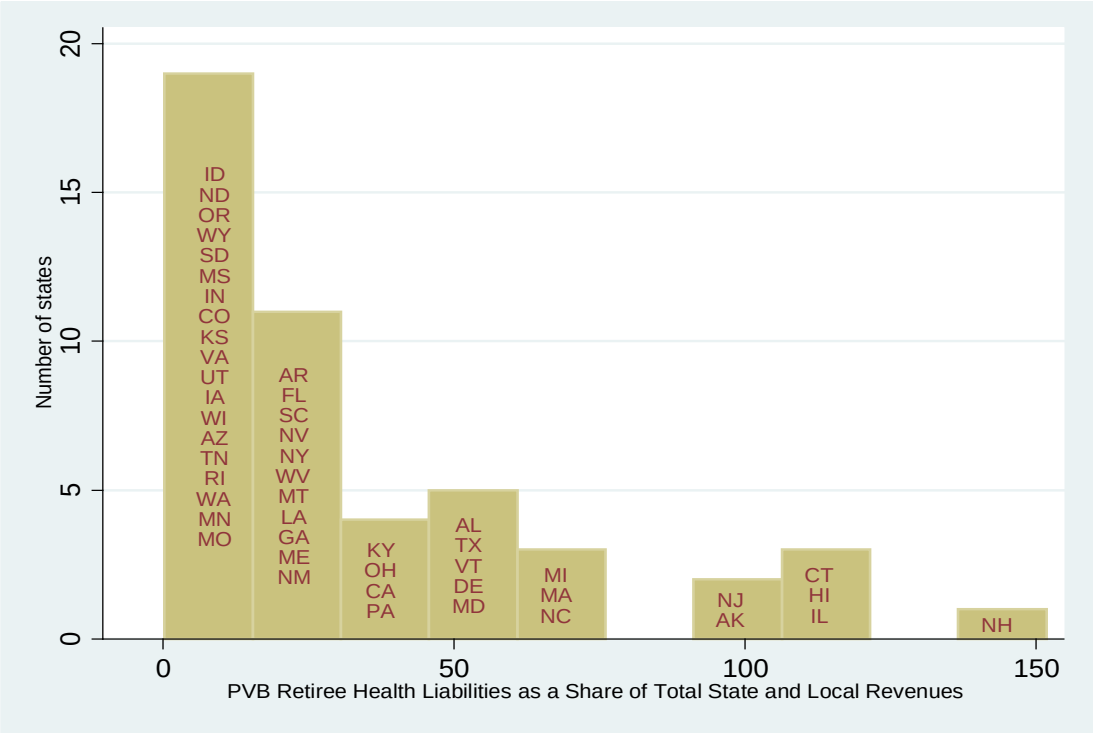
Panel B: Retiree Health Care Liabilites for Actives and Retirees, by Year



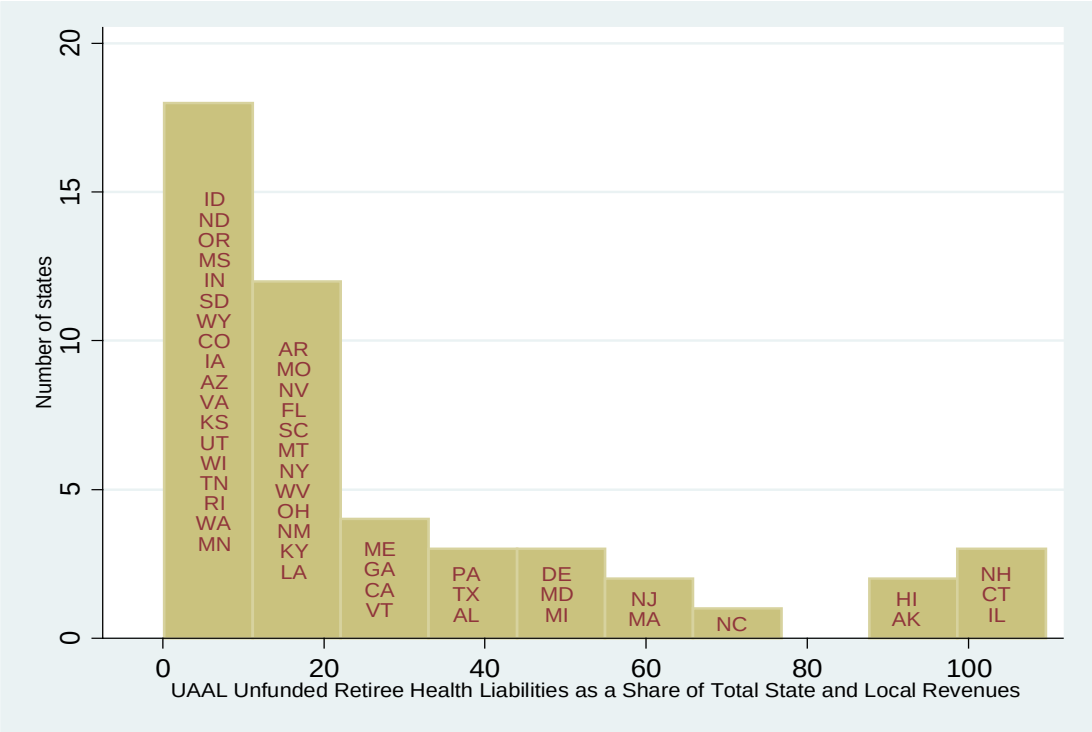
Note. The panels display cash flows for state government retiree health care obligations. The cash flows are calibrated to match the discounted value of the cash flows stated in the state GASB report. See the text for additional information. The AAL liabilites are calculated under the EAN methodology.

Figure 2

Panel A: Distribution of PVB as a Share of State and Local Revenue



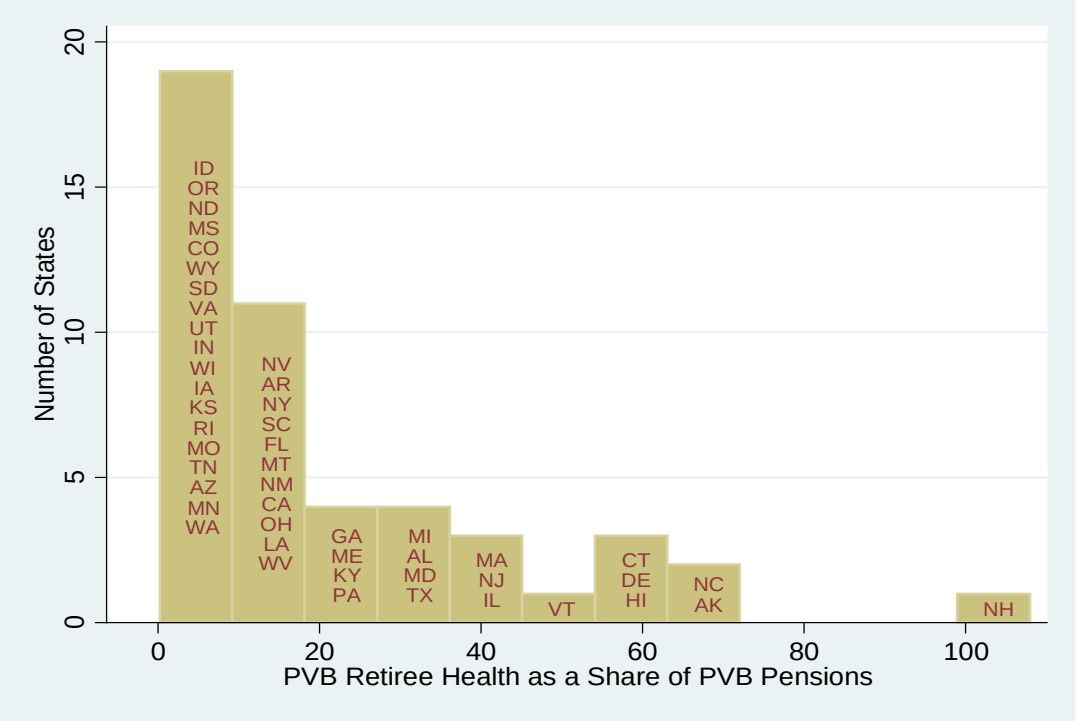
Panel B: Distribution of UAAL as a share of State and Local Revenue



All values are for the 2011 fiscal year and are produced using a 5% discount rate. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The UAAL liabilities are produced using the EAN methodology.

Figure 3

Panel A: Comparison Between PVBs - Retiree Health and Pensions



Panel B: Comparison Between UAALs - Retiree Health and Pensions

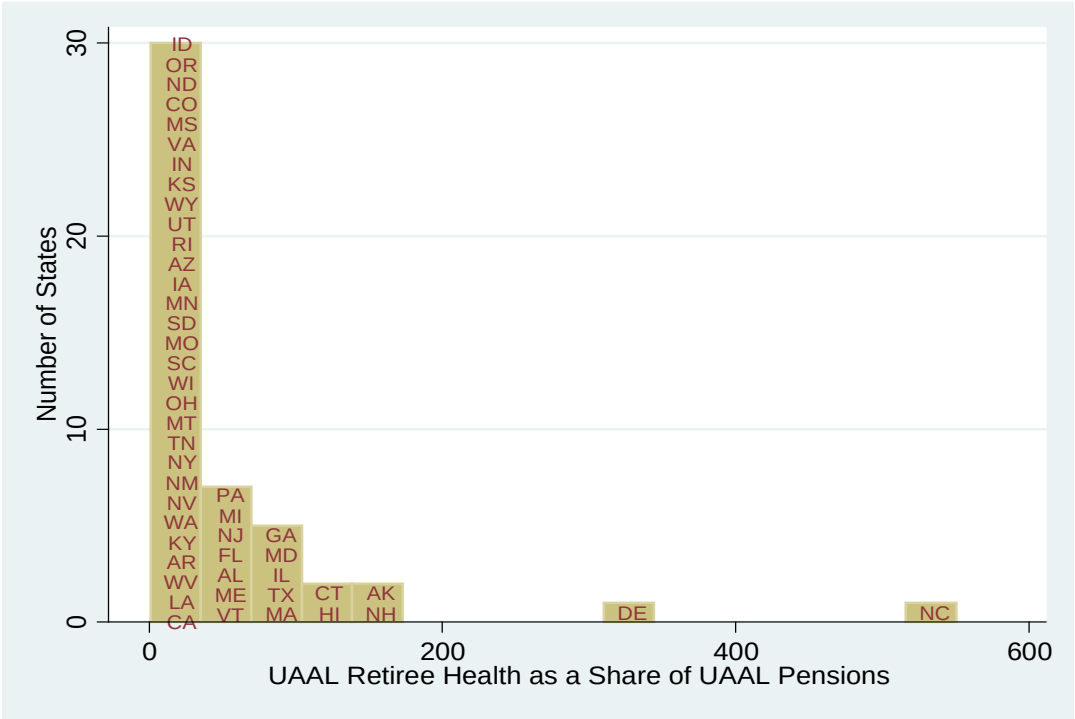


Figure 4

Unfunded Retiree Health and Pension Liabilities

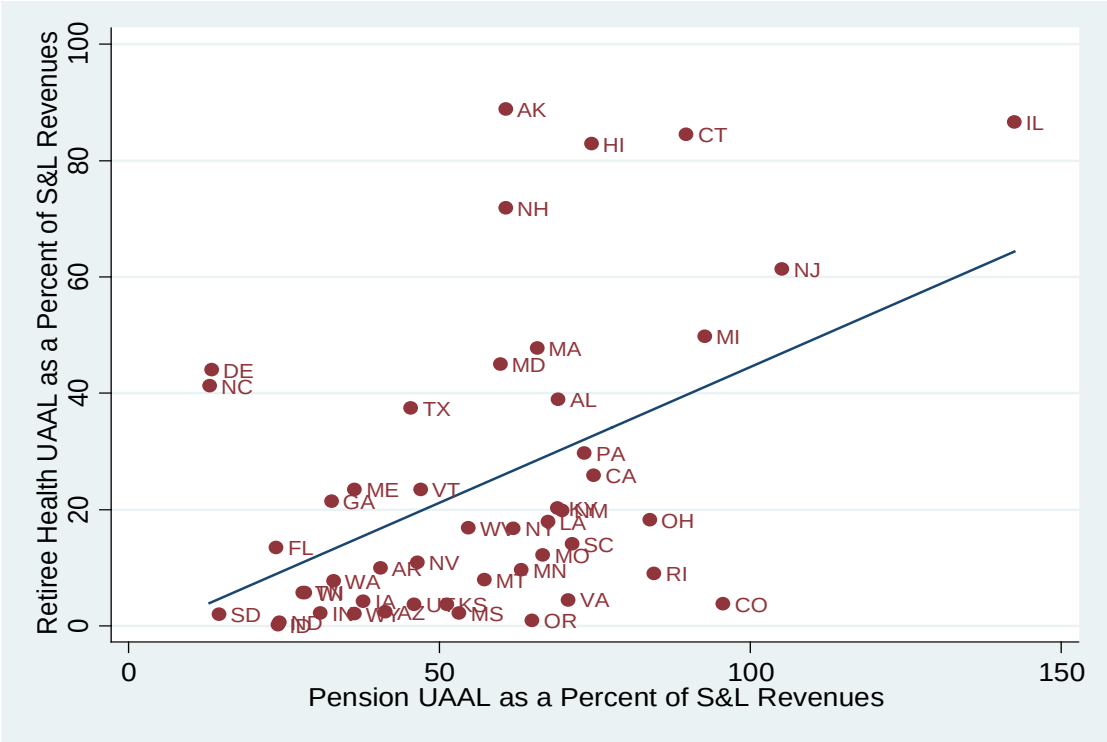


Figure 5
Retiree Health Obligations Existing Workers and Retirees

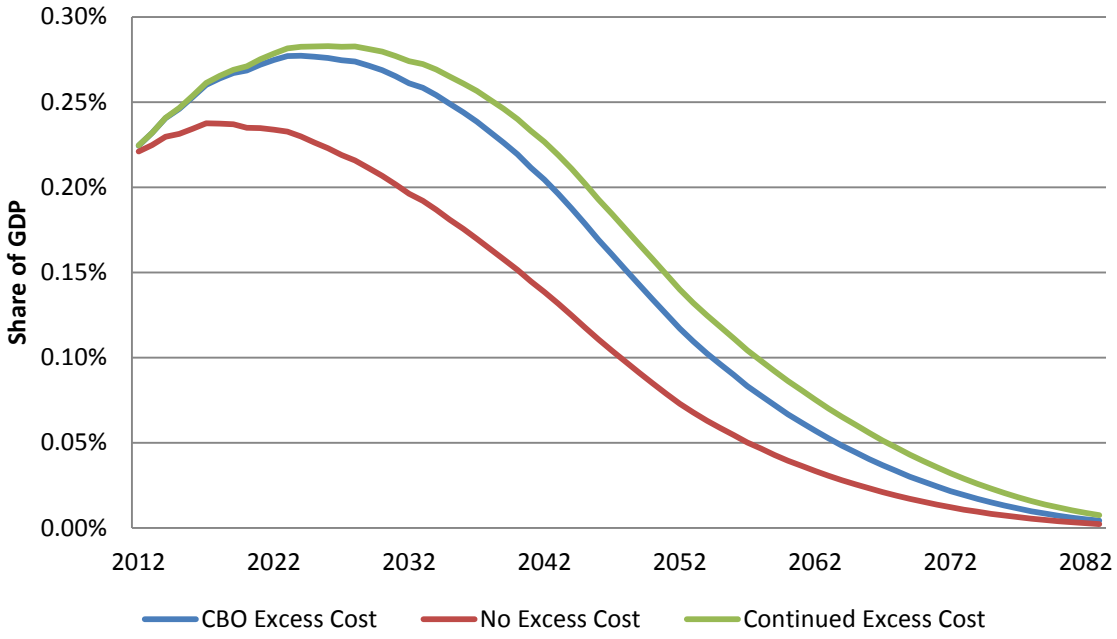
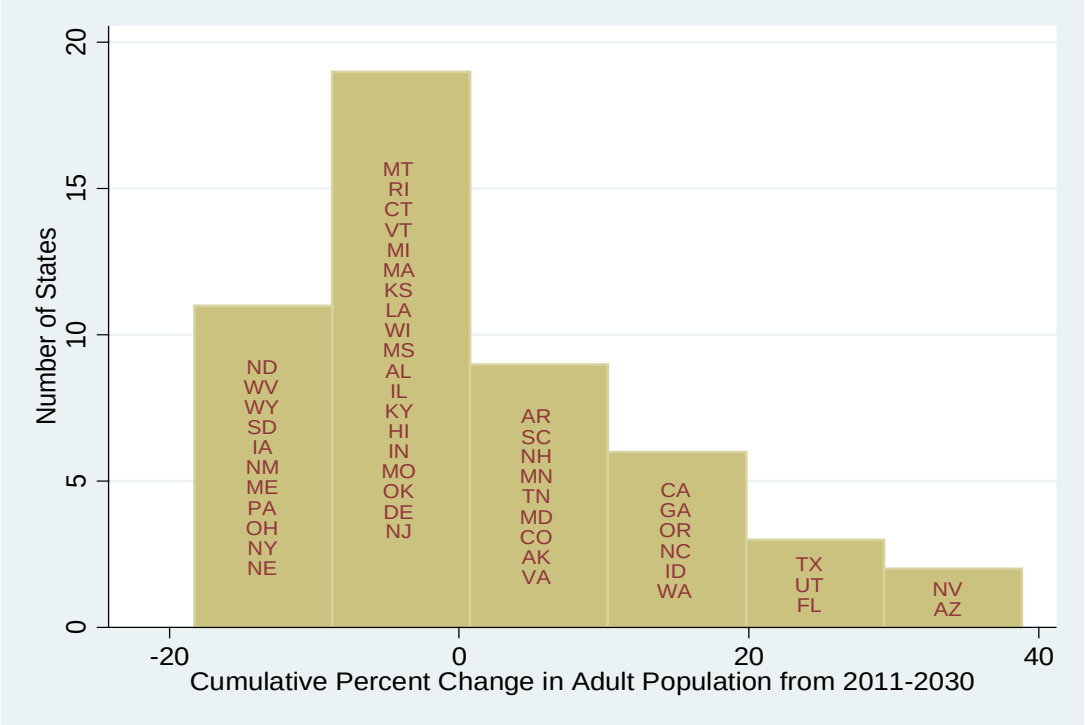


Figure 6
Demographic Projections
Panel A: Distribution of Changes in Adult Population



Panel B: Variation in Population Aging Across the States

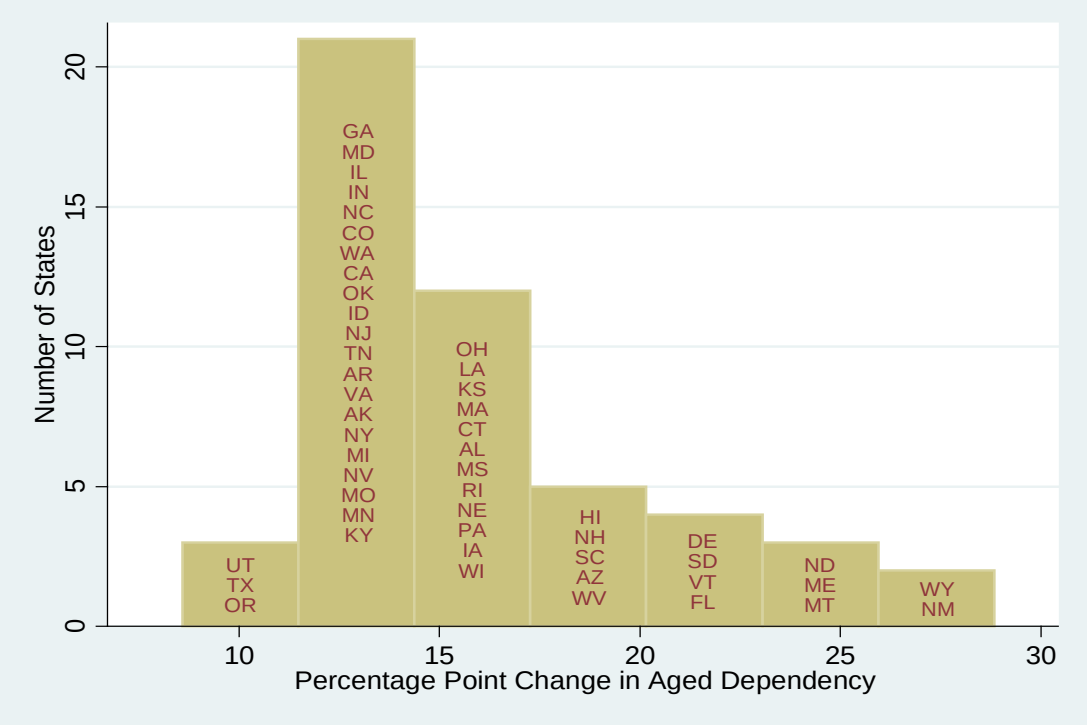


Figure 7
Distribution of Nominal GDP Growth Rates, 2011-2030

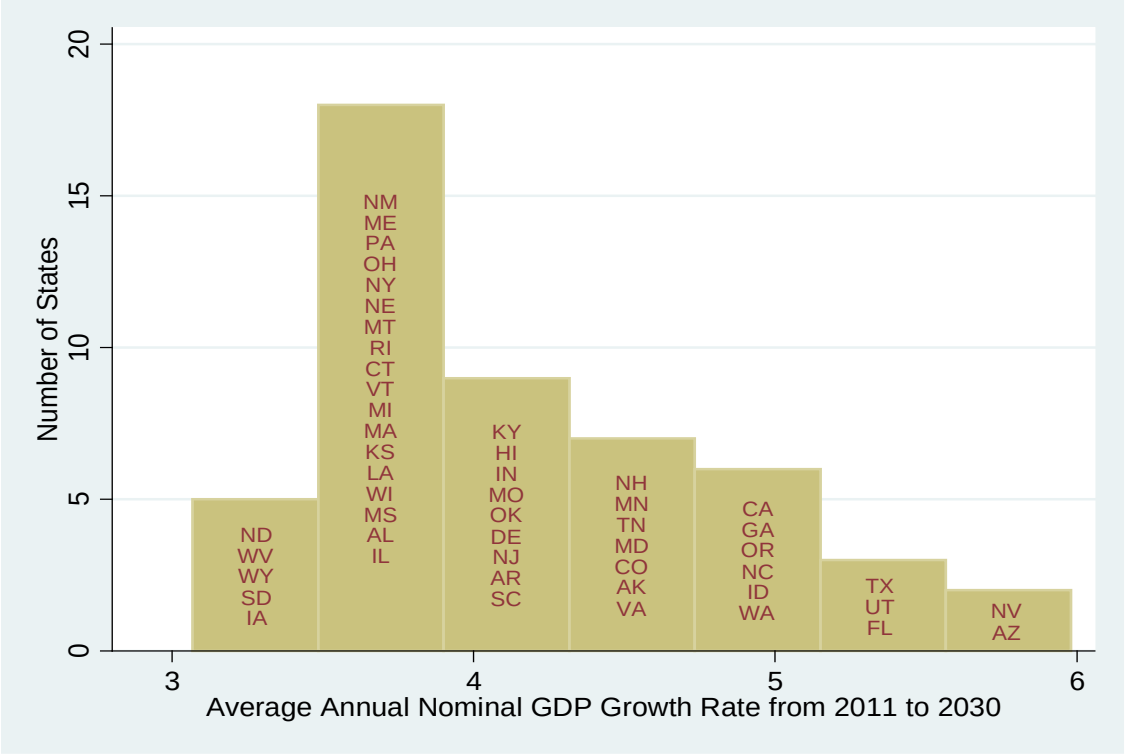
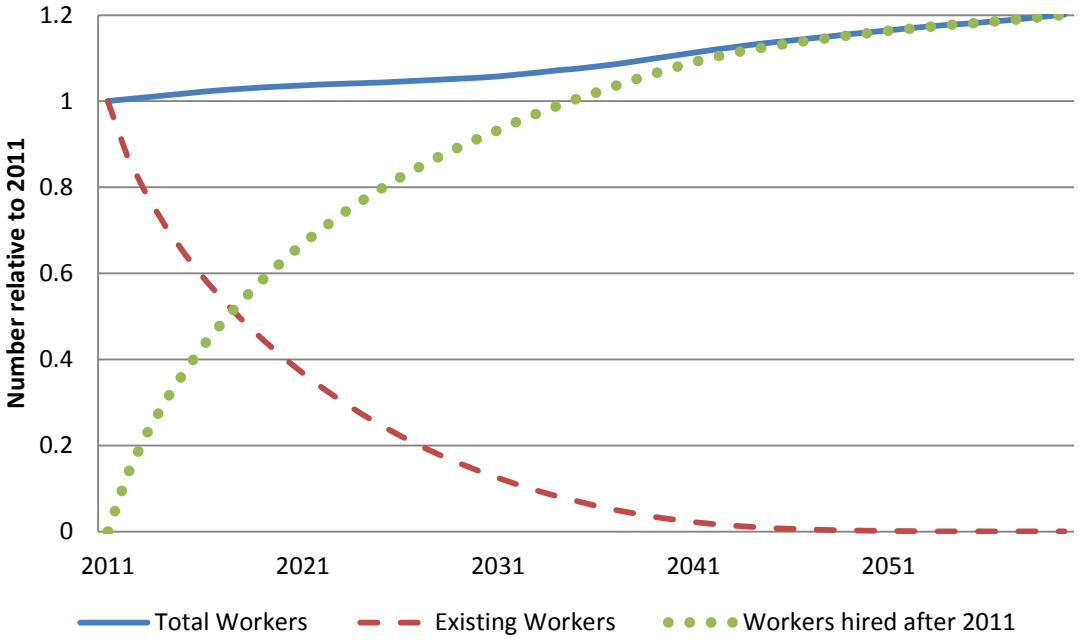


Figure 8

Panel A: Current Active and Newly Hired State and Local Government Workers, All States



Panel B: Retirees, All States

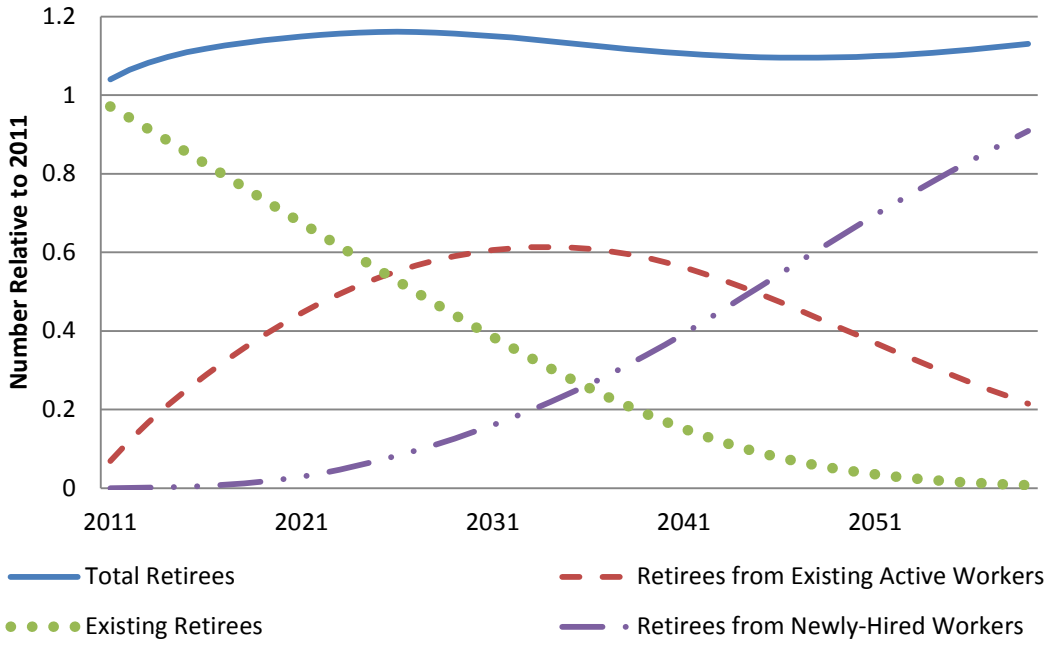


Figure 9
Demographic Change: Retiree Health vs Social Security

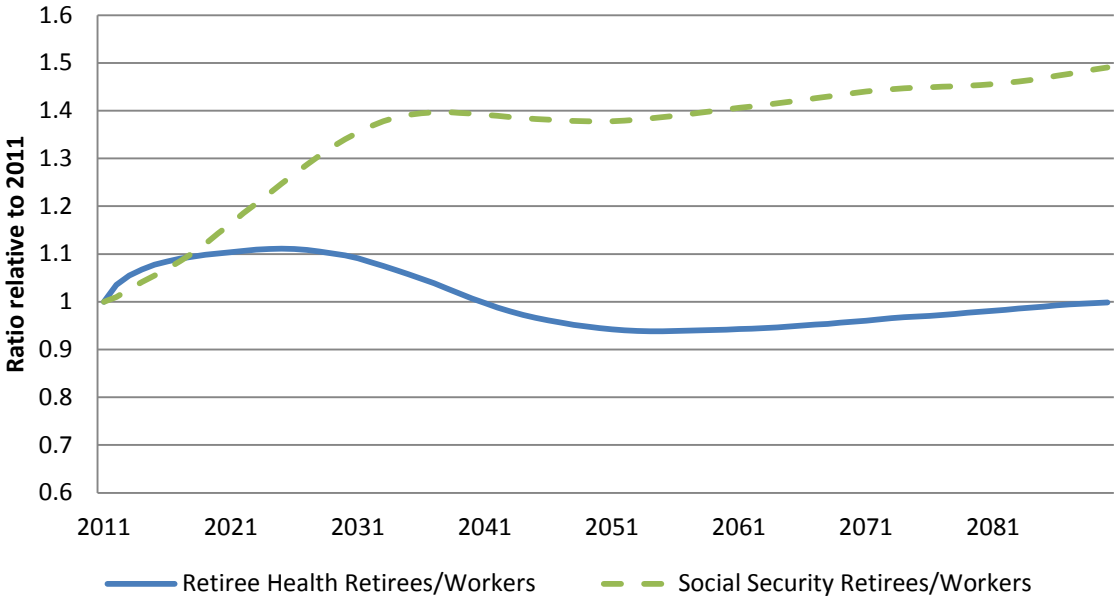


Figure 10
Retiree Health Obligations as a Share of Total S&L Revenue

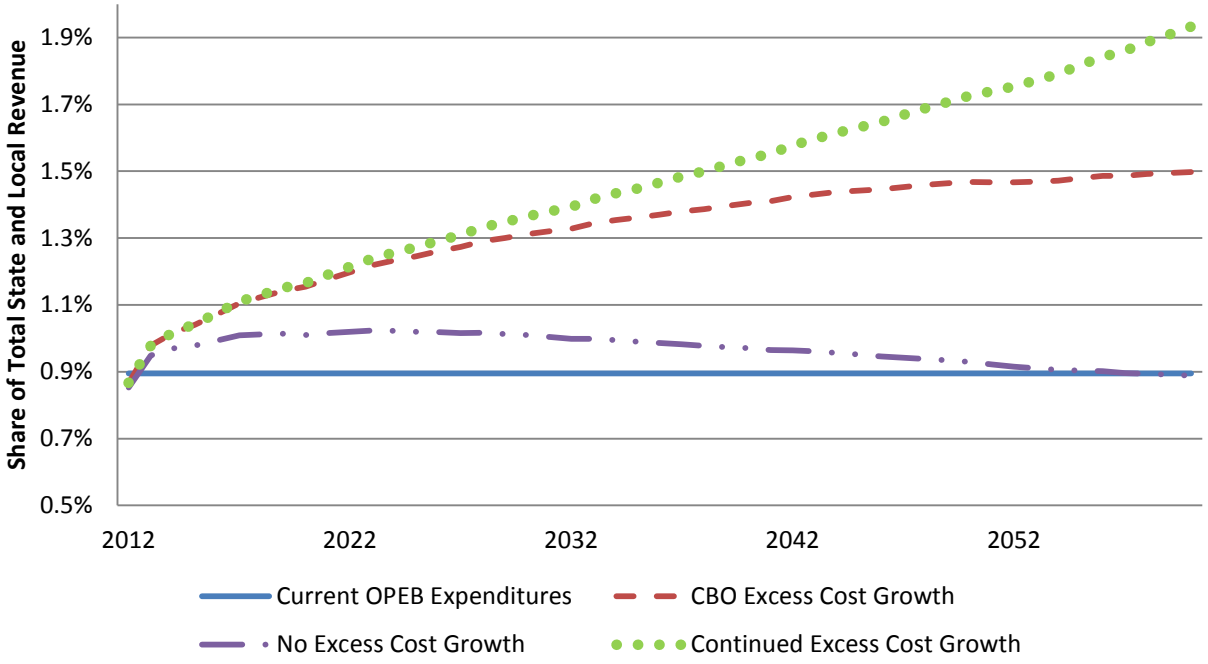


Figure 11
Deficit for State and Local Governments

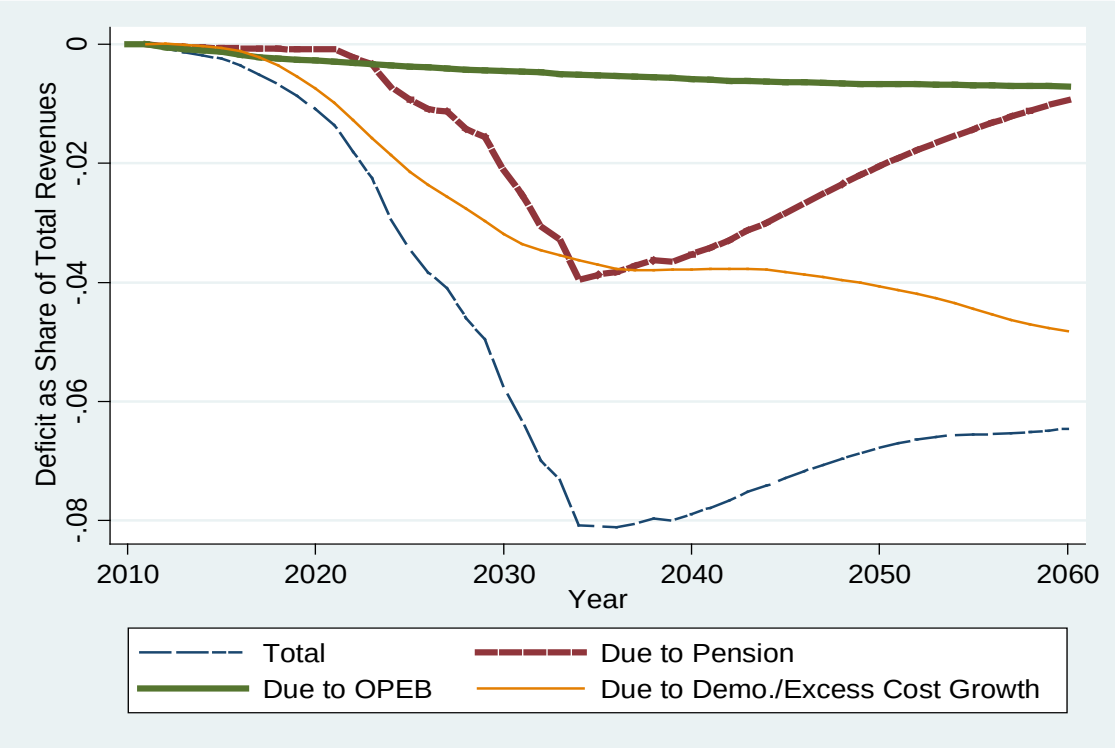
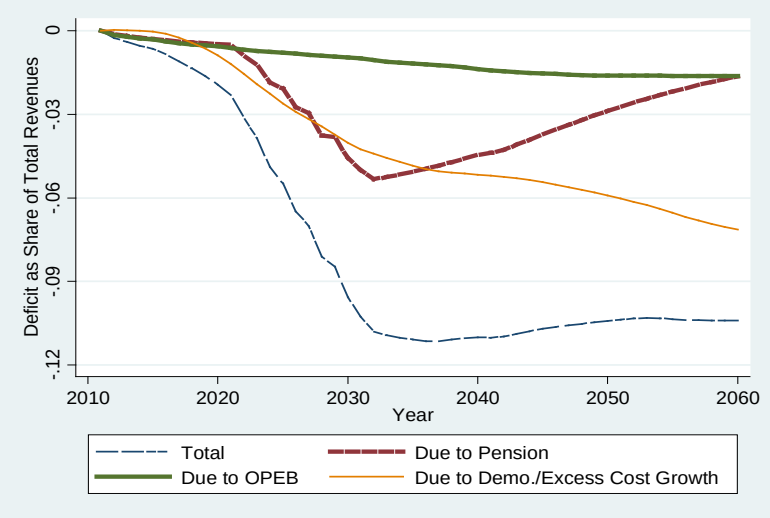
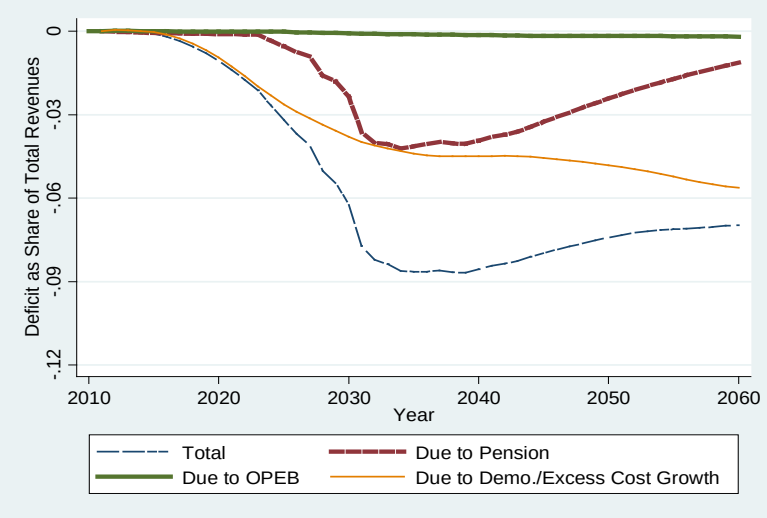


Figure 12
Deficit for State and Local Governments

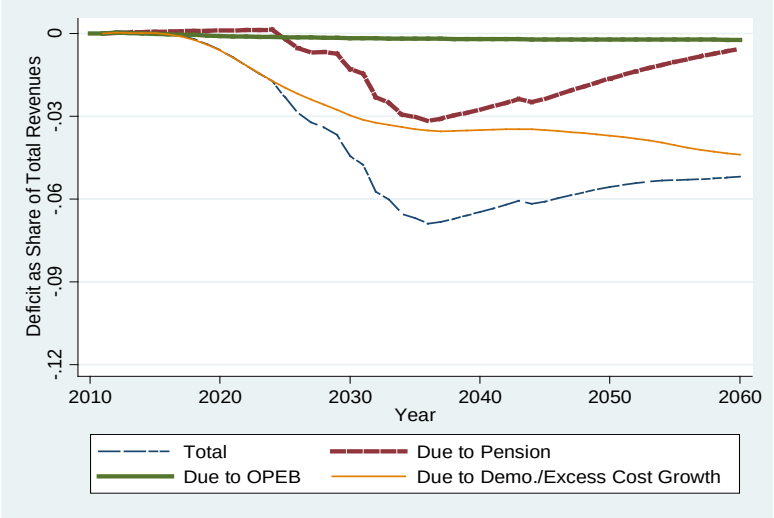
Panel A: First Quartile of Maximum Deficit



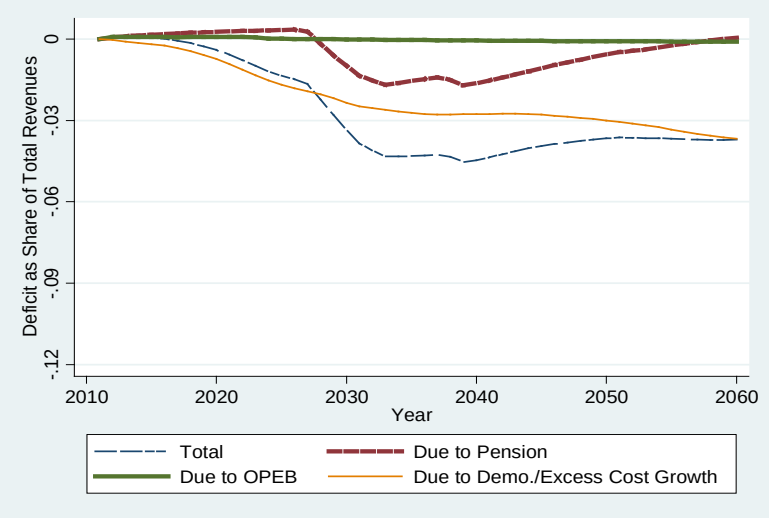
Panel B: Second Quartile of Maximum Deficit



Panel C: Third Quartile of Maximum Deficit



Panel D: Fourth Quartile of Maximum Deficit



Each table displays the unweighted average deficit of the states falling within the given quartile. States in the first quartile include: AK, CO, CT, IL, MA, NC, NH, NJ, NY, OH, TX, VT; states in the second quartile include: DE , HI, ME, MN, MO, MT, NE, NM, OR, PA, RI, SD, VA ; states in the third quartile include: AL , AR, CA, IA, MD, MI, ND, OK, TN, WA, WI, WY; states in the fourth quartile include: AZ ,FL, GA, ID, IN, KS , KY, LA, MS, NV, SC, UT, WV.

Table 1
State and Local Retiree Health Care Liabilities

State	Local Scaling Factor	Actuarial Accrued Liability (AAL)		Present Value of Benefits	
		$ millions	% of State and Local Revenue	$ millions	% of State and Local Revenue
	(1)	(2)	(3)	(4)	(5)
AK	0.4	$16,873	89%	$18,868	99%
AL	3.8	$16,799	42%	$20,263	51%
AR	0.7	$3,385	12%	$4,547	16%
AZ	0.3	$4,152	7%	$5,415	9%
CA	1.5	$140,572	26%	$195,270	36%
CO	0.0	$2,392	4%	$2,493	5%
CT	0.8	$45,034	106%	$45,060	107%
DE	0.0	$5,079	45%	$6,440	58%
FL	3.9	$26,096	13%	$32,423	17%
GA	3.8	$21,209	24%	$23,875	27%
HI	0.0	$14,727	90%	$18,750	114%
IA	3.2	$1,511	4%	$2,175	6%
ID	0.0	$36	0%	$50	0%
IL	2.9	$151,323	110%	$166,827	121%
IN	3.6	$1,533	3%	$1,993	3%
KS	3.6	$1,341	5%	$1,651	6%
KY	2.2	$11,051	26%	$14,612	34%
LA	0.5	$10,672	22%	$13,100	27%
MA	1.8	$50,595	59%	$57,097	67%
MD	2.5	$29,544	46%	$37,571	59%
ME	0.3	$3,542	25%	$4,064	28%
MI	2.8	$45,533	50%	$56,432	62%
MN	8.4	$6,340	10%	$9,218	14%
MO	2.7	$7,462	13%	$8,313	14%
MS	0.1	$708	2%	$875	3%

Note. All values are for the 2011 fiscal year and are produced using a 5% discount rate. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis.

Table 1 (cont.)
State and Local Retiree Health Care Liabilities

State	Local Scaling Factor	Actuarial Accrued Liability (AAL)		Present Value of Benefits	
		$ millions	% of State and Local Revenue	$ millions	% of State and Local Revenue
	(1)	(2)	(3)	(4)	(5)
MT	1.9	$1,468	14%	$2,458	24%
NC	0.5	$68,706	73%	$65,339	69%
ND	0.0	$86	1%	$122	1%
NH	2.9	$12,121	99%	$18,562	152%
NJ	0.0	$61,458	58%	$101,928	96%
NM	0.4	$5,203	21%	$7,385	30%
NV	3.0	$3,973	14%	$5,669	20%
NY	1.0	$171,108	52%	$266,628	81%
OH	0.3	$39,651	29%	$48,393	36%
OR	0.1	$901	2%	$1,104	2%
PA	1.8	$47,515	35%	$53,702	39%
RI	0.3	$1,211	9%	$1,495	11%
SC	0.4	$6,892	15%	$8,561	18%
SD	2.2	$240	3%	$244	3%
TN	1.8	$4,703	7%	$5,791	9%
TX	2.7	$87,607	38%	$128,502	55%
UT	1.7	$1,511	6%	$1,451	6%
VA	0.4	$3,787	5%	$4,369	6%
VT	1.1	$2,474	33%	$4,370	58%
WA	0.0	$7,815	10%	$10,394	13%
WI	3.2	$3,526	6%	$5,414	9%
WV	0.0	$3,660	19%	$4,507	24%
WY	0.0	$328	3%	$258	3%
US	**1.2**	**$1,153,455**	**33%**	**$1,494,030**	**43%**

Note. All values are for the 2011 fiscal year and are produced using a 5% discount rate. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis.

Table 2

State and Local Retiree Health Care Liabilities under Various Discount Rates ($ millions)

	Actuarial Accrued Liability (AAL)	Present Value of Benefits (PVB)
5 Percent	$1,037,331	$1,303,424
Treasury Yield Curve	$1,162,770	$1,458,792
AA Nonfinancial Corporate Yield Curve	$990,191	$1,217,664
7 Percent	$754,149	$912,332

Note. All values are U.S. total liabilities for the 2011 fiscal year. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The AAL liabilities are produced using the EAN methodology. The Treasury Yield Curve is the zero-coupon Treasury yield curve as of June 30, 2011 (the end of the 2011 state government fiscal year in most states). The AA Nonfinancial Corporate Debt Yield Curve is the AA corporate yield curve for non-financial firms as of June 30, 2011 produced by the Nelson-Siegel method.

Table 3
State and Local Retiree Health Care Liabilities Under CBO's Medical Cost Growth Assumptions

State	Actuarial Accrued Liability (AAL)			Present Value of Benefits (PVB)		
	State Medical Cost Growth Assumptions	CBO Medical Cost Growth Assumption	Percent Difference Between (2) and (1)	State Medical Cost Growth Assumptions	CBO Medical Cost Growth Assumption	Percent Difference Between (2) and (1)
	(1)	(2)	(3)	(4)	(5)	(5)
			A. National Estimates			
US	$1,037,331	$934,684	-10%	$1,303,424	$1,175,325	-10%
			B. Smallest Percent Differences in PVB			
ID	$36	$27	-25%	$50	$36	-27%
NM	$5,203	$3,914	-25%	$7,385	$5,439	-26%
WY	$328	$239	-27%	$258	$191	-26%
ND	$86	$65	-24%	$122	$91	-26%
FL	$26,096	$19,984	-23%	$32,423	$24,149	-26%
			C. Largest Percent Differences in PVB			
AZ*	$2,392	$2,392	0%	$2,493	$2,493	0%
CO*	$3,787	$3,787	0%	$4,369	$4,369	0%
OH	$39,651	$40,272	2%	$48,393	$50,463	4%
MI	$45,533	$46,258	2%	$56,432	$59,066	5%
WV	$3,660	$4,568	25%	$4,507	$5,872	30%

Note. All values are for the 2011 fiscal year and are produced using a 5% discount rate. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The AAL liabilities are produced using the EAN methodology.
* These states provide retirees with a fixed subsidy for health care. As a result their liabilities are not dependent upon medical cost inflation. Washington state provides a flat subsidy, but historically has increased it every year through legislation. We have therefore assumed, for the base results, that their cost of retiree health care increases with medical cost inflation. However, because this is based on our assumption, as opposed to the state's policy, we do not include WA on this table. It does appear on Appendix Table A5 which displays the full results for excess cost growth.

Table 4

State and Local Retiree Health Care Liabilities Under Differing Mortality Assumptions

State	Actuarial Accrued Liability (AAL)				Present Value of Benefits (PVB)			
	State Mortality Assumptions	S.S. Mortality Assumption Low	S.S. Mortality Assumption Middle	S.S. Mortality Assumption High	State Mortality Assumptions	S.S. Mortality Assumption Low	S.S. Mortality Assumption Middle	S.S. Mortality Assumption High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				A. National Estimates				
US	$1,037,331	$1,062,514	$1,109,248	$1,171,363	$1,303,424	$1,336,895	$1,397,577	$1,477,386
				B. Smallest Percent Differences Between Base PVB and Middle S.S. Assumption				
SD	$240	$240	$240	$241	$244	$245	$245	$245
WI	$3,526	$3,528	$3,532	$3,535	$5,414	$5,418	$5,427	$5,432
IA	$1,511	$1,511	$1,514	$1,515	$2,175	$2,176	$2,181	$2,184
MS	$708	$709	$710	$711	$875	$876	$878	$880
MN	$6,340	$6,344	$6,356	$6,364	$9,218	$9,226	$9,249	
				B. Largest Percent Differences Between Base PVB and Middle S.S. Assumption				
FL	$26,096	$26,868	$28,322	$30,259	$32,423	$33,475	$35,399	$37,963
WY	$328	$345	$377	$423	$258	$267	$282	$303
NH	$12,121	$12,574	$13,409	$14,575	$18,562	$19,369	$20,811	$22,842
VT	$2,474	$2,567	$2,737	$2,975	$4,370	$4,580	$4,955	$5,489
MT	$1,468	$1,553	$1,709	$1,932	$2,458	$2,628	$2,935	$3,377

Note. All values are for the 2011 fiscal year and are produced using a 5% discount rate. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The AAL liabilities are produced using the EAN methodology. S.S. in the column headers refers to the Social Security Administration.

Table 5

Harmonized State and Local Retiree Health Care Liabilities

State	Unfunded Actuarial Accrued Liability (UAAL)			Present Value of Benefits		
	State Assumptions	Harmonized Assumptions	(2) as a percent of (1)	State Assumptions	Harmonized Assumptions	(2) as a percent of (1)
	(1)	(2)	(3)	(4)	(5)	(6)
AK	$10,475	$15,139	145%	$11,394	$16,836	148%
AL	$15,504	$15,958	103%	$20,263	$19,881	98%
AR	$3,191	$3,514	110%	$5,362	$4,810	90%
AZ	$393	$2,888	735%	$3,112	$5,775	186%
CA	$153,317	$134,012	87%	$216,555	$189,256	87%
CO	$1,429	$2,185	153%	$1,791	$2,565	143%
CT	$31,408	$43,855	140%	$39,159	$43,355	111%
DE	$5,582	$4,908	88%	$7,419	$6,502	88%
FL	$31,320	$21,427	68%	$39,967	$26,012	65%
GA	$20,816	$20,024	96%	$26,159	$22,509	86%
HI	$16,358	$12,753	78%	$23,465	$16,405	70%
IA	$1,588	$1,244	78%	$2,318	$1,769	76%
ID	$31	$27	86%	$58	$37	63%
IL	$130,185	$139,169	107%	$182,963	$152,522	83%
IN	$1,287	$1,371	107%	$1,890	$1,827	97%
KS	$1,255	$1,075	86%	$1,962	$1,321	67%
KY	$8,832	$7,992	90%	$14,841	$13,670	92%
LA	$10,380	$9,826	95%	$15,773	$12,059	76%
MA	$44,883	$47,732	106%	$63,326	$54,718	86%
MD	$32,840	$27,251	83%	$43,470	$35,376	81%
ME	$2,240	$3,308	148%	$2,683	$4,001	149%
MI	$54,240	$50,590	93%	$68,859	$64,667	94%
MN	$6,496	$5,075	78%	$9,498	$7,276	77%
MO	$5,563	$6,771	122%	$6,486	$7,863	121%
MS	$752	$647	86%	$939	$797	85%

Note. All values are for the 2011 fiscal year. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis.

Table 5 (cont.)
Harmonized State and Local Retiree Health Care Liabilities

State	Unfunded Actuarial Accrued Liability (UAAL)			Present Value of Benefits		
	State Assumptions	Harmonized Assumptions	(2) as a percent of (1)	State Assumptions	Harmonized Assumptions	(2) as a percent of (1)
	(1)	(2)	(3)	(4)	(5)	(6)
MT	$974	$1,343	138%	$3,106	$2,269	73%
NC	$45,078	$65,700	146%	$76,139	$61,988	81%
ND	$65	$66	101%	$122	$91	75%
NH	$9,663	$11,530	119%	$20,920	$17,720	85%
NJ	$71,372	$57,437	80%	$115,116	$95,553	83%
NM	$4,923	$3,880	79%	$7,385	$5,826	79%
NV	$3,753	$3,292	88%	$7,008	$4,852	69%
NY	$207,376	$154,482	74%	$348,367	$249,516	72%
OH	$24,829	$28,241	114%	$48,393	$54,345	112%
OR	$283	$617	218%	$746	$1,083	145%
PA	$42,189	$37,669	89%	$55,931	$42,939	77%
RI	$1,184	$1,131	96%	$1,495	$1,458	98%
SC	$6,581	$6,481	98%	$8,561	$8,527	100%
SD	$210	$217	103%	$285	$221	78%
TN	$4,073	$3,919	96%	$6,649	$4,807	72%
TX	$80,536	$76,976	96%	$116,784	$111,588	96%
UT	$1,028	$1,133	110%	$1,553	$1,362	88%
VA	$2,665	$3,670	138%	$3,292	$4,555	138%
VT	$2,074	$2,480	120%	$5,379	$4,471	83%
WA	$6,936	$5,839	84%	$11,764	$7,479	64%
WI	$3,961	$3,172	80%	$6,290	$4,817	77%
WV	$2,649	$4,510	170%	$3,768	$6,405	170%
WY	$219	$272	124%	$258	$208	80%
US	**$1,112,986**	**$1,052,792**	**95%**	**$1,659,020**	**$1,403,890**	**85%**

Note. All values are for the 2011 fiscal year. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis.

Table 6
Projected Demographic Change

Percentage Change in Population Shares from 2011-2030

	(1) Kids	(2) Adults	(3) Elderly		(1) Kids	(2) Adults	(3) Elderly
AK	7%	-13%	74%	MT	-8%	-14%	69%
AL	-4%	-10%	49%	NC	3%	-10%	41%
AR	-1%	-9%	40%	ND	-5%	-14%	63%
AZ	-4%	-12%	57%	NE	-1%	-11%	49%
CA	-5%	-8%	52%	NH	-2%	-12%	63%
CO	3%	-10%	51%	NJ	-4%	-8%	45%
CT	-2%	-11%	47%	NM	-10%	-16%	83%
DE	-5%	-13%	63%	NV	1%	-11%	49%
FL	-5%	-14%	51%	NY	-3%	-9%	46%
GA	0%	-9%	53%	OH	-4%	-9%	48%
HI	-5%	-11%	53%	OK	0%	-9%	39%
IA	-5%	-10%	49%	OR	1%	-9%	38%
ID	-6%	-8%	51%	PA	-2%	-11%	45%
IL	-2%	-8%	44%	RI	-3%	-11%	50%
IN	0%	-9%	41%	SC	-5%	-12%	58%
KS	-3%	-10%	49%	SD	-1%	-14%	57%
KY	-4%	-9%	50%	TN	2%	-10%	42%
LA	-5%	-9%	54%	TX	-2%	-7%	46%
MA	-2%	-11%	51%	UT	-3%	-5%	44%
MD	2%	-10%	43%	VA	0%	-10%	49%
ME	-9%	-14%	67%	VT	-4%	-14%	67%
MI	-5%	-9%	50%	WA	0%	-9%	46%
MN	0%	-11%	51%	WI	-4%	-11%	57%
MO	-2%	-9%	45%	WV	-9%	-11%	53%
MS	-9%	-8%	58%	WY	-14%	-14%	85%
TOTAL	**-5%**	**-9%**	**49%**				

Table 7
Changes in the Adult Population and Projected GDP

	Cumulative Percent Change in Adult Population 2011-2030	Average Annual Growth Rate of Adult Population 2011-2030	Average Annual Nominal GDP Growth Rate 2011-2030		Cumulative Percent Change in Adult Population 2011-2030	Average Annual Growth Rate of Adult Population 2011-2030	Average Annual Nominal GDP Growth Rate 2011-2030
	(1)	(2)	(3)		(1)	(2)	(3)
AK	7.1%	0.4%	4.5%	MT	-8.2%	-0.4%	3.7%
AL	-4.9%	-0.3%	3.9%	NC	16.2%	0.8%	5.0%
AR	1.5%	0.1%	4.2%	ND	-18.3%	-1.1%	3.1%
AZ	38.8%	1.7%	6.0%	NE	-9.0%	-0.5%	3.6%
CA	11.2%	0.6%	4.7%	NH	3.0%	0.2%	4.3%
CO	6.7%	0.3%	4.5%	NJ	-1.0%	-0.1%	4.1%
CT	-8.1%	-0.4%	3.7%	NM	-11.4%	-0.6%	3.5%
DE	-1.2%	-0.1%	4.1%	NV	38.6%	1.7%	6.0%
FL	26.4%	1.2%	5.5%	NY	-9.2%	-0.5%	3.6%
GA	12.4%	0.6%	4.8%	OH	-9.7%	-0.5%	3.6%
HI	-3.3%	-0.2%	4.0%	OK	-1.7%	-0.1%	4.1%
IA	-12.2%	-0.7%	3.5%	OR	15.1%	0.7%	4.9%
ID	18.2%	0.9%	5.1%	PA	-9.8%	-0.5%	3.6%
IL	-4.8%	-0.3%	3.9%	RI	-8.2%	-0.4%	3.7%
IN	-3.2%	-0.2%	4.0%	SC	1.5%	0.1%	4.2%
KS	-5.9%	-0.3%	3.8%	SD	-12.8%	-0.7%	3.4%
KY	-3.5%	-0.2%	4.0%	TN	5.3%	0.3%	4.5%
LA	-5.6%	-0.3%	3.8%	TX	23.2%	1.1%	5.3%
MA	-6.2%	-0.3%	3.8%	UT	25.5%	1.2%	5.4%
MD	6.5%	0.3%	4.5%	VA	8.9%	0.5%	4.6%
ME	-11.0%	-0.6%	3.5%	VT	-6.9%	-0.4%	3.8%
MI	-6.7%	-0.4%	3.8%	WA	18.4%	0.9%	5.1%
MN	3.1%	0.2%	4.3%	WI	-5.1%	-0.3%	3.9%
MO	-2.2%	-0.1%	4.0%	WV	-16.0%	-0.9%	3.2%
MS	-5.0%	-0.3%	3.9%	WY	-14.3%	-0.8%	3.3%
TOTAL	**5%**	**0.3%**	**4.4%**				

Table 8
Retiree Health Obligations: Increase in Revenues to Balance Over Perpetuity

	Excess Cost Growth Assumption				Excess Cost Growth Assumption		
	CBO	None	Continued		CBO	None	Continued
	(1)	(2)	(3)		(4)	(5)	(6)
NH	2.5%	0.8%	5.8%	FL	0.1%	0.0%	0.4%
NY	2.3%	0.9%	5.1%	WA	0.1%	0.0%	0.3%
TX	1.9%	0.8%	4.2%	IA	0.1%	0.0%	0.3%
CT	1.8%	0.3%	4.5%	SD	0.1%	0.0%	0.2%
NJ	1.7%	0.4%	4.2%	AK	0.1%	-0.8%	1.7%
IL	1.7%	0.6%	3.5%	NV	0.1%	-0.2%	0.7%
NC	1.4%	0.3%	3.6%	SC	0.0%	-0.2%	0.5%
VT	1.2%	0.5%	2.6%	WY	0.0%	0.0%	0.1%
WV	0.9%	0.3%	2.1%	MN	0.0%	-0.2%	0.5%
AZ	0.7%	0.3%	1.3%	ND	0.0%	0.0%	0.0%
MI	0.6%	-0.3%	2.3%	MS	0.0%	0.0%	0.0%
HI	0.6%	-0.6%	2.9%	NE	0.0%	0.0%	0.0%
MA	0.6%	-0.3%	2.2%	OK	0.0%	0.0%	0.0%
MT	0.6%	0.3%	1.1%	IN	0.0%	-0.1%	0.0%
AL	0.5%	-0.1%	1.6%	ID	0.0%	0.0%	0.0%
CA	0.5%	0.0%	1.4%	OR	-0.1%	-0.1%	0.0%
AR	0.4%	0.1%	0.9%	ME	-0.1%	-0.4%	0.4%
OH	0.3%	-0.1%	1.1%	RI	-0.2%	-0.3%	0.0%
DE	0.3%	-0.4%	1.7%	KS	-0.3%	-0.3%	-0.2%
CO	0.3%	0.1%	0.6%	PA	-0.4%	-0.7%	0.1%
TN	0.2%	0.1%	0.3%	MD	-0.4%	-1.1%	0.8%
NM	0.2%	-0.2%	0.8%	GA	-0.4%	-0.6%	-0.2%
VA	0.1%	0.0%	0.5%	UT	-0.5%	-0.5%	-0.4%
WI	0.1%	0.0%	0.4%	LA	-0.5%	-0.9%	0.3%
MO	0.1%	-0.1%	0.4%	KY	-0.5%	-0.9%	0.2%
TOTAL	**0.6%**	**0.0%**	**1.7%**				

Table 9
Effects of Demographic Change on State Medicaid Spending

	Effect of Aging in 2030 Relative to 2011	Share of FY 2011 State Medicaid Spending Allocated to Each Group		
		Kids	Adults	Elderly
	(1)	(2)	(3)	(4)
AK	8%	37%	46%	16%
AL	6%	33%	43%	24%
AR	5%	29%	46%	25%
AZ	-2%	28%	61%	11%
CA	8%	25%	49%	26%
CO	7%	30%	48%	22%
CT	9%	23%	47%	30%
DE	3%	28%	55%	17%
FL	3%	27%	51%	22%
GA	5%	32%	51%	17%
HI	6%	22%	53%	24%
IA	4%	27%	51%	22%
ID	2%	29%	55%	16%
IL	2%	33%	51%	16%
IN	4%	27%	53%	20%
KS	5%	29%	50%	21%
KY	2%	29%	54%	16%
LA	2%	29%	55%	16%
MA	8%	26%	48%	26%
MD	4%	26%	53%	21%
ME	6%	29%	48%	23%
MI	4%	29%	52%	19%
MN	6%	26%	52%	22%
MO	3%	35%	48%	18%
MS	6%	28%	51%	21%

Table 9 (continued)
Effects of Demographic change on State Medicaid Spending

	Effect of Aging in 2030 Relative to 2009	Share of FY 2009 State Medicaid Spending Allocated to Each Group		
		Kids	Adults	Elderly
	(1)	(2)	(3)	(4)
MT	9%	29%	45%	26%
NC	2%	30%	54%	16%
ND	11%	24%	46%	30%
NE	6%	33%	44%	23%
NH	11%	32%	42%	26%
NJ	8%	26%	45%	30%
NM	-8%	46%	49%	6%
NV	2%	36%	50%	15%
NY	8%	20%	51%	30%
OH	5%	22%	55%	23%
OK	2%	34%	49%	17%
OR	5%	23%	52%	25%
PA	8%	24%	47%	30%
RI	6%	26%	50%	24%
SC	3%	28%	54%	18%
SD	5%	33%	47%	20%
TN	1%	31%	54%	15%
TX	4%	42%	41%	16%
UT	1%	35%	55%	11%
VA	4%	32%	49%	19%
VT	9%	29%	47%	25%
WA	5%	29%	51%	20%
WI	9%	21%	52%	27%
WV	3%	26%	54%	20%
WY	6%	33%	47%	20%
TOTAL	**6%**	**27%**	**50%**	**23%**

Table A1: Scaling for State and Local Employees not Covered in Primary State Report

	State GASB Report Captures			Scaling				
State	teachers	non-education local employees		teacher: based on liabilities in teacher OPEB report or CAFR	teacher: based on census employee counts	local non-ed. : based on census employee counts	general: based on supplememtal sources	Notes
AL				2.69		x		The 2011 AAL for teacher retiree health care is equal to 9,081,334,485, compared to a state reported retiree health care AAL of 3,369,896,864: ratio of 2.7. The state report is for the State Employee's Health Insurance Plan (SEHIP). The state also has a Local Government Health Insurance Plan (LGHIP). The LGHIP website states that it provides retiree health coverage in some cases: "An active employee who retires from a unit that allows retirees to continue coverage has the option of electing retiree coverage or COBRA." https://www.alseib.org/healthinsurance/lghip/FAQ.aspx
AK		x		0.41				The state report captures all state workers and the vast majority of non-education local workers. The Teacher's Retirement Systemt (TRS) CAFR gives an AAL of $3,076,288,000 for workers hired before 2006. For those hired after 2006, and whom are on a different retiree health care plan, the AAL equals $2,809,000. Thus, the total AAL for retiree health care is $3,079,097,000. Given the state AAL of $7,428,905,000, this implies a scaling factor of 0.41.
AZ	x	x					0.27	The state GASB report captures the bulk of state and local government employees (including both local ed. and non-ed.). The report only misses a few workers in 3 small state pension plans and 3 local plans. The workers in the 3 state plans are offered retiree health care from the state (Clark and Morrill 2010). The Census pension data indicates that these 6 plans have total active membership of 56, 539, equal to 27 percent of the 208,939 actives captued in the state GASB report.
AR							0.67	State GASB repot covers state employees and some local workers, including some school district employees. It does not cover any teachers. State retiree health care is linked to receipt of a pension from the state pension system (PERS). PERS had 45,200 active members actives in 2011 relative to 134,995 active members for all the state's pension plans according to the Census Bureau. Thus, we use an overall scaling factor of (134, 995 - 45, 200) / 134, 995 = 0.67.
CA							1.50	State GASB report captures most state employees (although excludes higher-ed. employees outside of CSU system -- e.g. the UC system and community colleges are excluded). Supplemental Source for general scaling: "Funding Pensions & Retiree Health Care for Public Employees: A Report of the Public Employee Post-Employee Benefits Commision," State of California, 2008. The report (table 3) calculates the UAAL for all retiree health liabilities in the state. The calculations suggest that the State GASB report captures 40 percent of total state and local government retiree health liabilities. A scaling factor of 1.5 (=(total liability - state liability) / state liability =(118, 126,505,346- 47,880,000,000)/47,880,000,000 =)is therefore applied to the liability streams calculated from the state GASB report. (Table 6 of the report shows that only 14 percent of total state and local retiree health liabiliteis are pre-funded, making the UAAL based scaling factor a reasonable approximation.)
CO	x	x						The state GASB report captures most state and local employees. Retiree health insurance in linked to receipt of a pension benefit from the state pension sysytem -- PERA. PERA membership include: "employees of the Colorado state government, public school teachers in the state, many university and college employees, judges, many employees of cities and towns, state troopers, and the employees of a number of other public entities." (https://www.copera.org/pera/about/overview.htm)
CT				0.17		x		The state GASB report only covers state government employees. The state report does refer to individuals covered by the State Teacher's Retirement System. A phone conversation with Thomas Woodruff, Healthcare Policy & Benefits Service Division, Office of the State Comptroller, indicates that this refers to a very small number of state employees covered by the Teacher's Retirement System. In general, teachers are covered by their own plan and are not captured in the state report. Dr. Woodruff also confirmed that local non-education employees receive retiree health care directly from local governments and are not captured in the state report. The State Teacher's Retirement System GASB OPEB report suggests an AAL of $3,023,082,000 for 2011. (This ia an average of the reported 2010 and 2012 AAL provided by the report. The STRS report is for fiscal year 2012, while the state OPEB report is for fiscal 2011.) Given the state reported AAL of nearly $18 billion, this yields a teacher scaling factor of 0.17. The teacher AAL is relatively low because it only refers to the provision of a Medicare supplement plan. Prior to Medicare, retired teachers may obtain health care from their former districts, but pay 100 percent of the cost.
DE	x	x						State GASB report appears to cover all local government workers (including teachers) with the exception of a couple of very small groups such as volunteer firefighters.

Table A1: Scaling for State and Local Employees not Covered in Primary State Report

	State GASB Report Captures			Scaling				
State	teachers	non-education local employees		teacher: based on liabilities in teacher OPEB report or CAFR	teacher: based on census employee counts	local non-ed.: based on census employee counts	general: based on supplememtal sources	Notes
FL					x	x		The state GASB report covers the provision of retiree heatlh care under the State Group Insurance Plan (GSP). Eligibility for GSP health insurance as a retiree is contingent on qualifying for a pension benefit from the Florida Retirement System (FRS). Although the FRS covers local employess (including teachers), the GSP health insurance *only* applies to state employees. Moroever, the number of active employees in the state GASB report is much too small to include local workers. (The state GASB report counts 159,407 active employees in the GSP plan. There are 326,753 k-12 employees and 168,583 state employees.) The exclusion of local workers (both K-12 and non-ed.) was confirmed in a telephone call with Sally Wade, an employee of the Florida State Group Insurance Plan. The provision of retiree health care at the local level is handled by the individual governments with varying levels of subsidy according to a telephone conversation with Gary Green of the FRS.
GA	x			2.58		x		The state GASB report is two reports appended together: one for state workers and one for k-12 personnel. We calculated annual liabilities for the state workers. The school personnel report indicates that the retire health care AAL is equal to 2.6 times the state retiree health care AAL.
HI	x	x						Report covers all state and local government workers.
ID	x	x						State GASB report appears to capture all state and local government employees.
IL							2.91	We collected three state-wide GASB OPEB reports. The first report , which is the basis of our cash flow projections, covers state employees other than some "college" employees. The second report covers these college workers and the third report covers k-12 teachers. These second two reports contain AALs jointly equal to 63 percent of the AAL in the first report. Local non-education workers are not covered in these three reports. We collected information on the AALs of both the City of Chicago and Cook County. The remaining non-teacher local workers (e.g. excluding Chicago and Cook County) were handled using a scaling factor equal to the ([number of local non-primary and secondary education instructional workers in Illinois] - [number of City of Chicago and Cook County non-primary and secondary education instructional workers]) / number of state workers = 1.9. Employee counts refer to full-time workers as measured by the Census Bureau. The provision of retiree health benefits in the City of Chicago is subject to the provisions of the settlement of City of Chicago v. Korshak. The agreement expires on June 30, 2013 and the city's CAFR statement values the OPEB obligations assuming the termination of the benefit on this date. This is not consistent with our current policy assumption. We therefore use the AAL reported by the Retiree Healthcare Benefits Commission (RHBC). (The RHBC was created as a condition of the settlement agreement.) The AAL equals $10.9 billion and assumes that the benefits which have been provided under the settlement agreement continue indefinitely. (Report to the Mayor's Office on the State of Retiree Healthcare, Retiree Healthcare Benefits Commission, January 11, 2013; http://www.cityofchicago.org/city/en/depts/fin/provdrs/ben/alerts/2013/jan/retiree_healthcarebenefitscommissionreporttothemayor.html) (In May 2013 Chicago announced it was terminating the subsidy for retiree health care. As this occurred after our "base" fiscal year of 2011 we do not account for this termination.) The Cook County Employee's Annuity and Benefit Fund reports an AAL of $1.1 billion for retiree health benefits. However, this was computed using a 7.5% discount rate. We utilize the $1.7 billion AAL, calculated under a 4.5% discount rate (the same used by the state GASB report used as the basis of the cash flows for the state), reported in Status of Local Pension Funding Fiscal Year 2011: An Evaluation of Ten Local Government Employee Pension Funds in Cook County, The Civic Federation, May 21, 2013. The City of Chicago and Cook County have a combined retiree health care AAL of 12.6 billion, equal to 38 percent of the state GASB report AAL. The total scaling factor for the state is equal to the two additional state reports (0.63) + Chicago and Cook County non-teacher (0.38) + remaining non-teachers in state (1.9) = 2.91.
IN					x	x	0.24	The state GASB report covers all state employee, but is basically two separate reports: one for state police and one for everyone else. The state police account for 76% of the total present value of the retiree health care liablities. As a result, we generated the cash flows from the state police portion of the report and then scale up these cash flows by a 0.24 factor. (Retiree health benefits to non-police employees , other than the legislature and conservation and excise police which are distinct from state police, are relatively small as there is no explicit subsidy.) The state report does not cover teachers or other local employees. A phone conversation with Nancy Tolson, Executive Director of the Indiana Retired Teachers Association, indicates that teacher retiree health care is handled on a district-by-district basis. Some districts do not even offer access to their health plans to retirees and those that do almost never provide a subsidy. The local scaling up is based upon the full state cash flows (i.e. the state police cash flows scaled up to reflect all state government employees.)

Table A1: Scaling for State and Local Employees not Covered in Primary State Report

	State GASB Report Captures			Scaling				
State	teachers	non-education local employees		teacher: based on liabilities in teacher OPEB report or CAFR	teacher: based on census employee counts	local non-ed. : based on census employee counts	general: based on supplememtal sources	Notes
IA					x	x	0.63	The state GASB report contains essentially no information on who is covered. The number of active employees covered matches up well with the count of non-higher ed. state employees. Jim Pierson, Iowa Department of Administrative Services, Head of Benefits Education, confirmed that the state retiree health plan only applies to state employees outside of higher ed. (Although there are a "handful" of university employees covered by the state plan, in almost all cases the higher ed. institutions direclty provide the benefit.) The scaling factor is the ratio of state higher ed. employees to non-higher-ed. state employees: (15,610) /(40, 561-15, 610)= 0.63.
KS					x	x		The state GASB report makes it clear only state employees are covered by the plan (both higher ed. and other). Every single department covered by the plan in listed on pgs. 11 - 12 and these are clearly all state agencies. Furthermore, the number of actives in the plan in the 2011 fiscal year, 36, 979, nearly matches the number of full-time state government employees counted by the census, 38, 293. Kristen Basso, Communications Director for the Kansas Public Employees Retirement System (KPERS), confirms that all local government retirees, including education employees and teachers, are provided with health care on case-by-case basis as determined by the individual local government.
KY							2.18	The state GASB report does not cover state police, teachers or non-education local workers (who are covered under the "County" retirement system.) We obtained a separate GASB report for each of these groups. The ratio of each groups retiree health care AAL to the state retiree health care AAL is: 9.5% (state police), 106.4% (local non-ed. worker) and 102.4% (k-12 employees). Thus, the total scaling factor is 2.18.
LA	x					x		The state GASB report covers the following workers: state, teachers, other school and state police. Based on a phone coversation with an employee of the statewide municipal pension fund (MERS: 800-820-1137; www.mersla.com) individual local governments typically provide coverage, but not universally as some of the very small governments do not.
ME	x					x	0.08	The state GASB report appears to captures state employees and teachers. However, "University of Maine System Report of the Retiree Health Plan Task Force II", Sept. 24 2008 makes it clear that the University of Maine system independently provides its retirees health care. The Annual Financial Report of the University of Maine, Year Ended June 20, 2012, gives a fiscal 2011 OPEB AAL of $160,336,000. Given the state AAL of $1,981,000,000, this implies a scaling factor of 0.08.
MD					x	x		The state GASB report, following a discussion of eligibility for retiree health benefits, has an unlabeled table listing several state pension systems. The Teacher's Retirement System is listed in the table. However, the count of active members in the state GASB report appear much too small to include teachers. This was confirmed by a conversation with a staff member of the Legislation and Research Division of the Maryland State Retirement and Pension System who indicated that the state did not provide retiree health benefits to any K-12 teachers in the state of Maryland.
MA							1.80	A report by a special commission on retiree health benefits estimates that the retiree health care AAL for the state's municipalities is $30 billion, equal to 1.8 times the state government's retiree health AAL. The report suggests that only the state and municipal governments provide retiree health care in Massachusetts. "The Commonwealth of Massachusetts Special Commission to Study Retiree Healthcare and Other Non-Pension Benefits Final Report", Submitted January 11, 2013. (http://www.mass.gov/anf/docs/anf/opeb-commission/opeb-commission-final-report.pdf) The Public Employee Retirement Administration Commission (a state government entity which oversees the 105 retirement sytems in the state) website states the following in regards to local government retiree health care: "While continuation of insurance coverage for retirees is an optional matter for the various governmental units in the Commonwealth, most cities and towns have accepted the necessary provisions of the law which permit them to be able to provide this service. (http://www.mass.gov/perac/guide/mainguide28.htm)
MI				1.90		x		2012 school retirement fund CAFR shows a 2011 OPEB AAL of $14,496,000,000 for retirees and $12,550,000,000 for actives = $27,046,000,000. As the state declared AAL equals $14,251,103,792, the scaling ratio equals 1.90.

Table A1: Scaling for State and Local Employees not Covered in Primary State Report

	State GASB Report Captures			Scaling				
State	teachers	non-education local employees		teacher: based on liabilities in teacher OPEB report or CAFR	teacher: based on census employee counts	local non-ed.: based on census employee counts	general: based on supplememtal sources	Notes
MN				2.91			5.46	The state report only covers state workers and excludes state higher education workers. The GASB report for state higher ed. employees (the Minnesota State Colleges and Universities Postretirement Medical Plan Actuarial Valuation) shows a present value of future benefits of $163,925,000. Given the state present value of $1,013,680,000, we use a scaling factor of 0.16 to account for the state higher ed. employees. K-12 educational employee OPEB obligations are based on "Special Study: Other Postemployment Benefit Liabilities of School Districts in Minnesota", Government Information Division, Office of the State Auditor, State of Minnesota, March 31, 2009. The report contains the results of a survey of the declared GASB OPEB liabilites of school distircts in the state (see Table 6). The total AAL for responding districts was $1,404,530,364. The only measure of district size given is operating revenues. The total of these revenues for the reporting districts was $5,978,186,071. The Census Bureau's Public Elementary-Secondary Education Finance Data reports $8,599,468,000 in total current spending in the fiscal year to which the state report refers in Minnesota. (The Census total current spending category matches up conceptualy well with the state reported total operating revenues. They also match up well in dollar terms on a district-by-district basis.) We gross-up the reported AAL of responding districts ($1,404,530,364) by 1.44 ($8,599,468,000 / $5,978,186,071) to obtain an AAL of $2,020,381,062. The state GASB report has an AAL of $693,297,000. Thus, to account for K-12 local workers we use a scaling factor of 2.91 ($2,020,381,062 / $693,297,000). Finally, for local non-education workers we use data on GASB declared OPEB liabilities from non-ed. local governments in Minnesota tabulated in a web appendix to Wirtz, Ronald, "OPEBs: What lies beneath the balance sheet" FedGazette, Minneapolis Federal Reserve, April 2011. The web appendix has data for 18 local governments and reports a total OPEB AAL for these entities of $1,665,069,714. The Census Bureau data on public employment shows these governments have 33,115 employees. As total local, non-ed. public employment is 73,119 in Minnesota, we gross up the reported AAL by 2.21 (73, 119 / 33, 115) to obtain an AAL of 3,676,528,232. The state GASB report has an AAL of 693,297,000. Thus, to account for local non-ed. workers we use a scaling factor of 5.30. The general scaling factor reported in the table is the sum of the local non-ed. scaling factor and the state higher ed. scaling factor: 5.30 + 0.16 = 5.46.
MS	x						0.146	The state GASB reports states "Eligible retirees will include State and School employees retiring from the State of Mississippi and electing coverage at retiree contribution rates." We scale for municipal, non-ed. workers as follows. All public pensions in the state fall under one of four state administered plans. Thes four plans have a total of 162,392 actives and the GASB report shows 141,646. To capture non-ed. municipal employees we scale by (162,392 - 141,646)/141,646 = 0.15 .
MO					x	x		The state GASB report covers only state employees. Although "state" employees who are receceving a pension from the teacher's pension system (PSRS) are eligible for retiree heatlh care from the state, almost all k-12 employees are employed by local governments, not the state. These local k-12 retirees receieve, by law, retiree health from the local government which had previously employed them (see https://www.psrsmo.org/PSRS/HealthInsurance.html for teachers and https://www.psrsmo.org/PEERS/HealthInsurance.html for non-teacher education retirees).
MT					x	x		The state GASB report covers state employees and small numbers of employees from 6 state administered pension plans (other than the primary plan for state workers). The counts for these 6 plans are much too small to be inclusive of all members in these plans. For instance, 145 and 48 individuals, respectively, from the Teacher's Retirement System and the Shefiff's Retirement System are covered. Furthermore, the Teacher's Retirement System website makes it clear that in most cases teacher's receive retiree health benefits directly from their former school district. (http://www.trs.mt.gov/Retirees/InsurancePremiums.asp) The wording of the state report suggests these workers are likely directly employed by the state (e.g. a small number of K-12 teachers employed in state run organizations). We proceed with this assumption and scale up based on census employee counts.
NE								The state of Nebraska does not issue a GASB report as it has negligible liabilities.
NV					x	x		The state - local breakdown in Nevada is unusually complicated. From 2003 - 2007 non-state public retirees could opt for the state retiree health plan. The state plan picked up a number of local employees (i.e. they opted out of their local plans to join the state plan). Actives in the 2011 GASB report are nearly 100 percent state employees. Local public retirees currently receive health care directly from the local government for whom they worked. The above information was provided by Celestina Glove, the CFO of the Public Employee's Benefits Program, State of Nevada. Given that local retirees could only opt in over a five year window and that all of the actives are state employees, we treat the state report as if it pertains only to state employees. This will slighly overstate total state and local liability, but the bias should be small, particurarly as actives account for 70% of the present value of liabilites.

Table A1: Scaling for State and Local Employees not Covered in Primary State Report

	State GASB Report Captures			Scaling				
State	teachers	non-education local employees		teacher: based on liabilities in teacher OPEB report or CAFR	teacher: based on census employee counts	local non-ed.: based on census employee counts	general: based on supplememtal sources	Notes
NH								The state GASB report covers only state employees. The report states that retired employees receiving a pension benefit from the New Hampshire Retirement System who meet "certain requirements" are eligible for the state retiree health care benefit. This includes Group 1 retirees -- a group which includes teachers. However, the count of actives in the GASB report, 11, 514, is too small to cover both state workers and teachers (there were 31, 499 full-time local education workers in the same year and 15, 548 full-time state workers). A coversation with the staff of the Risk Management Unit of the Department of Administrative Services, State of New Hampshire confirms that only retired state employees are eligible for the state retiree health care plan. Local workers, both education and non-education, are not covered.
NJ	x	x						State report covers all state and local public employees.
NM	x	x*					0.36	The state GASB report covers all state and all k-12 employees. It also covers "participating" local employers. Collectively the two pension funds (PERA and ERB) which provide the retiree health benefits covered in the state report have 122,188 active members according to their 2012 CAFRS. This accounts for essentially the entire universe of NM active public pension plan members captured in the Census Bureau pension plan data. The state GASB report captures 90,083 actives. We therefore infer that there are 32, 105 local employees whose employer have opted not to participate in the state retiree heatlh plan and assume they are providing this benefit at the local level instead. The local gross up factor is therefore (32, 105 / 90, 083) = 0.36.
NY	x						0.97	State GASB Report includes state workers, including the SUNY system, and some local government workers. We calculate our state cash flows exclusively on the portion of the report excluding SUNY employees. As described in the text, we also explicitly calculate cash flows for New York City (NYC) using its GASB report. We exclude the portion of the report for "Component Units" of NYC. (The NYC UAAL is equal to 175 percent of the state UAAL.) We first add the state and NYC cash flows together. We then scale up this joint cash flow using the following source: E.J. Mahon, "Iceberg Ahead: The Hidden Cost of Public-Sector Retiree Health Benefits in New York," Empire Center For New York State Policy, September 2012. Mahon (2012) catalogs the declared UAAL liabilities for 87 local governments and provides an estimate for the remaining local governments. The ratio of the UAAL from Mahon (2012) to the UAAL for the state (excluding SUNY) and NYC (excluding the Component Units) is 0.86. The scaling factors, again based on the UAAL, for SUNY and the Component Units of NYC are 0.08 and 0.03, respectively. Thus, we employ an overall scaling factor of 0.97. (The UAALs for both the State of New York and New York City are based on the Entry Age Normal actuarial method. Note that these governments also provide UAALs based on the Frozen Entry Age method and many publications which cite OPEB liabilities use the Frozen Entry Age figures.)
NC	x					x		State report covers state workers and teachers.
ND	x	x						The state report covers "A employee of the North Dakota Public Employees Retirement System (NDPERS) that is covered by an employment contract which provides for post-retirement benefits." NDPERS covers essentially all state and local workers in the state other than teachers. However, although teachers have their own pension system in North Dakota, the retiree health benefits for teachers are nonetheless provided by NDPERS (see http://www.nd.gov/rio/tffr/publications/retirement.htm). Thus, the state GASB report appears to capture all retiree health care liabilities in the state. Moreover, the number of actives in the GASB report, 28,115 is relatively close to the number of toal active public pension members in the state as recorded by the census, 32,430.
OH		x		0.28				State GASB report includes state and local workers excluding teachers. The2011 teachers retirement system CAFR reports a retiree health care AAL equal to 27 percent of the state reported retiree health care AAL.

Table A1: Scaling for State and Local Employees not Covered in Primary State Report

	State GASB Report Captures			Scaling				
State	teachers	non-education local employees		teacher: based on liabilities in teacher OPEB report or CAFR	teacher: based on census employee counts	local non-ed. : based on census employee counts	general: based on supplememtal sources	Notes
OK								The state no longer issues an OPEB reported. As noted in the Fiscal 2011 CAFR of the Oklahoma State and Education Employees Group Insurance Board "During 2006 and 2007, OSEEGIB applied the provisions of GASB Statement No. 43 (GASB 43), Financial Reporting for Postemployment Benefit Plans Other Than Pension Plans, and presented the portion of its activity related to covered active employees of participating employers as a public entity risk pool and the portion of its activity related to covered retirees of participating employers as an agency fund in accordance with the guidance for multiple-employer OPEB (other post-employment benefits) plans that are not administered as trusts. During 2008, OSEEGIB determined its activity related to covered retirees of participating employers does not meet the definition of an OPEB plan, and therefore is not subject to GASB 43. Additionally, as OSEEGIB is not a cooperative group of governmental entities joining together to finance exposure to risk, OSEEGIB is not subject to GASB Statement No. 10, Accounting and Reporting for Risk Financing and Related Insurance Issues. OSEEGIB, as an instrumentality of the State of Oklahoma created to administer, manage, and provide group health, dental, life and disability insurance for active employees and retirees of state agencies, school districts and other governmental units, believes the preferred method of accounting and reporting presentation is a special-purpose government engaged solely in business-type activities, more specifically an insurance enterprise. Effective January 1, 2008, OSEEGIB changed its financial statement accounting and reporting presentation and reported results in a single enterprise fund presentation and no longer included an agency fund."
OR	see note	see note					0.13	The state versus local breakdown is unusually complicated for Oregon. The Oregon Public Employees Retirement System (OPERS) is a state administered pension system covering almost all state and local (ed. and non-ed.) government employees. There are two retiree health plans:the Retiree Health Insurance Account (RHIA) and the Retiree Health Insurance Premium Account (RHIPA). RHIA, which provides a subsidy for Medicare eligible retirees, is available to those receiving a pension from OPERS and includes both state and local government retirees. RHIPA, which provides a benefit to pre-Medicare retirees, is only available to state government employees. The AAL for RHIPA only (as opposed to the combined RHIPA and RHIA) is $34,000,000. The total state AAL (RHIA plus RHIPA) is $495,000,000. There are 59,833 total full-time state government employees in Oregon and 110,785 local government employees. We scale up the ratio of the RHIPA AAL to the total state AAL (RHIA plus RHIPA) times the ratio of local to state employees: ($34,000,000 /$ 495,000,000) * (110,785 / 59,833) = 0.12. We acknowledge that the scaling is imperfect since it is distributed over both pre and post Medicare liabilities whereas it would ideally be distributed over only pre-Medicare liabilities.
PA					x		0.14	The state report covers only state employees. The Public School Employee's Retirement System (PSERS) Actuarial Valuation for 2011 (which values both pension and OPEB liabilities) shows an AAL of $1,339,444,000. Given the state reported AAL of $15,400,070,000, this implies a scaling factor of 0.087 for education workers. However, the PSERS OPEB valuation refers to a Premium Assistance (PA) program available to retirees with out-of-pocket premium expenses for health insurance through the PSERS health insurance coverage (which is funded 100% from retiree premiums including funds from the Premium Assistance Program) or from a school district's group health plan. (http://www.psers.state.pa.us/premiumasst.htm) According to James McAneny, Executive Director of the Public Employee Retirement Commission (PERC), Commonwealth of Pennsylvania (www.perc.state.pa.us), almost all school districts provide funding for retiree health care over and above the state funded PA program. This is done on a district-by-district basis and their is no systematic collection of the size of these liabilities. As a result, we scale up for education employees based on census employee counts and thereby implicitly assume that the school districts set their level of retiree health care benefits such that when they are added to the state PA program, the total benefit is equivalent to the benefit provided to state workers. (I.e. we do not use the 0.087 scaliong factor.) Local, non-education, retiree health is handled solely by each individual government. PERC conducted a survey of all municipal OPEB liabilities in the state. Although the results are unpublished, PERC generously shared the underlying data. Municipalities with 63, 475 active pension members responded with information on their OPEB AAL's which totaled $1,060,000,000. (The active counts come from PERC data on pension liabilities.) Accounting for 58, 645 active pension members at the County level and an additional 10, 499 actives whose employers either did not respond to the survey or failed to provide a AAL value, the total non-education local AAL scales to $2,215,000,000. Given the state reported AAL of $15,400,070,000, this implies a scaling factor for these workers of 0.14.

Table A1: Scaling for State and Local Employees not Covered in Primary State Report

	State GASB Report Captures			Scaling				
State	teachers	non-education local employees		teacher: based on liabilities in teacher OPEB report or CAFR	teacher: based on census employee counts	local non-ed. : based on census employee counts	general: based on supplememtal sources	Notes
RI	x					x		State GASB report covers state employees and teachers.
SC	x					x		The state GASB report is unusually clear about who is, and is not, covered by the retiree health insurance evaluated: "For the State of South Carolina, these benefits primarily include medical, prescription drug and dental insurance benefits provided to all eligible State and School District retirees, and also include the basic long term disability benefits provided to State employees, School District employees, and employees for Local Political Subdivisions. Any other OPEB benefits offered to the employees of the State of South Carolina are outside the scope of this report." Thus, the retiree health care in the state report covers state and local school employees, but not non-education employees.
SD					x	x		The state GASB report only covers state workers.
TN							1.76	The Tennesse Department of Finance and Administration, Division of Accounts, provides a summary of all public OPEB obligations in the state (http://www.tn.gov/finance/act/OPEB.shtml). There are four plans in total: State Plan (the basis of our cash flow projections), Teacher Plan, Tennessee Plan (Medicare Supplement Plan which is separate from the State plan) and the Local Government Plan. The respective ratios of plan UAAL to the UAAL for the State Plan are: 0.69 (Teacher Plan), 0.33 (Tennessee Plan), and 0.06 (Local Government Plan). All four plans are unfunded and these ratios cannot there be thought of as based on the relative AALs. (The Local Plan AAL reported on the above state website excludes some of the obligations and the above ratio is therefore based upon the AAL value in the July 1, 2011 Local Plan OPEB report.)
TX				1.34		x		Teachers 2011 GASB shows 681,457 actives and a UAAL of $28,894,299 (5.25% discount rate). Given the state AAL of $21,502,434,000, this yields a scalng factor of 1.34. The state report appears to only cover state employees. The Texas municipal retirement system does not provide retiree health care and their fact sheet states this is done directly by localities.
UT					x	x		The state GASB report appears to only cover state employees and this was confirmed by Marcie Handy, the state of Utah Assistant State Comptroller, Department of Administrative Services, Division of Finance. Both ed. and non-ed. local retiree heatlh care is completely decentralized and handled by individual governments. The state valuation covers liabilities accrued before Jan. 1, 2006. On Jan. 1, the retiree health program was converted to a plan which places money into a Health Reimburesement Account (HRA) which can be used to purchase health insurance. This new benefit does not trigger liabilities under GASB 43 or 45. Instead it is accounted for under GASB 16. (In 2014, the HRA program will terminate.)
VT				0.77		x		The state GASB report used to generate the cash flows only pertains to state employees covered by the Vermont State Employee Retirement System (VSERS) . The 2011 Annual Report, Office of the State Treasurer, State of Vermont, January 2012 provides the OPEB AAL for the Vermont State Teacher's Retirement System in fiscal 2011: $780,032,000. Given the VSERS AAL of $1,011,782,851, we use scaling factor of (780,032,000/1,011,782,851=0.77) for teachers. The 2011 Annual Report states that the State has no liabilities for local government workers other than teachers and that the individual local governments produce their own valuations for these liabilities, see pg. 23.
VA	x					x		The Health Insurance Credit Program (HICP) supplements the pension benefit by providing $4 a month per year of service (no COLA; cannot exceed monthly health insurance premium). Although the program is available to "participating" political subdivisions (i.e. local governments), the state GASB report only covers state employees and teachers. In addition to the HICP, the state offers health insurance to state retirees through the Health Insurance Benefit for State Retirees program. However, this only provides access to the insurance pool as the state pays none of the cost (http://www.dhrm.state.va.us/hbenefits/openenroll2012/NonMedicareRetireePremiums2012.pdf.)
WA	x	x						Reasonable clear that state report gets all state and local workers as there are categories for: state (including higher ed.), k-12 and political subdivisions
WV	x	x						State GASB report covers all state and local workers, including k-12.
WI					x	x		The state GASB report covers only state workers, including higher ed. This was confirmed by Bob Willett of the Department of Employee Trust Funds, State of Wisconsin. Mr. Willett also provided the information that, although localities can use the state health plan for their workers and retirees, the state does not fund this and all actuarial accounting for local retiree health is done by each individual local government.
WY	x	x						The state GASB report appears to cover all state and local government employees in the state.

Table A2
State Retiree Health Care Liabilities

State	Actuarial Accrued Liability (AAL)			Present Value of Benefits		
	Stated ($ millions)	EAN Methodology & 5% Discount Rate ($ millions)	EAN Methodology & 5% Discount Rate (% State Revenue)	Stated ($ millions)	5% Discount Rate ($ millions)	5% Discount Rate (% State Revenue)
	(1)	(2)	(3)	(4)	(5)	(6)
AK	$7,429	$11,966	80%	$8,081	$13,382	90%
AL	$3,370	$3,533	13%	.	$4,262	16%
AR	$1,953	$2,033	9%	.	$2,731	12%
AZ	$1,504	$3,270	9%	.	$4,264	12%
CA	$62,144	$56,978	17%	$87,776	$79,148	24%
CO	$1,711	$2,392	8%	$1,791	$2,493	8%
CT	$17,954	$25,672	89%	$22,323	$25,687	89%
DE	$5,805	$5,079	56%	.	$6,440	71%
FL	$6,416	$5,346	5%	.	$6,642	6%
GA	$4,312	$4,393	8%	.	$4,945	9%
HI	$16,777	$14,727	114%	$24,008	$18,750	145%
IA	$378	$356	1%	$543	$512	2%
ID	$32	$36	0%	$58	$50	0%
IL	$33,295	$38,701	49%	.	$42,667	54%
IN	$288	$337	1%	$415	$438	1%
KS	$276	$295	2%	$431	$363	2%
KY	$3,510	$3,471	11%	$4,710	$4,590	15%
LA	$7,076	$7,275	21%	.	$8,930	26%
MA	$16,401	$18,093	31%	$22,646	$20,418	36%
MD	$9,580	$8,406	20%	$12,509	$10,690	26%
ME	$1,981	$2,728	26%	$2,207	$3,130	29%
MI	$14,251	$11,963	19%	$18,092	$14,827	23%
MN	$693	$677	1%	$1,014	$984	2%
MO	$1,594	$2,027	5%	$1,761	$2,258	6%
MS	$665	$618	3%	.	$764	3%

Note. All values are for the 2011 fiscal year. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. NY reports an AAL under the Frozen EAN and Traditional EAN methodologies. Column (1) displays the Traditional EAN AAL for NY. . NE and OK are not included because they did not issue a GASB actuarial valuation in 2011.

Table A2 (cont.)
State Retiree Health Care Liabilities

State	Actuarial Accrued Liability (AAL)			Present Value of Benefits		
	Stated ($ millions)	EAN Methodology & 5% Discount Rate ($ millions)	EAN Methodology & 5% Discount Rate (% State Revenue)	Stated ($ millions)	5% Discount Rate ($ millions)	5% Discount Rate (% State Revenue)
	(1)	(2)	(3)	(4)	(5)	(6)
MT	$337	$508	6%	.	$851	11%
NC	$30,339	$45,131	71%	$50,014	$42,920	68%
ND	$65	$86	1%	$122	$122	2%
NH	$2,435	$3,113	37%	.	$4,767	56%
NJ	$71,372	$61,458	87%	$115,116	$101,928	144%
NM	$3,915	$3,836	19%	$5,602	$5,444	27%
NV	$977	$1,003	6%	$1,769	$1,431	8%
NY	$39,268	$28,173	14%	$58,749	$38,952	19%
OH	$31,020	$31,020	31%	.	$37,859	38%
OR	$496	$799	2%	.	$980	3%
PA	$15,400	$17,197	19%	$20,243	$19,436	21%
RI	$937	$937	10%	$1,156	$1,156	12%
SC	$4,880	$4,880	15%	$6,062	$6,062	19%
SD	$66	$76	1%	$90	$77	1%
TN	$1,476	$1,704	5%	$2,409	$2,099	6%
TX	$21,502	$23,391	17%	$31,181	$34,309	26%
UT	$481	$551	3%	$566	$529	3%
VA	$2,127	$2,748	5%	$2,388	$3,170	6%
VT	$1,012	$1,171	18%	.	$2,069	32%
WA	$6,936	$7,815	15%	$11,764	$10,394	21%
WI	$953	$848	2%	.	$1,303	3%
WV	$3,121	$3,660	24%	$3,768	$4,507	29%
WY	$219	$328	4%	$258	$258	3%
US	**$458,729**	**$470,805**	**21%**	**$519,622**	**$599,987**	**27%**
NYC	$71,281	$59,499	.	$123,309	$97,663	.

Note. All values are for the 2011 fiscal year. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. NY reports an AAL under the Frozen EAN and Traditional EAN methodologies. Column (1) displays the Traditional EAN AAL for NY. NE and OK are not included because they did not issue a GASB actuarial valuation in 2011.

Table A3

State and Local Retiree Health Care Liabilities Compared to Pension Liabilites

State	Unfunded Actuarial Accrued Liability (UAAL)			Present Value of Benefits		
	Retiree Health Care Liabilities	Pension Liabilities	(1) as a percent of (2)	Retiree Health Care Liabilities	Pension Liabilities	(4) as a percent of (5)
	(1)	(2)	(3)	(4)	(5)	(6)
AK	$16,873	$11,510	147%	$18,868	$27,023	70%
AL	$16,282	$27,500	59%	$20,263	$63,553	32%
AR	$3,385	$11,374	30%	$4,547	$39,888	11%
AZ	$2,635	$24,676	11%	$5,415	$70,960	8%
CA	$140,572	$405,657	35%	$195,270	$1,342,217	15%
CO	$2,110	$52,495	4%	$2,493	$128,860	2%
CT	$44,947	$37,934	118%	$45,060	$81,903	55%
DE	$4,927	$1,488	331%	$6,440	$11,356	57%
FL	$26,096	$46,005	57%	$32,423	$254,661	13%
GA	$21,209	$29,302	72%	$23,875	$117,858	20%
HI	$14,574	$12,219	119%	$18,750	$31,299	60%
IA	$1,511	$13,356	11%	$2,175	$48,987	4%
ID	$36	$3,607	1%	$50	$19,058	0%
IL	$151,323	$196,731	77%	$166,827	$391,468	43%
IN	$1,509	$18,330	8%	$1,993	$54,931	4%
KS	$1,341	$15,240	9%	$1,651	$37,175	4%
KY	$8,689	$29,545	29%	$14,612	$65,386	22%
LA	$10,672	$33,325	32%	$13,100	$83,512	16%
MA	$49,615	$56,173	88%	$57,097	$140,684	41%
MD	$28,803	$38,341	75%	$37,571	$114,335	33%
ME	$3,374	$5,232	64%	$4,064	$19,774	21%
MI	$45,533	$84,663	54%	$56,432	$181,858	31%
MN	$6,340	$41,341	15%	$9,218	$116,110	8%
MO	$7,154	$38,938	18%	$8,313	$121,567	7%
MS	$708	$17,095	4%	$875	$51,765	2%

Note. All values are for the 2011 fiscal year. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The UAAL for pension liabilities is based on the ABO actuarial methodology, while the UAAL for retiree health is based on the EAN methodology. The discrepancy reflects data availability. Novy-Marx and Rauh (2009), Table V, show that the ABO is, on average, 88 percent of the size of the EAN for state pension liabilities. We therefore inflate the ABO liabilities to account for this mean difference.

Table A3 (cont.)

State and Local Retiree Health Care Liabilities Compared to Pension Liabilites

State	Unfunded Actuarial Accrued Liability (UAAL)			Present Value of Benefits		
	Retiree Health Care Liabilities	Pension Liabilities	(1) as a percent of (2)	Retiree Health Care Liabilities	Pension Liabilities	(4) as a percent of (5)
	(1)	(2)	(3)	(4)	(5)	(6)
MT	$1,468	$5,870	25%	$2,458	$18,183	14%
NC	$67,596	$12,279	550%	$65,339	$102,637	64%
ND	$86	$2,419	4%	$122	$7,874	2%
NH	$12,121	$7,425	163%	$18,562	$17,219	108%
NJ	$61,458	$111,619	55%	$101,928	$248,512	41%
NM	$4,923	$17,316	28%	$7,385	$53,217	14%
NV	$3,854	$13,332	29%	$5,669	$50,472	11%
NY	$164,943	$203,253	81%	$266,629	$648,943	41%
OH	$24,829	$113,943	22%	$48,393	$325,031	15%
OR	$626	$32,262	2%	$1,104	$117,342	1%
PA	$47,154	$100,486	47%	$53,702	$225,445	24%
RI	$1,184	$11,106	11%	$1,495	$23,411	6%
SC	$6,581	$33,144	20%	$8,561	$69,838	12%
SD	$240	$1,324	18%	$244	$12,065	2%
TN	$4,703	$17,777	26%	$5,791	$78,163	7%
TX	$87,607	$106,003	83%	$128,502	$381,436	34%
UT	$1,218	$11,577	11%	$1,451	$43,255	3%
VA	$3,521	$55,279	6%	$4,369	$164,436	3%
VT	$2,446	$3,565	69%	$4,370	$9,526	46%
WA	$7,815	$26,651	29%	$10,394	$113,740	9%
WI	$3,526	$17,368	20%	$5,414	$121,855	4%
WV	$3,188	$10,318	31%	$4,507	$25,456	18%
WY	$328	$3,679	9%	$258	$13,273	2%
US	**$1,011,677**	**$2,170,073**	**47%**	**$1,303,424**	**$6,487,516**	**20%**

Note. All values are for the 2011 fiscal year. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The UAAL for pension liabilities is based on the ABO actuarial methodology, while the UAAL for retiree health is based on the EAN methodology. The discrepancy reflects data availability. Novy-Marx and Rauh (2009), Table V, show that the ABO is, on average, 88 percent of the size of the EAN for state pension liabilities. We therefore inflate the ABO liabilities to account for this mean difference.

Table A4
State and Local Retiree Health Care Liabilities under Various Discount Rates

State	Actuarial Accrued Liability (AAL)			Present Value of Benefits		
	Treasury Yield Curve	AA Nonfinancial Corporate Yield Curve	7 Percent Discount Rate	Treasury Yield Curve	AA Nonfinancial Corporate Yield Curve	7 Percent Discount Rate
	(1)	(2)	(3)	(4)	(5)	(6)
AK	$18,883	$15,986	$12,118	$21,098	$17,680	$13,290
AL	$18,824	$16,042	$12,222	$22,672	$18,991	$14,267
AR	$3,787	$3,187	$2,401	$5,078	$4,169	$3,077
AZ	$4,649	$3,897	$2,931	$6,054	$4,975	$3,680
CA	$157,524	$134,601	$102,693	$218,198	$180,867	$134,614
CO	$2,693	$2,396	$1,896	$2,807	$2,503	$1,983
CT	$50,301	$41,350	$30,590	$50,338	$41,557	$30,849
DE	$5,704	$4,935	$3,806	$7,214	$6,096	$4,613
FL	$29,213	$24,863	$18,934	$36,248	$30,142	$22,525
GA	$23,787	$20,445	$15,706	$26,737	$22,680	$17,241
HI	$16,494	$13,907	$10,503	$20,971	$17,207	$12,708
IA	$1,711	$1,559	$1,255	$2,451	$2,181	$1,722
ID	$40	$36	$29	$56	$50	$39
IL	$169,632	$144,940	$110,676	$186,912	$158,223	$119,914
IN	$1,718	$1,450	$1,095	$2,228	$1,825	$1,346
KS	$1,516	$1,358	$1,077	$1,856	$1,626	$1,268
KY	$12,409	$10,810	$8,406	$16,361	$13,845	$10,515
LA	$11,979	$10,304	$7,912	$14,681	$12,461	$9,461
MA	$56,584	$47,337	$35,532	$63,829	$52,920	$39,422
MD	$33,095	$28,399	$21,775	$41,993	$35,282	$26,590
ME	$3,966	$3,374	$2,567	$4,545	$3,806	$2,860
MI	$51,093	$43,783	$33,501	$63,306	$53,184	$40,053
MN	$7,207	$6,577	$5,284	$10,433	$9,335	$7,377
MO	$8,365	$7,146	$5,456	$9,317	$7,913	$6,012
MS	$801	$718	$569	$986	$868	$678

Note. All values are for the 2011 fiscal year. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The AAL liabilities are produced using the EAN methodology.

Table A4 (cont.)
State and Local Retiree Health Care Liabilities under Various Discount Rates

State	Actuarial Accrued Liability (AAL)			Present Value of Benefits		
	Treasury Yield Curve	AA Nonfinancial Corporate Yield Curve	7 Percent Discount Rate	Treasury Yield Curve	AA Nonfinancial Corporate Yield Curve	7 Percent Discount Rate
	(1)	(2)	(3)	(4)	(5)	(6)
MT	$1,636	$1,284	$913	$2,744	$2,063	$1,408
NC	$76,780	$63,121	$46,642	$73,047	$60,843	$45,439
ND	$97	$83	$64	$137	$116	$87
NH	$13,558	$11,299	$8,452	$20,727	$16,678	$12,110
NJ	$68,852	$58,232	$44,112	$113,919	$91,367	$66,220
NM	$5,820	$4,835	$3,612	$8,251	$6,612	$4,791
NV	$4,454	$3,801	$2,897	$6,342	$5,259	$3,916
NY	$192,132	$165,819	$127,621	$298,570	$248,720	$185,956
OH	$44,551	$38,443	$29,621	$54,268	$45,783	$34,643
OR	$1,014	$902	$714	$1,238	$1,080	$841
PA	$53,425	$46,625	$36,208	$60,291	$51,967	$39,963
RI	$1,366	$1,220	$967	$1,681	$1,471	$1,147
SC	$7,724	$6,624	$5,079	$9,576	$8,042	$6,061
SD	$273	$247	$197	$278	$253	$202
TN	$5,312	$4,758	$3,771	$6,519	$5,759	$4,513
TX	$98,262	$83,823	$63,888	$143,809	$120,008	$89,805
UT	$1,699	$1,490	$1,160	$1,634	$1,442	$1,128
VA	$4,260	$3,748	$2,931	$4,905	$4,256	$3,292
VT	$2,767	$2,273	$1,682	$4,885	$3,807	$2,689
WA	$8,725	$7,157	$5,283	$11,593	$9,249	$6,667
WI	$3,992	$3,593	$2,856	$6,091	$5,326	$4,138
WV	$4,113	$3,574	$2,770	$5,060	$4,318	$3,299
WY	$366	$301	$222	$289	$245	$186
US	**$1,162,770**	**$990,191**	**$754,149**	**$1,458,792**	**$1,217,664**	**$912,332**

Note. All values are for the 2011 fiscal year. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The AAL liabilities are produced using the EAN methodology.

Table A5

State and Local Retiree Health Care Liabilities Under CBO's Excess Medical Cost Growth Assumptions

State	Actuarial Accrued Liability (AAL)			Present Value of Benefits		
	State Excess Cost Growth Assumptions	CBO Excess Cost Growth Assumption	Percent Difference Between (2) and (1)	State Excess Cost Growth Assumptions	CBO Excess Cost Growth Assumption	Percent Difference Between (2) and (1)
	(1)	(2)	(3)	(4)	(5)	(5)
AK	$16,873	$14,144	-16%	$18,868	$15,664	-17%
AL	$16,799	$15,490	-8%	$20,263	$18,624	-8%
AR	$3,385	$3,258	-4%	$4,547	$4,426	-3%
AZ*	$4,152	$4,152	0%	$5,415	$20,742	283%
CA	$140,572	$126,072	-10%	$195,270	$176,357	-10%
CO*	$2,392	$2,392	0%	$2,493	$5,418	117%
CT	$45,034	$40,153	-11%	$45,060	$40,203	-11%
DE	$5,079	$4,793	-6%	$6,440	$6,133	-5%
FL	$26,096	$19,984	-23%	$32,423	$24,149	-26%
GA	$21,209	$18,900	-11%	$23,875	$21,218	-11%
HI	$14,727	$12,151	-17%	$18,750	$15,325	-18%
IA	$1,511	$1,241	-18%	$2,175	$1,764	-19%
ID	$36	$27	-25%	$50	$36	-27%
IL	$151,323	$130,579	-14%	$166,827	$142,856	-14%
IN	$1,533	$1,315	-14%	$1,993	$1,720	-14%
KS	$1,341	$1,072	-20%	$1,651	$1,315	-20%
KY	$11,051	$9,911	-10%	$14,612	$13,015	-11%
LA	$10,672	$9,274	-13%	$13,100	$11,343	-13%
MA	$50,595	$44,773	-12%	$57,097	$50,418	-12%
MD	$29,544	$26,240	-11%	$37,571	$33,182	-12%
ME	$3,542	$3,232	-9%	$4,064	$3,692	-9%
MI	$45,533	$46,258	2%	$56,432	$59,066	5%
MN	$6,340	$5,063	-20%	$9,218	$7,253	-21%
MO	$7,462	$6,669	-11%	$8,313	$7,421	-11%
MS	$708	$645	-9%	$875	$795	-9%

Note. All values are for the 2011 fiscal year and are produced using a 5% discount rate. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The AAL liabilities are produced using the EAN methodology. * Arizona, Colorado and Virginia provide retirees with a fixed subsidy for health care. As a result their liabilities are not dependent upon medical cost inflation.

Table A5 (cont.)
State and Local Retiree Health Care Liabilities Under CBO's Excess Medical Cost Growth Assumptions

State	Actuarial Accrued Liability (AAL)			Present Value of Benefits		
	State Excess Cost Growth Assumptions	CBO Excess Cost Growth Assumption	Percent Difference Between (2) and (1)	State Excess Cost Growth Assumptions	CBO Excess Cost Growth Assumption	Percent Difference Between (2) and (1)
	(1)	(2)	(3)	(4)	(5)	(5)
MT	$1,468	$1,163	-21%	$2,458	$1,919	-22%
NC	$68,706	$61,355	-11%	$65,339	$58,379	-11%
ND	$86	$65	-24%	$122	$91	-26%
NH	$12,121	$10,465	-14%	$18,562	$15,897	-14%
NJ	$61,458	$53,784	-12%	$101,928	$88,065	-14%
NM	$5,203	$3,914	-25%	$7,385	$5,439	-26%
NV	$3,973	$3,193	-20%	$5,669	$4,514	-20%
NY	$171,108	$55,202	-68%	$266,629	$234,965	-12%
OH	$39,651	$40,272	2%	$48,393	$50,463	4%
OR	$901	$863	-4%	$1,104	$1,047	-5%
PA	$47,515	$36,214	-24%	$53,702	$40,791	-24%
RI	$1,211	$1,115	-8%	$1,495	$1,400	-6%
SC	$6,892	$6,427	-7%	$8,561	$8,014	-6%
SD	$240	$216	-10%	$244	$221	-10%
TN	$4,703	$3,904	-17%	$5,791	$4,785	-17%
TX	$87,607	$73,282	-16%	$128,502	$105,803	-18%
UT	$1,511	$1,395	-8%	$1,451	$1,337	-8%
VA*	$3,787	$3,787	0%	$4,369	$11,513	164%
VT	$2,474	$2,279	-8%	$4,370	$3,974	-9%
WA**	$7,815	$5,463	-30%	$10,394	$6,981	-33%
WI	$3,526	$3,166	-10%	$5,414	$4,806	-11%
WV	$3,660	$4,568	25%	$4,507	$5,872	30%
WY	$328	$239	-27%	$258	$191	-26%
US	**$1,037,331**	**$934,684**	**-10%**	**$1,303,424**	**$1,175,325**	**-10%**

Note. All values are for the 2011 fiscal year and are produced using a 5% discount rate. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The AAL liabilities are produced using the EAN methodology. * Arizona, Colorado, and Virginia provide retirees with a fixed subsidy for health care. As a result their liabilities are not dependent upon medical cost inflation. ** WA provides a flat subsidy, but historically has increased it every year through legislation. We have therefore assumed, for the base results in columns (1) and (4), that the state cost of retiree health care grows with medical costs.

Table A6

State and Local Retiree Health Care Liabilities Under Differing Mortality Assumptions

State	Actuarial Accrued Liability (AAL)				Present Value of Benefits (PVB)			
	State Mortality Assumptions	S.S. Mortality Assumption Low	S.S. Mortality Assumption Middle	S.S. Mortality Assumption High	State Mortality Assumptions	S.S. Mortality Assumption Low	S.S. Mortality Assumption Middle	S.S. Mortality Assumption High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AK	$16,873	$17,363	$18,253	$19,454	$18,868	$19,457	$20,519	$21,958
AL	$16,799	$17,182	$17,899	$18,840	$20,263	$20,763	$21,678	$22,874
AR	$3,385	$3,471	$3,633	$3,850	$4,547	$4,678	$4,917	$5,237
AZ	$4,152	$4,242	$4,405	$4,616	$5,415	$5,544	$5,775	$6,074
CA	$140,572	$143,599	$149,160	$156,316	$195,270	$200,274	$209,138	$220,547
CO	$2,392	$2,417	$2,467	$2,528	$2,493	$2,517	$2,565	$2,625
CT	$45,034	$46,613	$49,458	$53,380	$45,060	$46,381	$48,730	$51,859
DE	$5,079	$5,171	$5,347	$5,576	$6,440	$6,568	$6,805	$7,110
FL	$26,096	$26,868	$28,322	$30,259	$32,423	$33,475	$35,399	$37,963
GA	$21,209	$21,655	$22,526	$23,708	$23,875	$24,396	$25,401	
HI	$14,727	$15,065	$15,691	$16,493	$18,750	$19,253	$20,153	$21,306
IA	$1,511	$1,511	$1,514	$1,515	$2,175	$2,176	$2,181	$2,184
ID	$36	$36	$36	$36	$50	$50	$50	$50
IL	$151,323	$155,396	$162,715	$172,537	$166,827	$171,515	$179,864	$191,075
IN	$1,533	$1,566	$1,624	$1,701	$1,993	$2,037	$2,115	$2,214
KS	$1,341	$1,343	$1,346	$1,348	$1,651	$1,653	$1,659	$1,662
KY	$11,051	$11,238	$11,566	$11,986	$14,612	$14,897	$15,385	$16,009
LA	$10,672	$10,906	$11,338	$11,918	$13,100	$13,408	$13,969	$14,725
MA	$50,595	$52,225	$55,233	$59,330	$57,097	$58,904	$62,186	$66,602
MD	$29,544	$30,222	$31,588	$33,416	$37,571	$38,453	$40,161	$42,433
ME	$3,542	$3,641	$3,822	$4,061	$4,064	$4,191	$4,420	$4,725
MI	$45,533	$46,752	$49,069	$52,145	$56,432	$57,980	$60,837	$64,567
MN	$6,340	$6,344	$6,356	$6,364	$9,218	$9,226	$9,249	$9,264
MO	$7,462	$7,628	$7,938	$8,353	$8,313	$8,494	$8,828	$9,273
MS	$708	$709	$710	$711	$875	$876	$878	$880

Note. All values are for the 2011 fiscal year and are produced using a 5% discount rate. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The AAL liabilities are produced using the EAN methodology. S.S. in the column headers refers to the Social Security Administration.

Table A6 (cont.)

State and Local Retiree Health Care Liabilities Under Differing Mortality Assumptions

State	Actuarial Accrued Liability (AAL)				Present Value of Benefits (PVB)			
	State Mortality Assumptions	S.S. Mortality Assumption Low	S.S. Mortality Assumption Middle	S.S. Mortality Assumption High	State Mortality Assumptions	S.S. Mortality Assumption Low	S.S. Mortality Assumption Middle	S.S. Mortality Assumption High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MT	$1,468	$1,553	$1,709	$1,932	$2,458	$2,628	$2,935	$3,377
NC	$68,706	$70,864	$74,936	$80,567	$65,339	$66,770	$69,446	$72,939
ND	$86	$86	$87	$87	$122	$122	$123	$123
NH	$12,121	$12,574	$13,409	$14,575	$18,562	$19,369	$20,811	$22,842
NJ	$61,458	$62,981	$65,811	$69,523	$101,928	$105,230	$111,148	$118,931
NM	$5,203	$5,334	$5,562	$5,857	$7,385	$7,601	$7,964	$8,432
NV	$3,973	$4,069	$4,255	$4,501	$5,669	$5,824	$6,116	$6,496
NY	$171,108	$174,365	$180,518	$188,409	$266,629	$272,711	$283,831	$297,988
OH	$39,651	$40,449	$41,998	$44,003	$48,393	$49,495	$51,557	$54,230
OR	$901	$911	$930	$954	$1,104	$1,116	$1,141	$1,171
PA	$47,515	$48,391	$49,975	$52,002	$53,702	$54,752	$56,620	$58,999
RI	$1,211	$1,226	$1,254	$1,289	$1,495	$1,514	$1,550	$1,597
SC	$6,892	$7,027	$7,271	$7,585	$8,561	$8,753	$9,093	$9,530
SD	$240	$240	$240	$241	$244	$245	$245	$245
TN	$4,703	$4,708	$4,722	$4,731	$5,791	$5,799	$5,818	$5,830
TX	$87,607	$89,329	$92,612	$96,893	$128,502	$131,319	$136,557	$143,373
UT	$1,511	$1,523	$1,542	$1,565	$1,451	$1,461	$1,477	$1,496
VA	$3,787	$3,841	$3,935	$4,051	$4,369	$4,438	$4,555	$4,700
VT	$2,474	$2,567	$2,737	$2,975	$4,370	$4,580	$4,955	$5,489
WA	$7,815	$8,055	$8,495	$9,083	$10,394	$10,731	$11,330	$12,121
WI	$3,526	$3,528	$3,532	$3,535	$5,414	$5,418	$5,427	$5,432
WV	$3,660	$3,745	$3,907	$4,119	$4,507	$4,613	$4,809	$5,059
WY	$328	$345	$377	$423	$258	$267	$282	$303
US	$1,153,455	$1,180,872	$1,231,830	$1,299,343	$1,494,030	$1,531,918	$1,600,652	$1,690,678

Note. All values are for the 2011 fiscal year and are produced using a 5% discount rate. For some states the GASB report upon which the liabilities are based pertain to the 2010 or 2012 fiscal years. In these cases, the liabilities are adjusted so as to be on a 2011 fiscal year basis. The AAL liabilities are produced using the EAN methodology. S.S. in the column headers refers to the Social Security Administration.