The Fiscal Stress Arising from State and Local Retiree Health Obligations*

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Abstract

A major factor weighing down the long-term finances of state and local governments is the obligation to fund retiree benefits. 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 public retiree health plans to reverse engineer the cash flows underlying the liabilities given in the report. 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 unfunded accrued liability of state and local governments for the provision of retiree health care exceeds $1 trillion, or about ⅓ of total state and local government revenue. 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 much of the projected increase in retiree health obligations as a share of revenue is the result of health care cost growth. On average, states could put their retiree health obligations into long-run fiscal balance by contributing an additional ¾ percent of total revenue toward the benefit each year. There is, however, wide variation across the states, with the majority of states requiring little in the way of additional financing, but some states requiring a significantly larger increase.

I. Introduction

Obligations for retiree benefits are among the most important factors behind the long-term fiscal imbalances of state and local governments (e.g. State Budget Crisis Task Force 2012). Although state and local pension obligations have been analyzed in great detail, much less attention has been paid to the costs of retiree health insurance—the other major retiree benefit provided by these governments. Almost all state and local governments provide this benefit to their former employees and very few have put away funds with which to honor these obligations. Moreover, the ever escalating cost of medical care is expected to push up the cost of providing the benefit over time. This paper seeks to answer two fundamental questions surrounding state and local government retiree health care liabilities. First, how large are these obligations? Second, are these benefits fiscally sustainable over the long-term?

Retiree health insurance became prevalent in both the public and private labor markets following the 1965 introduction of Medicare, which significantly lowered the cost of providing the benefit. As with any fringe benefit, the coverage formed part of the employee compensation package and it was also used to encourage early retirement (Blau and Gilleskie 2001; Marton and Woodbury 2006). Initially, both private firms and state and local governments accounted for the cost of the benefit on an annual, cash basis – i.e. they accounted for only the annual expenditures for current retirees. This situation changed for firms in 1989 when the Financial Accounting Standards Board (FASB) required employers to begin accounting for retiree health care on an accrual basis – i.e. the full expected future cost of promised benefits had to be acknowledged each year. The accounting statements which followed revealed extremely large liabilities. At least partially in response, firms began phasing the benefit out: In 1988, 66 percent of employers with 20 or more employees offered retiree health insurance; by 1993, only 36 percent of firms offered coverage (Kaiser Trust 2006). The prevalence of retiree health insurance in the private sector has continued to decline since (Fronstin 2012).[1]

In sharp contrast, the significant majority of state and local governments continue to offer their retirees health coverage. Although there is immense heterogeneity in the provision of the benefit, full coverage is often provided until the retiree reaches Medicare eligibility at age 65, at which time the coverage either ends or converts to a supplemental plan.[2] The coverage is usually explicitly subsidized by the government offering it. In some cases, though, the subsidy is implicit: the retiree is offered access to an insurance pool which includes both current workers and retirees. The presence of the younger, current workers reduces the insurance premium for the retirees (and raises the cost to the government of providing insurance to their current workforce).

[1] This paragraph draws heavily from Clark and Morrill (2010).

[2] In most cases the receipt of retiree health care requires formal retirement from the system providing the benefit. It does not require exiting the labor force.

In 2004, the Government Accounting Standards Board (GASB) issued a statement requiring state and local governments to begin accounting for retiree health benefits on an accrual basis. The actuarial reports which followed revealed extremely large unfunded liabilities for many governments. Likely in response to both the acknowledgement of the size of the liabilities, as well as the escalating cost of the benefit, many state and local governments have begun to pare back the generosity of the benefit through actions such as increasing the percent of the premium that must be paid by the retiree and by tightening eligibility standards (e.g. Clark, Morrill, and Vanderweide, 2014, Franzel and Brown 2012). Some governments have even eliminated the benefit (Franzel and Brown 2013). Going forward, the availability of potentially-subsidized health insurance through the health care exchanges operating under the Affordable Care Act (ACA) may lead more governments to curtail their retiree health coverage.[3] Reducing and eliminating the benefit, though, comes at a cost to governments as it reduces the level of compensation being provided to its employees. In a competitive labor market, this will require boosting other forms of compensation or accepting employees of lower quality (Qin and Chernew, 2014).

In order to answer our first question—how large are state and local government liabilities for retiree health care?—we construct a comprehensive set of projections of these obligations. In doing so, we build on past work by Clark 2009, 2010, Clark and Morrill 2010, 2011, GAO 2009 and Pew 2012 that has carefully analyzed the stated liabilities in the retiree health care actuarial reports mandated by GASB. In addition to being the logical starting point for an analysis of these liabilities, this approach benefits from being transparent (Pew 2010). Moreover, it has clearly been successful in drawing considerable public policy attention to the issue (e.g. State Budget Crisis Task Force 2012).

We advance this existing literature in two ways. First, in reporting the present value of future liabilities, governments have significant latitude in setting the assumptions which underlie the stated obligation. For instance, they have discretion over the rate at which to discount future benefit payments, and also differ in their assumptions about underlying inflation and future heath care cost growth. As a result, comparing the size of stated liabilities across governments is problematic as it is unclear if differences reflect fundamental budget issues, such as the generosity of the benefit, or merely reflect different actuarial and economic assumptions. We address this lack of comparability by harmonizing the assumptions upon which the liability estimates are based. Our estimates are therefore directly comparable to each other across governments. Second, much of the past literature relies on the state government actuarial reports. In some states, local government retirees receive their health insurance from the state and are therefore captured by the state report. In other cases, local retirees receive the benefit directly from their former local government employer and are not captured by the state report.

[3] For example, in May of 2013, the city of Chicago announced its intention to terminate its retiree health care benefit. The city expects that retirees not yet eligible for Medicare will be able to find affordable coverage through the ACA exchanges being setup by the state of Illinois (Shields 2013).

Thus, despite the fact that most local government retirees are eligible for the benefit, there is significant variation across states in the percent of the local retirees captured by the state actuarial reports. The past work which has examined local government obligations has focused on subsets of local governments.[4] Given that our aim is to assess the total fiscal burden of retiree health within each state, we need to fully account for all local government liabilities. We therefore develop a methodology and collect the data required to estimate the size of retiree health obligations for all local government retirees.

We produce our liability estimates by projecting the annual cash flows upon which the stated liabilities are based. (The stated liabilities are equal to the present discounted value of the projected future cash flows needed to fund the benefit.) While such cash flows have been constructed for retiree pension obligations (Novy-Marx and Rauh, 2011, 2014), 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 GASB. As discussed above, many of these 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 government sector. Once the statistical machinery is in place to produce the cash flows, we can alter the assumptions upon which they are based. Specifically, we produce liability estimates harmonized across three key factors: the discount rate, current and future life expectancy, and health care inflation. Moreover, we impose a common actuarial methodology.

We answer our second question—are retiree health benefits fiscally sustainable over the long-run—by performing a "current policy" projection. The projection assumes that state and local government continue to offer retiree health care under the set of policies (e.g. eligibility requirements) identified in the GASB mandated actuarial reports. A crucial aspect of this analysis is the need to account for new workers—i.e. those hired in the future—as the liability analysis only accounts for current workers and retirees. To do so, we develop a methodology for projecting the flow of new workers and, ultimately, the flow of benefit payments required when these workers reach retirement. We then add these payments to the payments for current workers and retirees and assess the overall fiscal burden of the benefit over the long-run.

We find that the total liability of state and local governments for retiree health care equals around \$1.1 trillion dollars, equal to roughly 1/3 of the total annual revenues of the state and local government sector. There is significant heterogeneity across the states, with several having liabilities exceeding 80 percent of annual revenues. The more thoroughly studied pension liabilities provide a useful point of comparison. Discounting both pension and retiree health liabilities at the same rate, we find that unfunded retiree health care liabilities equal around 50 percent of unfunded pension liabilities. The standard datasets on government finance do not

[4] For example, Clark 2010 examines obligations for teachers and GAO 2009 examines obligations for the 39 largest local governments. We are unaware of any past work which has attempted to account for all retiree health obligations at the local level in a detailed fashion. There are, however, back-of-the-envelope calculations which attempt to account for the entirety of the local government sector (e.g. Zion and Varshney 2007).

allow for breaking out expenditures for retiree health care. Our cash flow estimates allow us to fill this gap: We find that current annual outlays for the benefit equal around $31 billion, equal to about 1 percent of annual revenues. In terms of fiscal sustainability, we find that state and local governments could fund their retiree health obligations in perpetuity by annually dedicating an additional ¾ percent of total revenue toward the benefit. There is significant heterogeneity, though, with some states requiring a substantially larger funding increase to bring the benefit into fiscal balance. Finally, we find that health care cost inflation is likely to be the primary driver of growth in benefit payments.

All of our estimates are "current law" estimates, i.e., they assume that the rules that govern retiree health benefits in our base year of 2011 are maintained over time, even for workers hired after our base year. Contrary to this assumption, it is quite possible that state and local governments will reduce the size of their retiree health liabilities by reducing the generosity of the benefit or eliminating it all together. These governments operate in a competitive labor market, though, and a reduction in retiree health benefits would likely require increasing other forms of compensation to some extent or accepting lower quality employees.

The paper proceeds as follows. Section II presents the methodology and results for our first question—how large are the retiree health care liabilities. Section III presents the methodology and results for our second question—how much fiscal pressure will these liabilities apply to state and local governments. Section IV concludes.

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. In this section, we examine only the obligations associated with current workers and retirees and do not account for liabilities associated with future hires. In the next section we incorporate new employees into the analysis.

State Government Employees

For each state, we collected the 2011 fiscal year actuarial report required by GASB statements 43 and 45 which details the liabilities of the state retiree health insurance plan.[5] Henceforth, we refer to these reports with the shorthand of "GASB reports". The reports generally provide

[5] 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.

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 state government or state employee pension fund Comprehensive Annual Financial Reports (CAFRs) or the actuarial statement for the pension plan rather than in the GASB reports directly. In other states, some of the necessary information was not included in either the health care actuarial report or in any of the above sources, 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 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 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.

We use this information to construct the future cash flows required under two actuarial liability concepts – the PVB and the AAL. These concepts only account for liabilities associated with current workers and current retirees. They do not capture liabilities associated with employees hired in the future (after 2011).

Present Value of Benefits (PVB)

The present value of benefits (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)

The Actuarially Accrued Liability (AAL) is a narrower liability concept as it only captures liabilities accrued *to date* by current workers and retirees (i.e. it does not account for the future accruals of current workers). 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.[6]

Following Novy-Marx and Rauh (2011), we note that, for an employee age *a* with *y* years of service who will retire in *T* years, with a present value of benefits equal to $PVB_{a,y,T}$, the PUC measure of the AAL is just:

$$\mathrm{PUC}_{a,y,T} = \left(\frac{\mathrm{y}}{\mathrm{y+T}}\right)\mathrm{PVB}_{a,y,T} \tag{1}$$

The EAN uses a different method to accrue benefits over time. It 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 AAL under this methodology is simply the value of such an account at any given time. It depends on the rate of salary growth and the discount rate, as well as on the likelihood that workers stay employed long enough to receive a benefit. Let p be salary growth and r be the discount rate, and define $\phi = \frac{(1+p)}{(1+r)}$. Also define $S_{a-y,t}$ as the probability of remaining employed from entry age (a-y) to time t. Then, the EAN measure of the AAL is:

$$\mathrm{EAN}_{a,y,T} = \left(\frac{\sum_{i=1}^{y}\phi^{i}\mathrm{S}_{a-y,i}}{\sum_{i=1}^{y+T}\phi^{i}\mathrm{S}_{a-y,i}}\right)\mathrm{PVB}_{a,y,T} \tag{2}$$

[6] 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, we use whichever method the state specified.

If the rate of salary growth is equal to the discount rate (so that $\phi = 1$) and if every worker who is hired stays long enough to receive a health benefit (so that $S_{a-y,t} = 1$ for all i), then the PUC is equal to the EAN. But if the rate of salary growth is smaller than the discount rate and/or many employees leave before they are eligible for a benefit, then the EAN is larger than the PUC.[7] In most states, an employee has to retire from the job in order to receive a health benefit (unlike pensions, there is not much accruing of benefits for workers who leave before retirement), and so the EAN tends to be larger than the PUC.[8] Because the majority of states use the EAN for both retiree health and pension reporting, we use it as our measure of accrued liabilities for all states (except for calibration purposes). Using the PUC instead would reduce our estimates by an average of about 8 percent.

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. Similarly, the reports do not always contain information about the age distribution of their retirees or their workforces. To address these and other sources of measurement 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:

$$\mathrm{C}_t^{cal,m} = \mathrm{C}_t^m * (1+\lambda^m)^{t-1} \tag{3}$$

where C_t^m is our cash flow estimate, $\mathrm{C}_t^{cal,m}$ is the calibrated cash flow estimate, λ is the calibration parameter, t indexes year and m indexes the three actuarial methodologies underlying the cash flows: PVB, EAN and PUC. λ is chosen to satisfy

$$\sum_{t=1}^{\infty} \frac{(1+\lambda^m)^{t-1}\mathrm{C}_t^m}{(1+r_{stated})} = \mathrm{PV}_{stated}^m \tag{4}$$

Where PV_{stated}^m is the present value of the retiree health care liability given in the GASB actuarial report.

[7] Essentially, the contributions to the "account" made on behalf of employees who leave before becoming eligible are used to fund the benefits of those who remain.

[8] On the other hand, although wage growth for the economy at large tends to be lower than the discount rate, wage growth over an employee's tenure, which is the appropriate measure for the EAN calculation, tends to be higher than the discount rate. We use the average salary growth over the first 10 years of tenure by state.

The calibration uses state-level variation in the 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 our retiree and active worker 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 a given cash flow, we use the EAN or PUC to calculate the calibration factor (depending on which AAL measure is provided in the report).[9]

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 as a whole. Our average error for the total AAL liabilities (using the state-chosen actuarial method) is 6 percent. The mean absolute error is a bit larger at 11 percent. For the PVB liabilities, our average error is negative 1 percent and the mean absolute error is 5 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.

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[9] For example, if the state does not provide the PVB present value, we calibrate the PVB cash stream using the AAL calibration factor.

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.[10] 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 Comprehensive Annual Financial Reports (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 for very large local governments such as central cities or large counties. 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 local education workers 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

[10] 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.

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 liability 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.

We often use both the aggregate AAL method and the worker count method simultaneously. For instance, for the state of Illinois, we obtained the AAL retiree health liability for the City of Chicago and for Cook County (from their GASB reports) and scale up the stated liabilities based on these. For the remainder of local government employees in the state, we scale using the worker count method.

Web Appendix Table 1 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 the table. 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 (using the EAN methodology) for the entire United States, 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 nominal obligations peak somewhere around 2040 for most states. At this point, mortality begins to dominate medical cost inflation and the annual liability associated with current workers and retirees begins to fall. (If retiree health benefits for workers hired after 2011 were included, however, total benefits would still be rising, as shown below.) The fact that costs for Medicare-eligible retirees (age 65+) are generally less than costs for pre-Medicare retirees also plays a role in the decline in the annual liability.

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.

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.

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.[11] 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 0.67 and the portion due to employee counts is 0.49. 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, 31 percent is based on scaling up the estimated cash flows on the basis of reported local government liabilities, and the remaining 23 percent is based on scaling up on the basis of employee counts. The 23 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 accrual liability equal to 91 percent of the

[11] 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.

aggregate liability produced using the local liability scaling method. On average, the employee count method appears to produce a reasonable scaling factor.[12]

For the U.S. as a whole, we estimate that accrued state and local government retiree health care liabilities equal roughly $1.1 trillion dollars.

The total annual revenue of state and local governments roughly equals their total annual expenditure, as these governments operate under balanced budget requirements. Total annual revenue is therefore a useful metric for assessing the magnitude of the overall fiscal burden on both the spending and revenue side of the budget. Our accrued liability estimate is equal to approximately 32 percent of total annual revenues. However, states and localities do not have the ability to adjust all elements of their revenue stream. For instance, around 20 percent of total revenues come from grants from the federal government and these grants cannot be adjusted upward by state and local governments to address retiree health care funding. If governments wish to increase the degree of prefunding solely through revenue side adjustments, they would most likely need to increase general own source revenue–basically taxes and fees. Our retiree health care liability estimate is equal to roughly 60 percent of these revenues.

In contrast to our estimate of $1.1 trillion, Pew (2012) values accrued liabilities of $660 billion, but they include only state-administered plans and use the state's discount rate and actuarial methodology. 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 97 percent unfunded, although Ohio, Arizona, and Oregon are only about 60 to 70 percent unfunded.[13] Similarly, Pew (2012), focusing on state-run plans, estimated that they are 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 about $1.5 trillion.

These estimates assume that states do not pare back their benefits in the future. If they were to do so, then future liabilities would be smaller. For example, we can calculate the liabilities under the (extreme) assumption that the retiree health programs are abolished for workers younger than 50. Under this assumption, the PVB of the retiree health liability would be closer to $1 trillion

[12] 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 Web 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 problematic.

[13] 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.

(although there would presumably be some required increase in wages in order to offset the loss of benefits.)

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 local revenue (Idaho) to a high of 91 percent (Hawaii and 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 roughly 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 (2014). 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 age 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.)[14] On average across the states, the present value of retiree health benefits is 22 percent of the present value of pension benefits. However, as shown in the top panel of Figure 3, there is a wide variation across the states. In 21 states, the retiree health PVB is less than 10 percent of the pension PVB; in 6 states, the retiree health PVB is 50 percent or more of the pension PVB.

[14] GASB rules allow states to discount the funded portion of their liabilities at a rate that reflects the expected rate of return on pension assets, but require that a lower rate be used to discount unfunded liabilities. Because pension liabilities are funded to a much greater extent than retiree health liabilities, states tend to use higher discount rates for discounting future pension liabilities. However, as noted by Rauh and Novy-Marx (2009 and 2011), the GASB distinction does not make economic sense. They argue that the rate used to discount liabilities should reflect the ability of state and local governments to default on their obligations. From this perspective, the discount rate should be lower for pensions than for retiree health, as pensions have much greater legal protection. On the other hand, as we discuss below (see, in particular, footnote 20) other factors make the comparison between the appropriate economic discount rates on pensions and retiree health liabilities less clear.

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 49 percent of the pension UAAL. As shown in the bottom panel of Figure 3, 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 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, Colorado, and Ohio.

Pew (2012) finds a much greater relative importance of retiree health obligations. While we find that unfunded accrued retiree health care liabilities amount to around 50 percent of unfunded accrued 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 Pew's 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, recalculate the liability and then apply the calibration factor. We proceed by first varying the key assumptions one-by-one in order to assess their importance. We then harmonize all of the assumptions simultaneously in order to produce liability estimates which can be cleanly compared across governments.

The first assumption we explore is the discount rate. The choice of discount rate has been a contentious issue in evaluating the size of pension liabilities. Governments have traditionally discounted at the expected rate of return on their pension assets – often around 8 percent. 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 have been used to argue for discounting public pension liabilities at a risk-free rate (Novy-Marx and Rauh 2009, 2011)[15].

The situation is much less clear cut for retiree health care obligations. These obligations have substantially weaker legal protections than do pension promises and numerous states and localities have reduced the generosity of, or even eliminated, the benefit in recent years (Clark 2009, Franzel and Brown 2013).[16] It is thus not clear that these employee benefits should be viewed as a promise that will be fulfilled 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 guaranteed benefit, a discount rate in excess of the risk free rate should be used.[17]

Ideally, we would discount by the return on a financial asset that defaults in exactly the same states of the world and by exactly the same amount as those in which the government in question defaults on its retiree health care obligation.[18] We are unaware of any such asset and therefore present several different possible discount rates on Table 2. The first row again displays the results for the U.S. using a 5 percent rate. The next row uses the federal government borrowing

[15] However, pension benefits (and retiree health benefits) appear likely to be scaled back as a result of Detroit's bankruptcy declaration (Davey 2014), indicating that pension benefits are subject to at least some default risk.
[16] Some governments, though, do have limits on their ability to alter retiree health care benefits due to collective bargaining agreements and other factors. Moreover, benefit changes are sometimes challenged in court. For example, a court recently overturned the freezing of retiree health benefits for certain employees of Los Angeles, CA (Chin 2013).
[17] There are many other uncertainties beyond default risk that have implications for the choice of discount rates, including uncertainty surrounding employee turnover and retirement rates, mortality, take-up rates, and medical cost inflation. (Some of these, like employee turnover, retirement, and mortality also apply to pensions, whereas others—like take-up rates and medical cost inflation, do not.) The implications of these sources of uncertainty for the appropriate discount rate depend on the correlation between the realizations of these variables and the marginal utility of income for the ultimate payer of retiree health care obligations – the present and future taxpayer – in the same state of the world. Consider medical costs. Suppose medical costs are pushed up by new technologies that boost the cost of health insurance but also have important medical benefits. In this case, the taxpayer may have a high marginal utility of income given the need to fund her own unexpectedly high health insurance costs. She will simultaneously have an unexpectedly large obligation for retiree health care. This positive correlation points toward a lower discount rate and a higher valuation of the retiree health care liability. Intuitively, because the retiree health obligation is relatively large in states of the world where the income needed to fund the obligation is particularly valuable, the obligation is more onerous – i.e. larger in size. An increase in life expectancy would have similar implications – it would push up the size of retiree health liabilities and simultaneously push up the marginal value of income for the taxpayer who now needs to finance consumption over more years of life. Again, the positive correlation points toward a relatively lower discount rate. Alternatively, medical costs may be pushed higher by robust economic growth and the resulting increase in demand for medical services. In this state of the world, retiree health care costs are high, but the marginal value of income likely low because the economic growth has increased the income and asset values of the taxpayer. In this case, the negative correlation between retiree health care costs and the marginal utility of income suggests that the discount rate should be relatively higher and the size of the liability lower. Given the ambiguous implications of the uncertainty around medical cost inflation and other determinants of retiree health for the discount rate, we do not address it directly and instead focus solely on default risk.
[18] Note that the risk of default affects both the expected cash flows and their riskiness. Finding a traded asset that defaults in exactly the same states of the world and by exactly the same amount (e.g., government pays 85% of the claim in those states of the world) would provide a market-based price for the riskiness of the retiree health obligation that would encompass both the effect of default risk on expected cash flows and on the riskiness of the stream of payments.

rate—the zero-coupon Treasury yield curve—to discount the cash flows.[19] The Treasury yield curve produces a PVB that is 12% higher than the liability produced by the 5 percent discount rate. This risk-free discounting can be viewed as expressing the size of the liability under the hypothetical assumption that these benefits have iron-clad guarantees. The next row shows the liabilities using the state-chosen discount rates which generally conform to GASB guidelines. For states with unfunded plans, these guidelines require a rate consistent with the return on a government's general assets – typically around 4 percent. For states with funded plans, the rate may reflect the expected rate of return on trust fund assets – typically ranging from 7 to 9 percent (Clark and Morrill 2010). These discount rates, though, can be viewed as ad hoc as they do not conform to the logic of financial economics discussed above. In any case, the state-chosen discount rates yield a liability only slightly lower than that produced by the Treasury yield curve. In the final row, we employ the relatively high, and admittedly somewhat arbitrary, discount rate of 7 percent. The PVB liability is 30 percent lower than the baseline 5 percent discounting. The sensitivity of the AALs to the discount rate is just a bit less than the PVBs, reflecting the fact that the AALs are more heavily weighted toward current benefits (as many of the far off future benefits are as yet unaccrued).

Overall, we view the 7 percent discount rate as not unreasonable given the ease with which benefits can be adjusted. Nonetheless, for our fully harmonized runs presented below, we employ the more conservative 5 percent discount rate.

Table 3 examines the sensitivity of the retiree health benefit liabilities to the assumption about per capita health care spending growth. The assumptions underlying the GASB reports almost universally assume that health care spending 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 private-sector health spending will slow over time to a rate in line with per capita GDP growth. For example, in their 2011 Long-Term Budget Outlook, CBO assumed that the "excess cost growth" in private insurance premiums—defined as the difference between the growth rates of health spending per beneficiary and GDP per capita—would decline from 1.7 percent in 2011 to 0 percent by 2085.[20] In addition to differences in "excess" cost assumptions, states also differ in their assumptions about general long-term inflation, which likely also contributes to differences in expected health spending growth.[21]

Applying the CBO's assumptions for "excess cost growth" to the retiree health liabilities allows us to compare the cash flows across the states on a consistent basis. Doing so lowers our

[19] The zero-coupon treasury yield is estimated as of June 30, 2011 – the end of the 2011 fiscal year for most state governments. It is estimated using the methodology of Gurkaynak, Sack and Wright (2006).
[20] See The 2011 Long-Term Budget Outlook and the accompanying Data Underlying Scenarios and Figures available at the CBO website (CBO, 2011).
[21] Of course, states vary in how they determine future health costs 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.

measure of the PVB and AAL for state and local retiree health liabilities by an average of about 5 percent, although the effects varies significantly across the states. In six states (Ohio, Michigan, Arkansas, Maryland, Delaware, and Rhode Island) the CBO health cost assumption boosts the PVBs. In the remainder of the states the PVBs are unchanged or decline. The decline is at least 20 percent in three states (Idaho, North Dakota, and New Mexico.)

Many 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.[22] Table 4 reports the effect of allowing life expectancy to increase over time. We use mortality tables by age and sex for healthy white collar annuitants as the starting point, and then allow 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).[23] Allowing life expectancy to increase raises the present value of the retiree health obligations. Assuming that life expectancy increases according to Social 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.[24]

We report 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 in Web Appendix Table 2. Our preferred UAAL estimate is equal to \$1.1 trillion and our preferred PVB estimate is \$1.5 trillion. The full harmonization result in a slightly lower estimate of the retiree health obligations than that implied by the assumptions in the state reports—with the unfunded accrued liability 3 percent lower, and the present value of benefits 8 percent lower. However, there is significant heterogeneity across states: Harmonization increases the unfunded AAL by 30 percent or more in 9 states, while it decreases it by 15 percent or more in 8 states.

Figure 5 provides a useful summary of the heterogeneity across the states; the states with the largest accrued retiree health obligations as a share of total revenue are in red, while those with the lowest liabilities are in yellow.

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[22] Roughly one-half of the states make some adjustment for future life expectancy increases, either by using a lower mortality rate throughout (a "static" approach) or by allowing mortality rates to decline over time (a "generational" approach.)

[23] Our starting mortality rates can be found in the Society of Actuaries RP-2000 Tables. The Social Security annual mortality changes, which are the rates underlying the 2011 Trustees Report, were provided to us by Michael Morris from the Social Security Administration.

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

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.[25] 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 6 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 no 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 GDP rise about 20 percent (from 5 percent of GDP to 6 percent of GDP) in that same time period.[26] Outlays for retiree health care rise much more rapidly under both the excess cost assumptions employed by the CBO—the blue line—and the assumption that excess cost growth continues at its current pace—the green line.

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. 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.

[25] In other words, although states have an unfunded liability, they also have an asset equal to the present value of revenues less the present value of other expenditures. The issue of risk and the appropriate discount rate could be brought into this analysis by determining the proper discount rate for "government taxes less other expenditures" and comparing it to the proper discount rate for retiree health liabilities.

[26] The annual pension outlays of state and local governments calculated by Novy-Marx and Rauh 2014, which are based on very similar demographic data as the retiree health projections, also do not rise significantly as a share of CBO's projected GDP over the next decade or two.

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 Web Appendix Table 3, 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 child share of the population declines by 1 percentage point, and the elderly share of the population—the share of population aged 65 or greater—increases by 6 percentage points. The elderly dependency ratio—the ratio of the elderly 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 7 plots the distribution across the states in the change in the adult population (top panel) and the change in the elderly dependency ratio (bottom panel). Almost half the states show an increase in the elderly 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 (Board of Trustees, 2011). Specifically, we calculate the percentage difference between each state's growth rates for children, 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 children, adults, and the elderly. We then add up the total population of children, 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 5, using this methodology results in an average nominal GDP growth rate of 4½ percent per year, with estimates by state ranging from lows of around 3 percent (West Virginia) to highs of around 6 percent (Arizona and Nevada). Figure 8 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 boom in shale oil means this prediction will likely 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.

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, we simply add employees to the remaining 2011 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.[27]

Our projection of the state and local labor force for the workers covered by the state GASB reports are presented in Web Appendix Figure 1. The top panel shows our workforce projection. The total workforce (the solid 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

[27] To calibrate the cash flows associated with future workers, we multiply by the average error between our liability estimate for existing workers and the corresponding stated liability in the GASB report. Because the liabilities associated with future workers continue indefinitely, proportional calibration makes more sense than the geometric calibration used for the existing workforce. Using the geometric calibration in this context would produce nonsensically large (small) liabilities.

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.

The top panel of Figure 9 compares the ratio of retirees to workers in our projections to those projected by Social Security, where the Social Security line reports the ratio of beneficiaries to covered workers over time.[28] The figure shows a large difference between the effect of demographic change on Social Security versus the effect on state and local retiree health insurance. Of course, the age of eligibility for Social Security benefits is, on average, later than the age of eligibility for state and local retirement benefits.[29] Thus, the aging of the population may have pushed up the ratio of retiree health beneficiaries to workers in the years prior to the 2011 start of our data. The bottom panel of Figure 9 uses the Census population projections (summed across the states and available only through 2030) to get a sense of the importance of this difference in retirement age. In particular, it plots the projected ratios of retiree-age to working-age population using two different definitions of retirement age: The long-dashed green line uses a "retirement age" of 55, whereas the short-dashed red line uses a "retirement age" of 65. Although the ratio of retirement-age to working-age population rises less when age 55 is treated as the retirement age, there still is a much larger rise in that ratio than in the one we project for state and local retiree health insurance—the solid blue line.

There are several possible explanations for this remaining difference between our retiree health demographics and those for the population as a whole. 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

[28] The line plotted is the ratio of Old-Age and Survivors Insurance (OASI) beneficiaries to covered workers under the Intermediate set of assumptions (Table IV.B.2. Board of Trustees (2011)).

[29] Social Security early retirement age is 62 and full retirement age is currently 66 and moving to 67 by 2027. Many state and local plans allow early retirement at 50 or 55, often with full access to the retiree health insurance benefit.

considered a factor over the long run, because the answer depends on the incidence of these costs. In a perfectly competitive labor market without any minimum wage constraints, 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 is an obligation that the state and local governments have already accrued. But the effect of excess health costs on future workers is more difficult to pin down. Although there is a substantial literature suggesting that private-sector workers bear the cost of their employer-provided health insurance, there is only limited evidence on the incidence of such insurance in the public sector, which may be quite different (Qin and Chernew, 2014.) One recent study (Clemens and Cutler, 2014) found that public sector employees bear little of the cost of their *current* health insurance. Almost no empirical evidence exists about the incidence of health insurance that is provided after retirement, which seems even less likely to be borne by workers, because it hard to value and is not guaranteed.

If public sector workers do not bear the cost of retiree health insurance, then increases in health costs represent a burden for the state. If, on the other hand, the incidence of retiree health insurance is on workers, then total future compensation would be invariant to excess health costs, and so any increase in retiree health benefits would be offset by lower compensation elsewhere.[30] Given the uncertainty about the incidence of these benefits, our projections of annual retiree health insurance costs should 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 (including retiree health costs for all workers hired after 2011) as a share of the total revenue of the state and local government sector, where total revenues are assumed to rise with state GDP. The solid blue line displays 2012 outlays for retiree health (including any contributions to trust funds). The long-dashed red, short-dashed green, and dashed-dot orange 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 1.7 percentage points (the CBO value for 2012) up until 2100 and then 0 thereafter.[31] Retiree health care outlays reach around 1.7 percent of total annual revenues by 2060 under our baseline and somewhat over 2 percent of total revenues under our constant excess cost growth assumption. In the absence of excess cost growth, these outlays consume less than 1 percent of revenues by 2060.

[30] For example, 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.
[31] Excess cost growth must dissipate eventually; otherwise, health spending would ultimately comprise 100% of GDP.

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 *j*'s revenues $PVR_j = \sum_{2012}^{\infty} \frac{Rev_{j,t}}{(1+r)^{t-2012}}$, the present value of retiree health costs $PVC_j = \sum_{2012}^{\infty} \frac{Costs_{j,t}}{(1+r)^{t-2012}}$, 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, k_j, 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:

$$(\mathrm{k}_j + c_j)PVR_j + A_j = PVC_j \quad (5)$$

or

$$k_j = \frac{PVC_j - A_j}{PVR_j} - c_j. \quad (6)$$

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 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. However, the contribution was, if anything, lower than average, biasing upward our estimates of k_j. The discussion of the appropriate discount rate, r matters for these calculations as well. We are using the path of federal borrowing rates that CBO projected in their June 2011 Long-Term Budget Outlook, which average about 5.5 percent.[32]

Table 6 tabulates the required increases in total revenues by state under the three assumptions about excess cost growth. Nationally, we calculate that a 0.7 percentage point increase in total 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 1.5 percent of total revenues.

[32] CBO projected that borrowing rates would rise from their unusually low levels of 3.3 percent (nominal) in 2011 to a long-run average of 5.5 percent (3 percent real and 2.5 percent inflation). By using the federal government borrowing rate, we are implicitly projecting a risk-adjusted budget that assumes that (1) states and localities will not default on their retiree health obligations and that the risks associated with mortality, health costs, and other parameters are uncorrelated with taxpayer marginal utility (see footnote 17), and (2) any increments to the federal rate received by states and localities on their investment represent a return for holding risk.

There is, of course, considerable heterogeneity across the states, with the states experiencing the greatest increases in expenditures requiring an adjustment of 1 percent to 3 percent of total revenue. Because expenditures and revenues are very similar at the state level, these estimates can also be interpreted as the cut in spending that would be required to offset the costs of increasing retiree health insurance costs.

Web Appendix Table 4 presents analogous calculations using general own source revenue. Using this measure, we calculate that, under our CBO excess cost assumption, a 1.3 percentage point increase in own revenues would be required to finance retiree health expenditures on average, with the states with the largest burden having to raise own revenues by up to 5.2 percentage points.

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. If so, states may be able to pay lower wages if they pre-fund (Novy-Marx and Rauh 2013). 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).

Conclusion

Obligations for retiree benefits are an important factor in the long-run fiscal imbalances of state and local governments. While pension benefits have been widely studied, obligations for retiree health care have received much less attention. We examine the costs of these benefits to state and local governments in two ways. First, we calculate the present value of the health insurance benefits already accrued by state and local retirees and workers. Second, we examine the burden to state and local governments of continuing to provide these benefits in to the future.

Using a 5 percent discount rate, we estimate that accrued state and local government retiree health care liabilities equal around 1.1 trillion dollars, roughly ½ of the value of accrued pension obligations. However, states and localities have far more leeway to cut back the health insurance benefits of existing retirees and workers than they do the pension benefits, suggesting that a higher discount rate might be warranted. In that case, the already-accrued liability associated with retiree health obligations may be significantly less than ½ that of pensions.

We also calculate the annual costs of these benefits and assume that states and localities continue to provide the same level of health insurance to future retirees. 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. We attempt to convey the variation across the states in the burden of these benefits by calculating what changes in revenue, if begun immediately and maintained forever, would be sufficient to fund these benefits in perpetuity. We find that states would have to increase revenues or cut overall spending by an amount equal to about ¾ percentage point of total revenues, on average. However, the burden is negative or close to zero for many states, but much larger–up to 3 percent–for others. Importantly, as many state and local governments face the need to shore up their retiree health plans, they will simultaneously confront a number of other budget challenges. Perhaps most significantly, ever rising expenditures on Medicaid will likely generate significant fiscal strain.

Our estimates are subject to two important caveats. First, given the limited legal protections for retiree health benefits and the potential for early retirees to get subsidized insurance through the new ACA exchanges, it is possible that state and local governments will pair back the size of these liabilities by reducing, or even out-right eliminating, the generosity of the benefit. Such reductions, though, are unlikely to constitute a free lunch. A reduction in one portion of the employee compensation package is likely to require increasing a different portion or accepting lower quality employees. Second, our estimates are subject to significant uncertainty. Most of the key inputs into our liability estimates are themselves subject to substantial uncertainty, with the future growth in medical costs probably the most uncertain. Moreover, in many instances we are forced to impute important inputs – for example, the local government retiree health cash flows in the cases where local government workers are not included in the state GASB report, and these imputations may be subject to error. Viewed jointly, these factors suggest that our estimates provide a reasonable projection of retiree health benefits under current law, but that there is much scope for actual realized benefits to differ from our projections in the years ahead.

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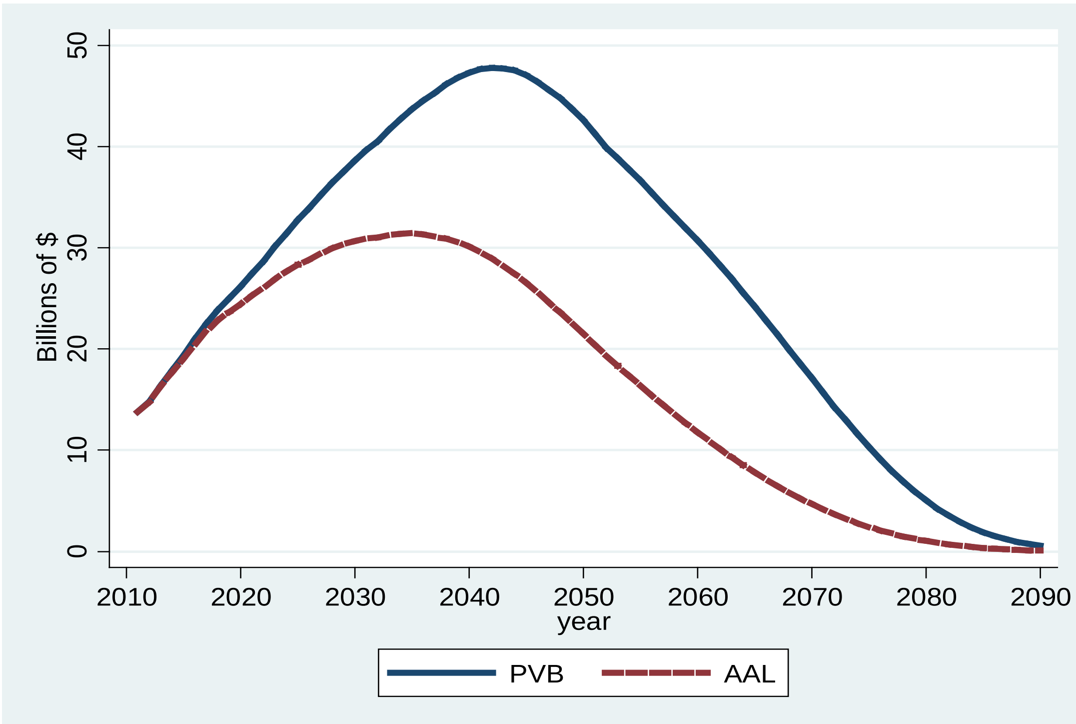
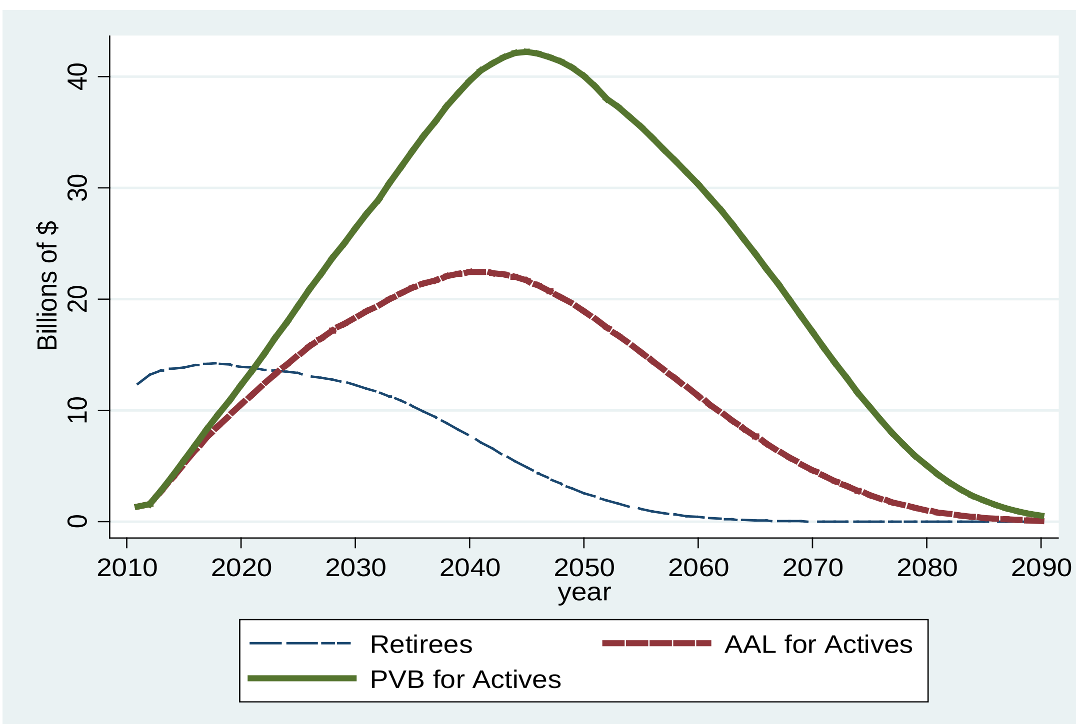
Figure 1

Panel A: Total Retiree Health Care Liabilites, by Year



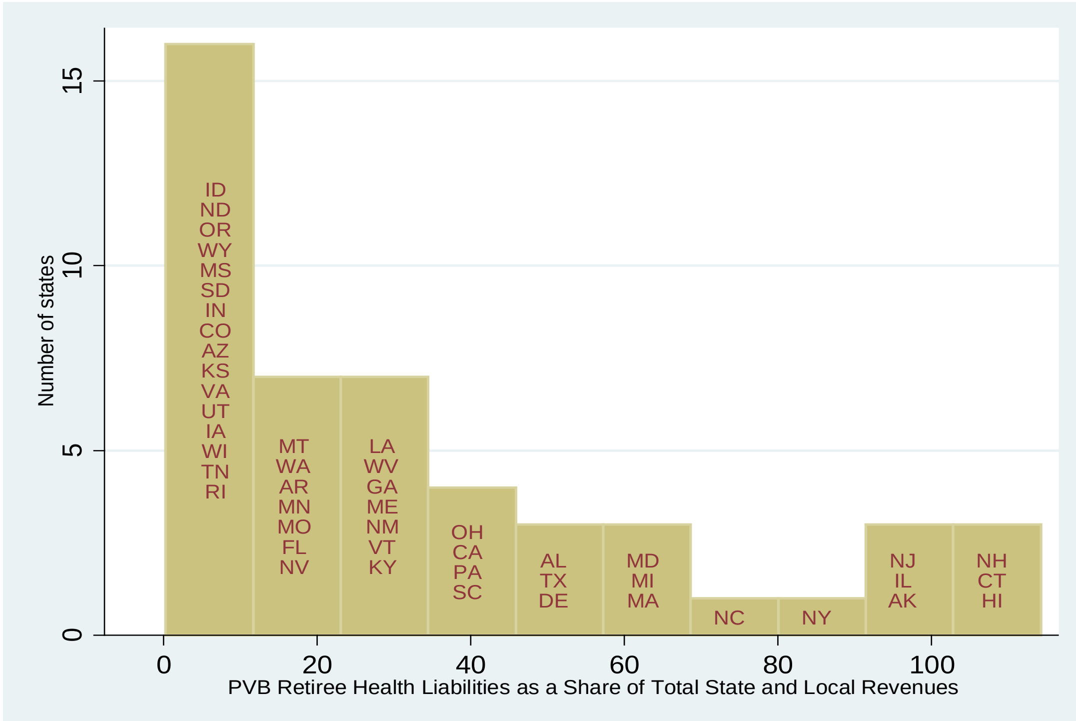
Panel B: Retiree Health Care Liabilites for Actives and Retirees, by Year



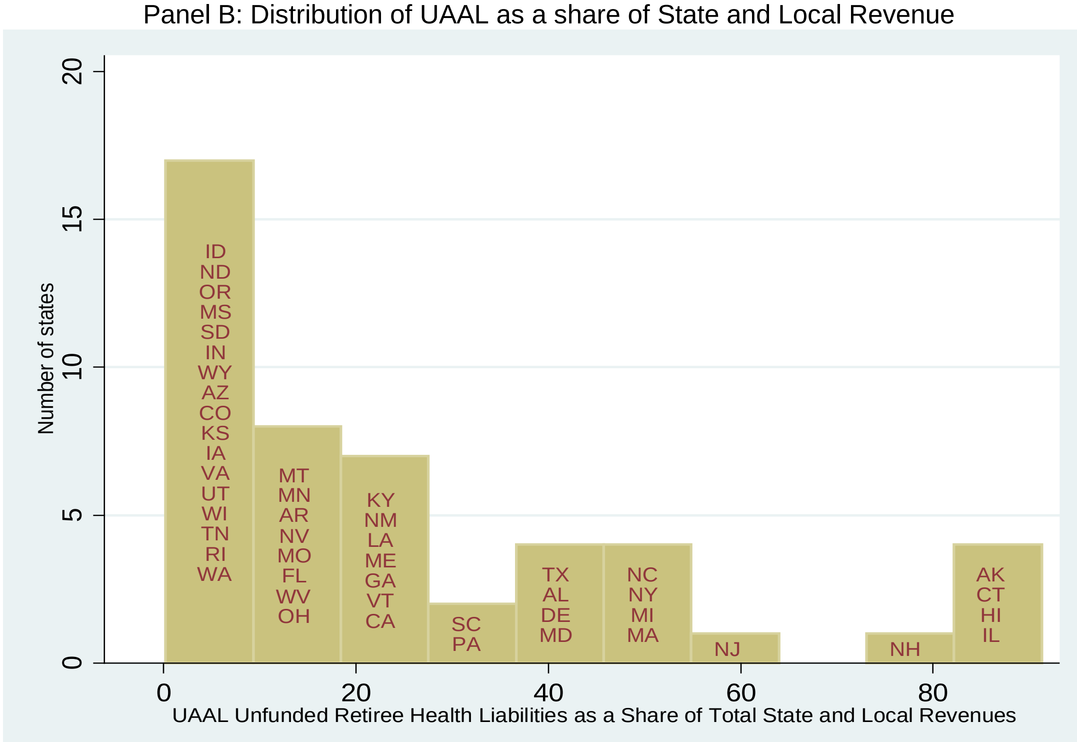
Note. The panels display cash flows for state government retiree health care obligations. The cash flows are calibrated to match the discounted value of the cash flows stated in the state GASB report. See the text for additional information. The AAL liabilites are calculated under the EAN methodology.

Figure 2

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



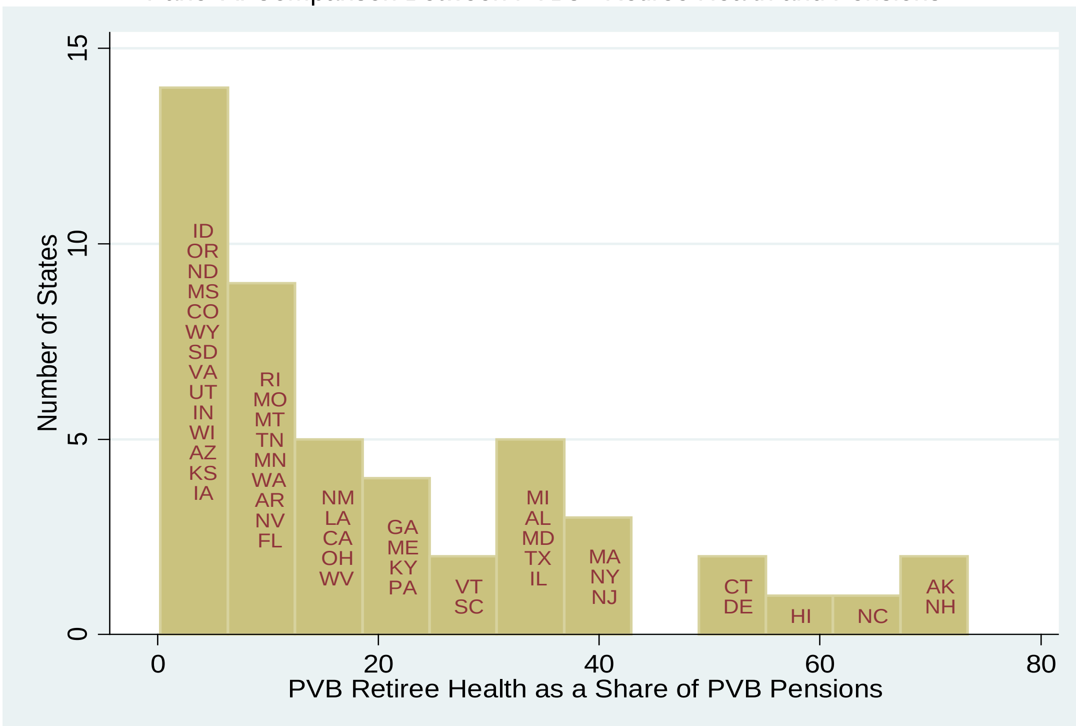
Panel B: Distribution of UAAL as a share of State and Local Revenue



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

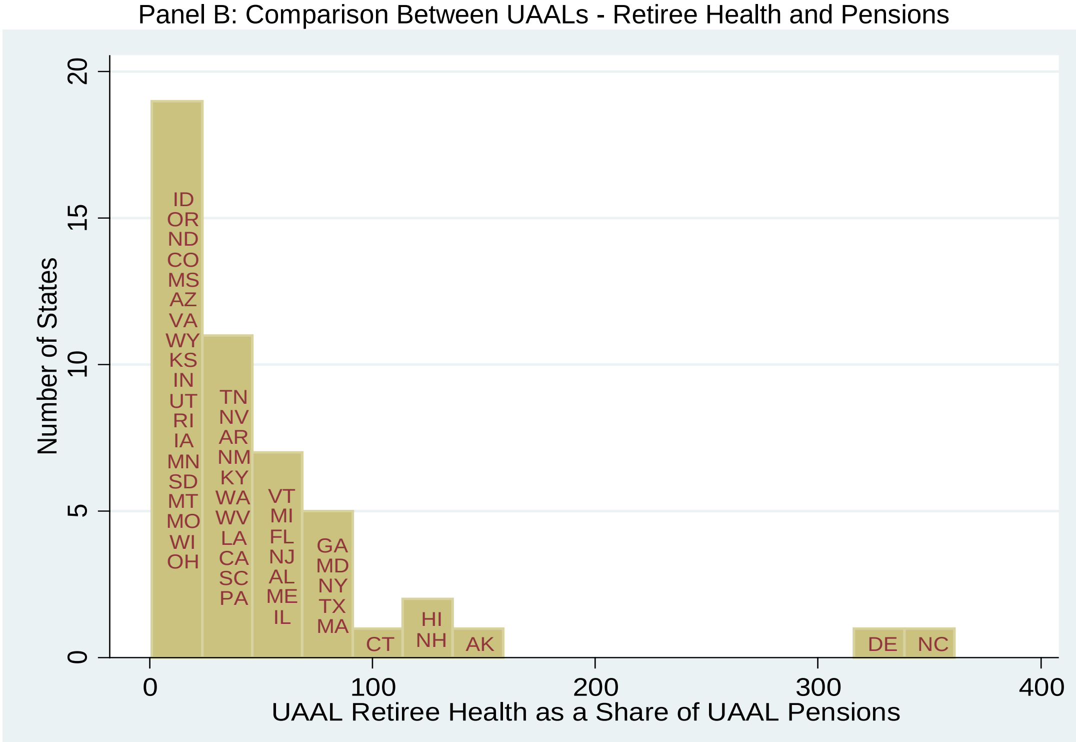


Figure 4

Unfunded Retiree Health and Pension Liabilities

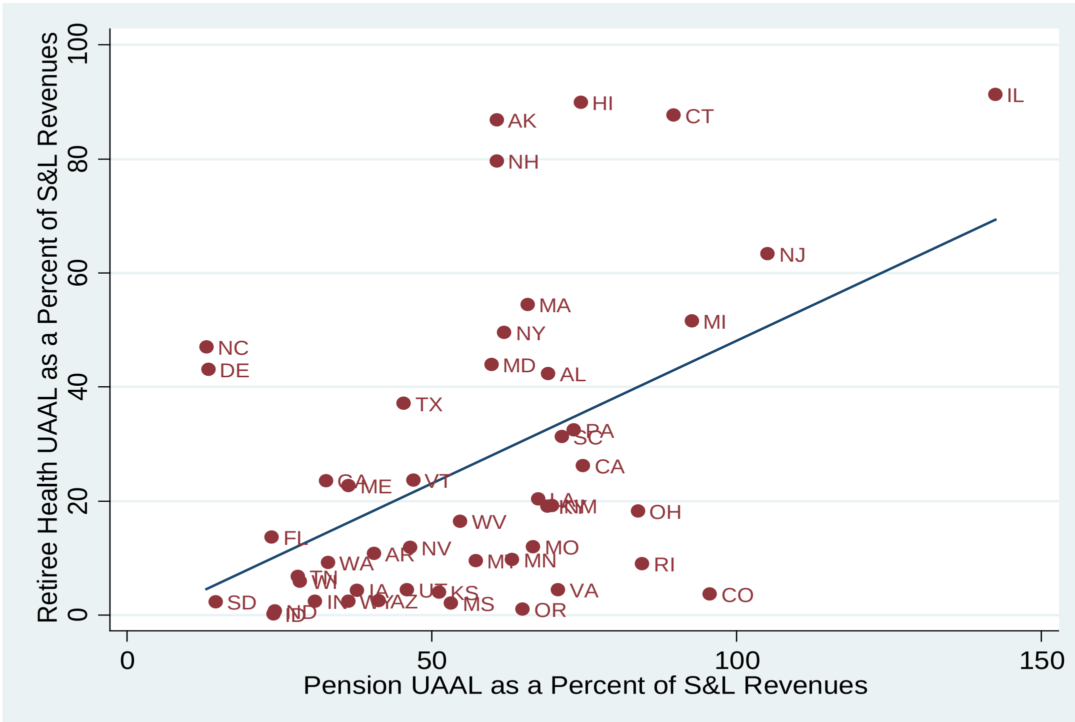


Figure 5
Distribution of UAAL as a Share of Total Revenue

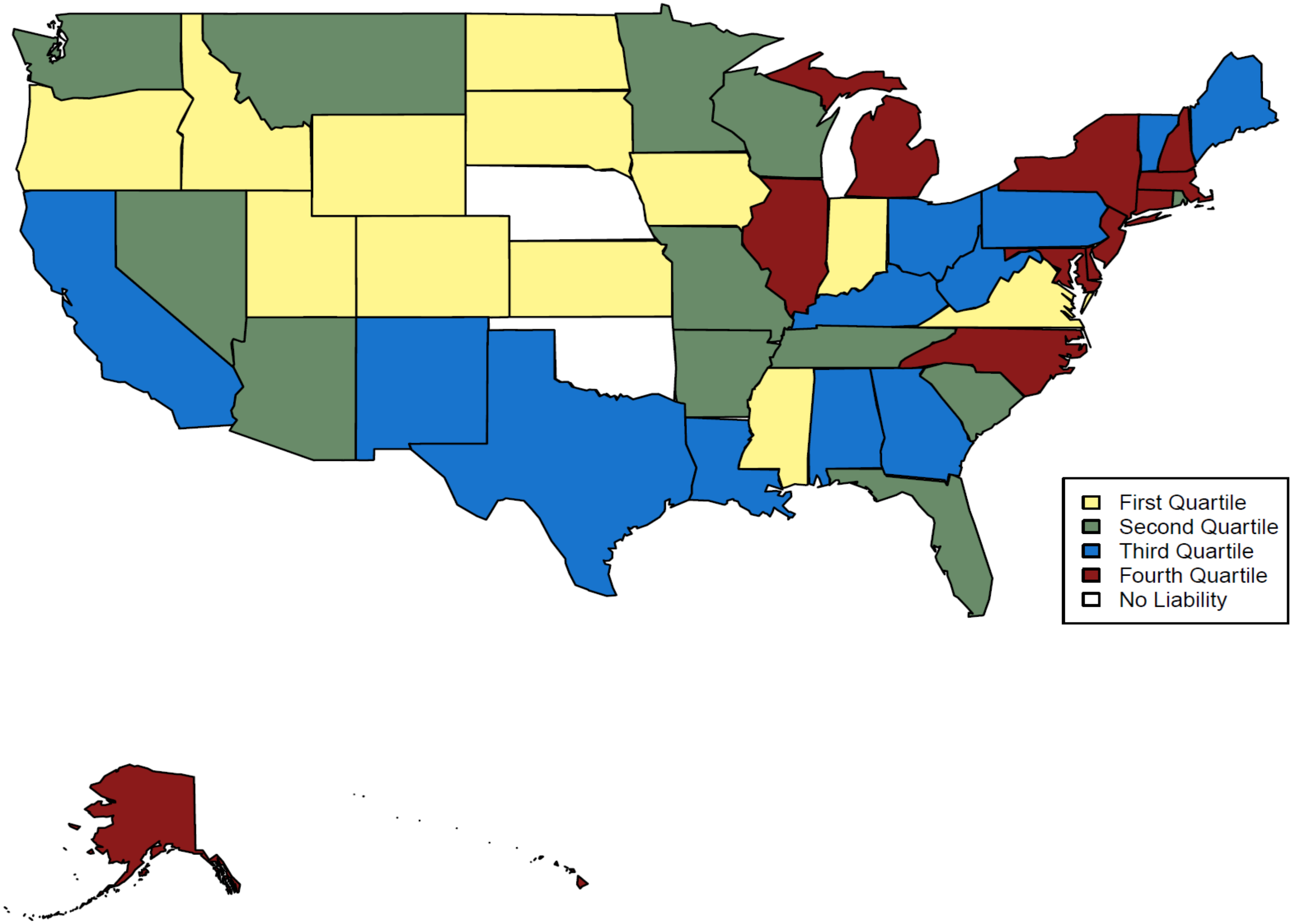


Figure 6
Retiree Health Obligations Existing Workers and Retirees

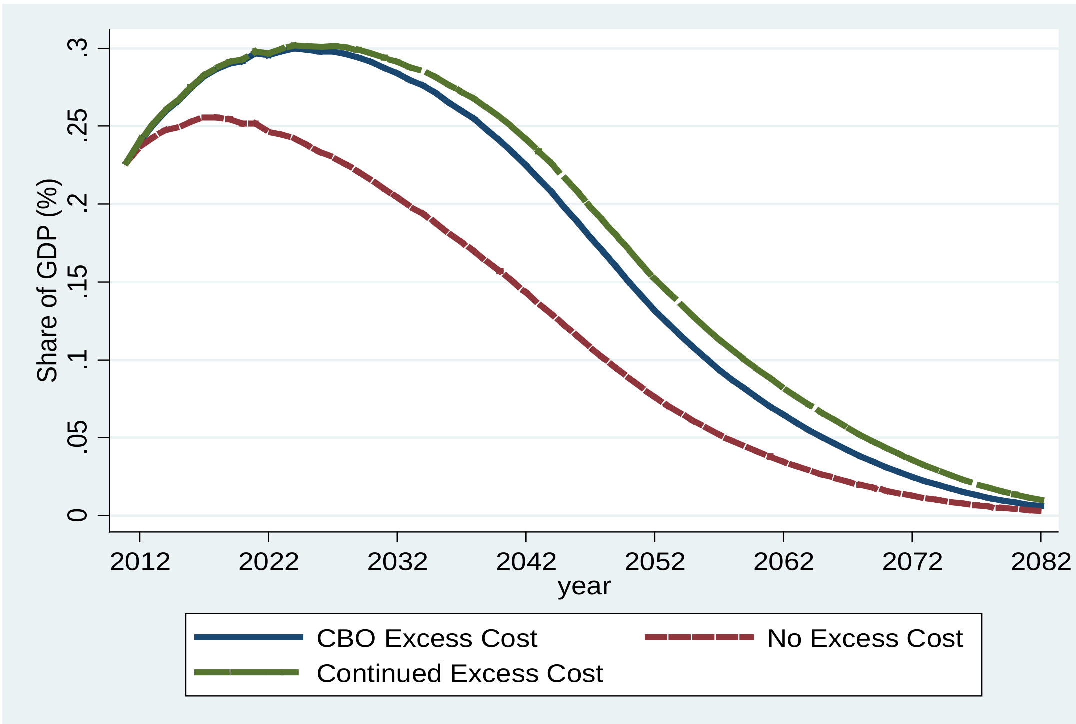
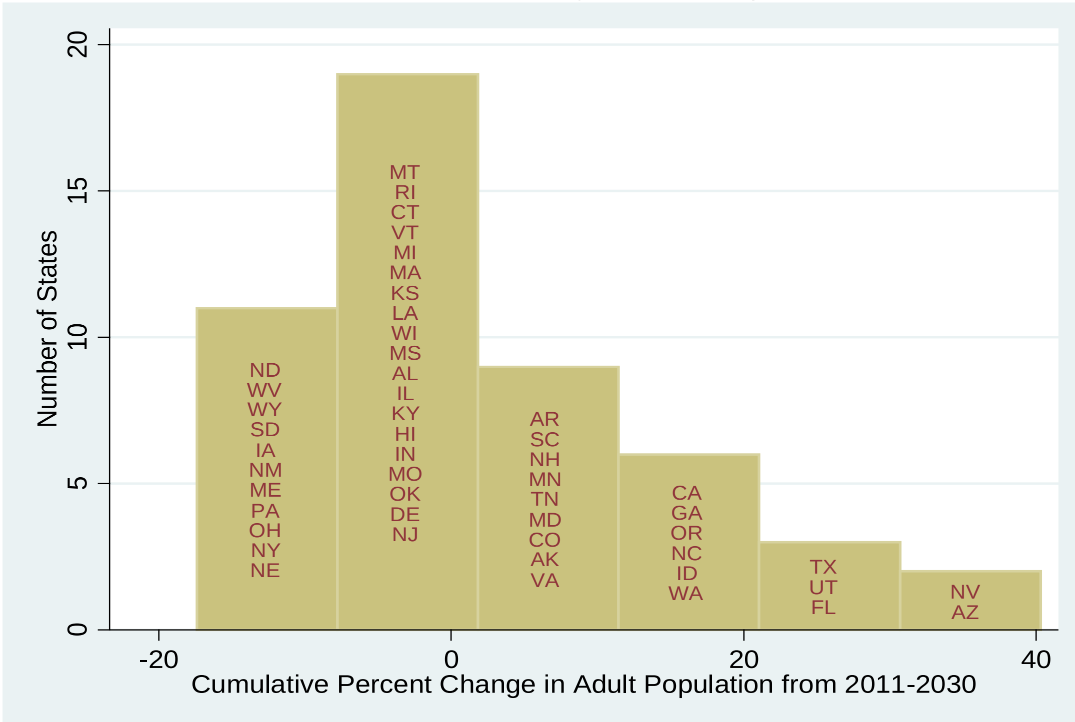


Figure 7
Demographic Projections
Panel A: Distribution of Changes in Adult Population



Panel B: Variation in Population Aging Across the States

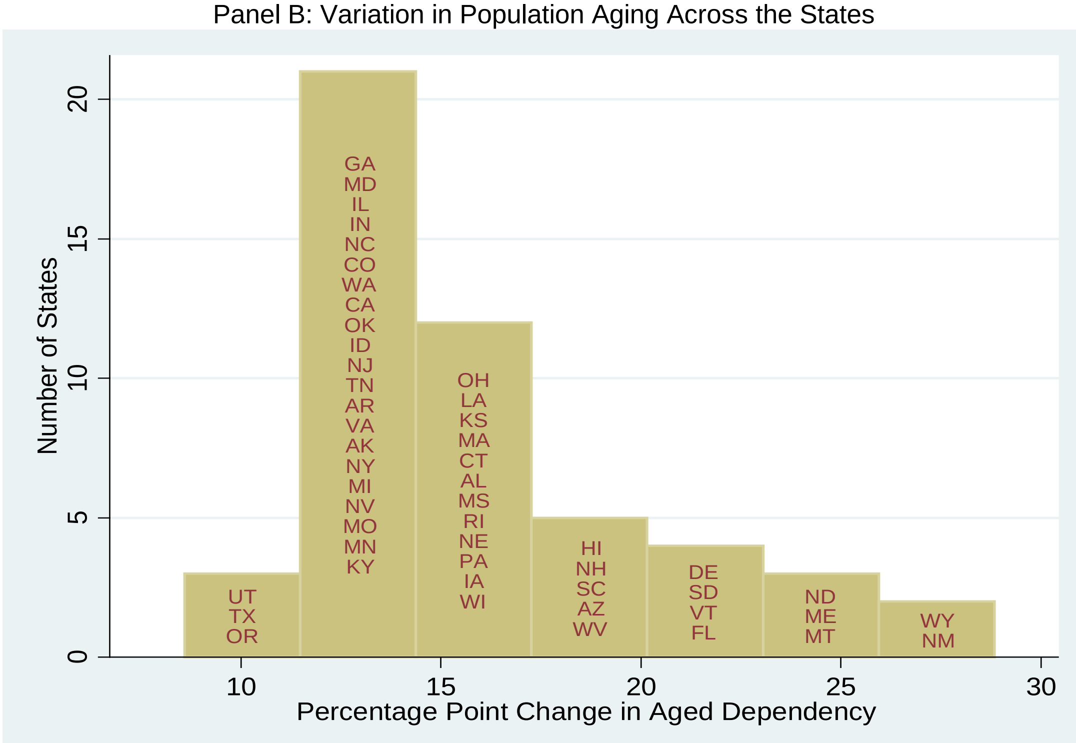


Figure 8
Distribution of Nominal GDP Growth Rates, 2011-2030

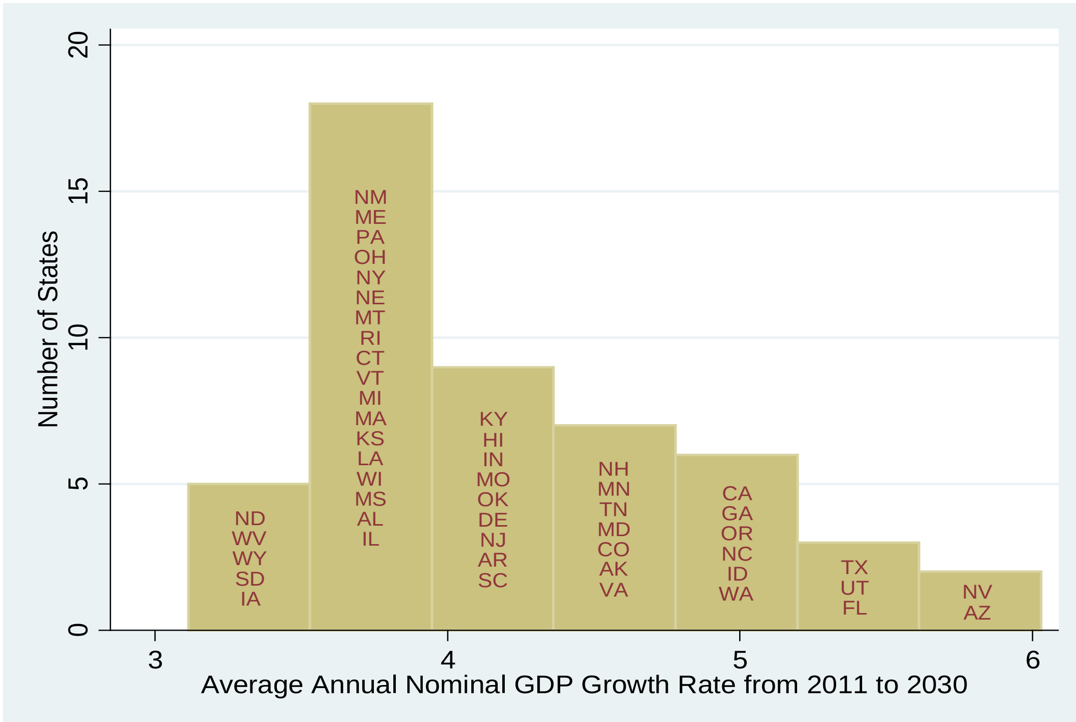
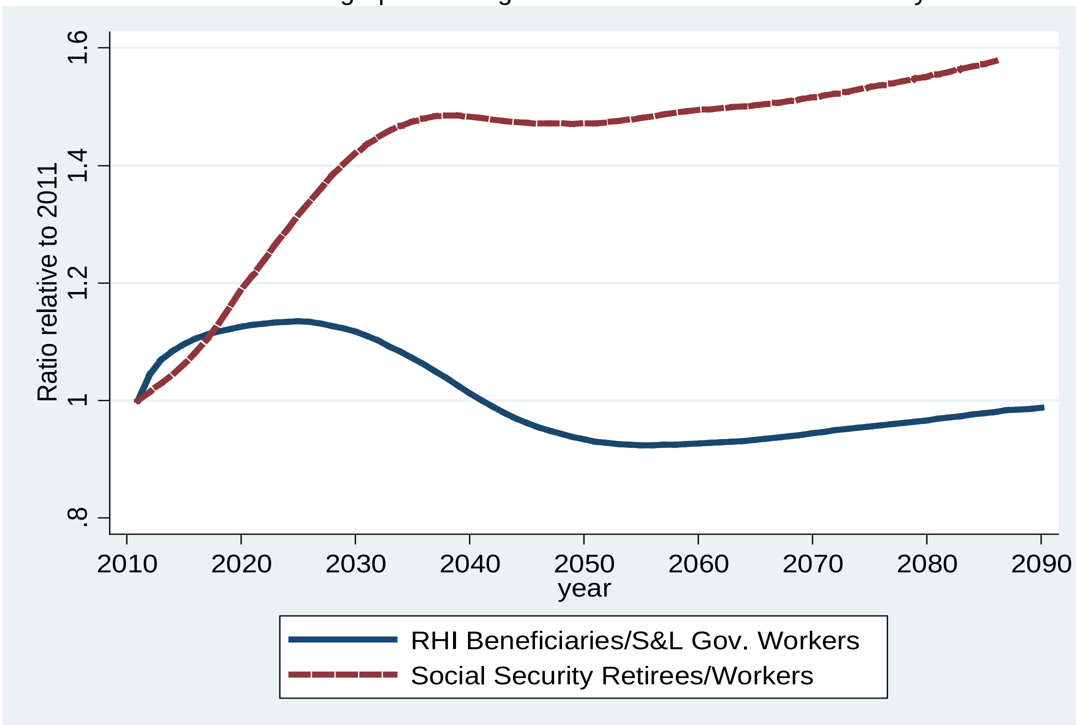


Figure 9

Panel A: Demographic Change: Retiree Health vs Social Security



Panel B: Demographic Change: Retiree Health vs Census Population Projections

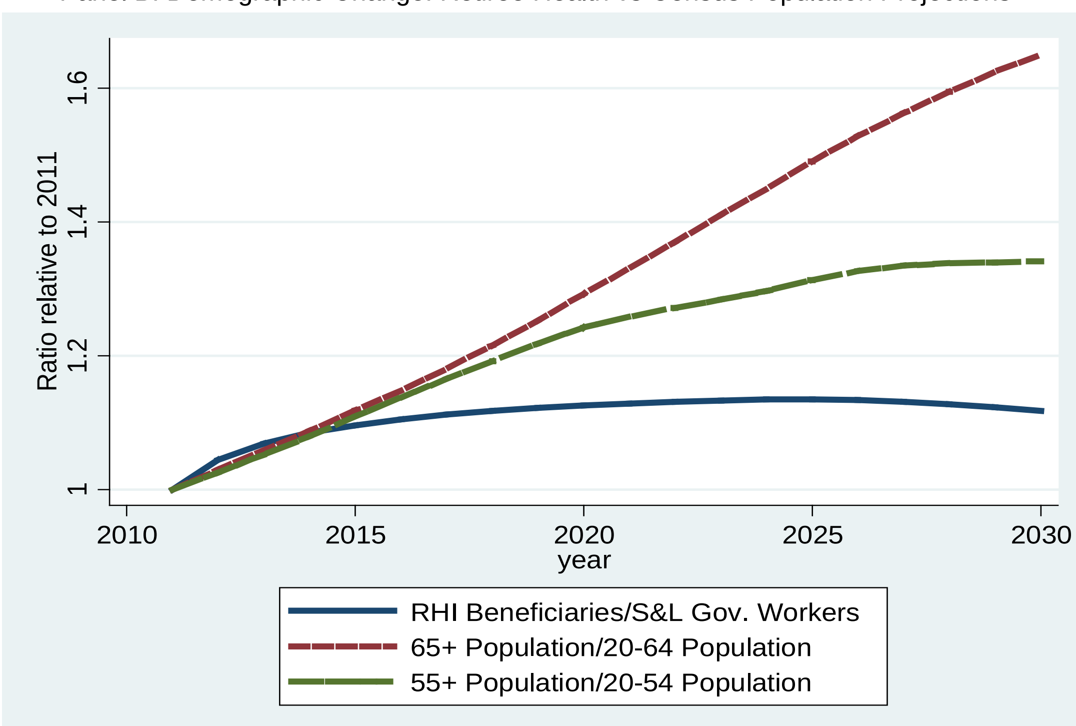
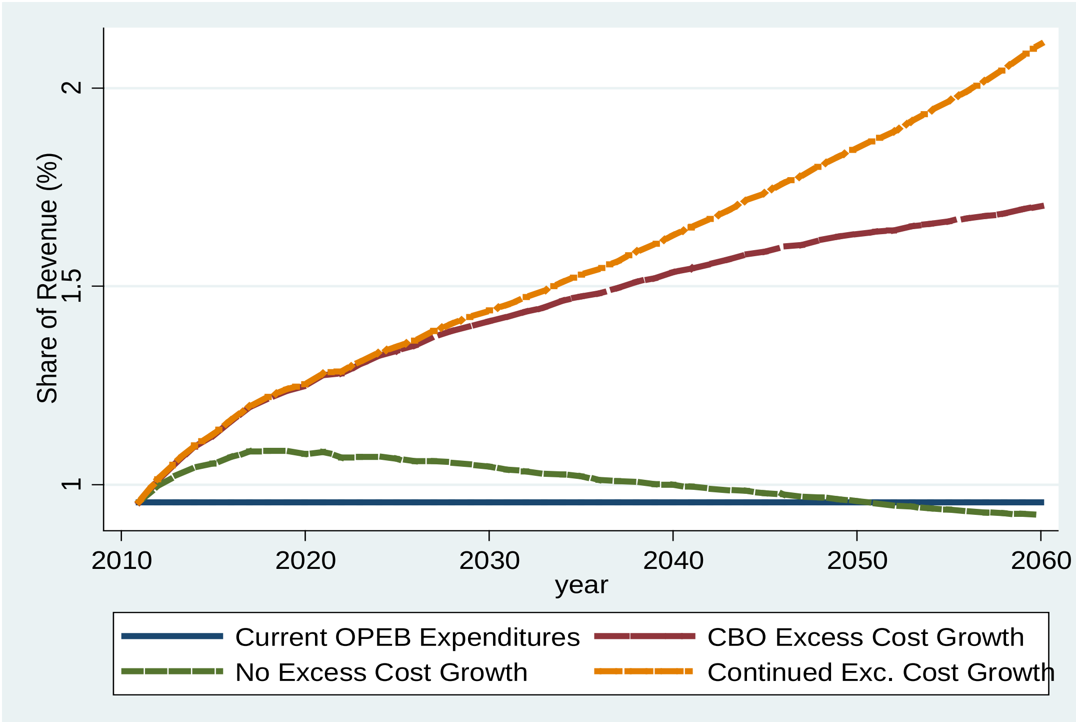


Figure 10
Retiree Health Obligations as a Share of Total S&L Revenue



Note: Figure includes obligations of existing retirees, current active workers, and projected future workers.

Table 1

State and Local Retiree Health Care Liabilities

State	Local Scaling Factor	Actuarial Accrued Liability (AAL) $ millions	Actuarial Accrued Liability (AAL) % of State and Local Revenue	Present Value of Benefits $ millions	Present Value of Benefits % of State and Local Revenue
	(1)	(2)	(3)	(4)	(5)
AK	0.4	$16,491	87%	$18,868	99%
AL	3.8	$17,365	44%	$20,263	51%
AR	0.7	$3,033	11%	$3,909	14%
AZ	0.3	$3,012	5%	$3,053	5%
CA	1.5	$142,009	26%	$195,270	36%
CO	0.0	$2,318	4%	$2,493	5%
CT	0.8	$37,176	88%	$44,488	105%
DE	0.0	$4,972	44%	$6,250	56%
FL	3.9	$26,477	14%	$30,631	16%
GA	3.8	$21,195	24%	$23,875	27%
HI	0.0	$14,918	91%	$18,750	114%
IA	3.2	$1,532	4%	$2,185	6%
ID	0.0	$94	0%	$50	0%
IL	2.9	$126,063	91%	$135,965	98%
IN	3.6	$1,477	2%	$1,993	3%
KS	3.6	$1,188	4%	$1,651	6%
KY	2.2	$10,532	25%	$14,612	34%
LA	0.5	$10,074	20%	$11,622	24%
MA	1.8	$47,560	56%	$57,156	67%
MD	2.5	$28,948	45%	$37,709	59%
ME	0.3	$3,445	24%	$4,064	28%
MI	2.8	$47,140	52%	$56,873	62%
MN	8.4	$6,370	10%	$9,218	14%
MO	2.7	$7,310	13%	$8,313	14%
MS	0.1	$691	2%	$839	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) $ millions	Actuarial Accrued Liability (AAL) % of State and Local Revenue	Present Value of Benefits $ millions	Present Value of Benefits % of State and Local Revenue
	(1)	(2)	(3)	(4)	(5)
MT	1.9	$985	10%	$1,298	13%
NC	0.5	$45,464	48%	$65,128	69%
ND	0.0	$78	1%	$122	1%
NH	2.9	$9,751	80%	$12,634	103%
NJ	0.0	$67,333	63%	$101,928	96%
NM	0.4	$5,058	20%	$7,385	30%
NV	3.0	$3,528	12%	$5,679	20%
NY	1.0	$168,984	51%	$263,965	80%
OH	0.3	$39,651	29%	$48,117	35%
OR	0.1	$799	2%	$927	2%
PA	1.8	$44,938	33%	$53,702	39%
RI	0.3	$1,211	9%	$1,495	11%
SC	0.4	$14,887	32%	$19,527	42%
SD	2.2	$211	2%	$244	3%
TN	1.8	$4,284	7%	$5,791	9%
TX	2.7	$86,662	37%	$128,750	55%
UT	1.7	$1,416	6%	$1,451	6%
VA	0.4	$3,728	5%	$4,369	6%
VT	1.1	$1,829	24%	$2,527	33%
WA	0.0	$7,469	9%	$10,370	13%
WI	3.2	$3,623	6%	$4,854	8%
WV	0.0	$3,583	19%	$4,507	24%
WY	0.0	$249	2%	$258	3%
US	**1.2**	**$1,097,051**	**32%**	**$1,455,125**	**42%**

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	$1,097,051	$1,455,125
Treasury Yield Curve	$1,209,444	$1,629,510
States' Chosen Discount Rate	$1,188,063	$1,615,902
7 Percent	$829,576	$1,022,988

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.)

.

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 (5) and (4)
	(1)	(2)	(3)	(4)	(5)	(6)
			A. National Estimates			
US	$1,097,051	$1,048,910	-4%	$1,455,264	$1,385,658	-5%
			B. Smallest Percent Differences in PVB			
ID	$33	$27	-20%	$50	$39	-22%
ND	$78	$64	-18%	$122	$98	-20%
NM	$5,058	$4,228	-16%	$7,385	$5,924	-20%
FL	$26,477	$21,783	-18%	$30,631	$24,784	-19%
PA	$44,938	$36,623	-19%	$53,702	$43,779	-18%
			C. Largest Percent Differences in PVB			
MD	$28,948	$30,912	7%	$37,709	$38,836	3%
AR	$3,033	$3,199	5%	$3,909	$4,091	5%
MI	$47,140	$50,364	7%	$56,873	$64,217	13%
OH	$39,651	$43,307	9%	$48,117	$54,420	13%

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.

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	$1,097,051	$1,137,054	$1,179,380	$1,234,621	$1,455,264	$1,500,513	$1,563,638	$1,646,014
Percent Difference		104%	108%	113%		103%	107%	113%
B. Smallest Percent Differences Between State PVB and Middle S.S. Assumption								
CO	$2,346	92%	94%	96%	$2,493	92%	94%	97%
WI	$3,537	99%	99%	99%	$4,854	98%	99%	99%
IA	$1,519	99%	99%	99%	$2,185	99%	99%	99%
HI	$15,080	96%	101%	106%	$18,750	95%	99%	105%
MS	$709	103%	103%	103%	$839	99%	100%	100%
B. Largest Percent Differences Between State PVB and Middle S.S. Assumption								
NJ	$66,657	108%	113%	119%	$101,928	109%	115%	122%
MT	$971	106%	114%	123%	$1,298	107%	115%	127%
NV	$3,476	110%	114%	119%	$5,679	111%	116%	123%
ME	$3,529	113%	119%	126%	$4,064	111%	116%	124%
WY	$259	124%	127%	130%	$258	122%	124%	127%

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
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	8%	0%	5%	MT	-7%	0%	4%
AL	-4%	0%	4%	NC	17%	1%	5%
AR	3%	0%	4%	ND	-17%	-1%	3%
AZ	40%	2%	6%	NE	-8%	0%	4%
CA	12%	1%	5%	NH	4%	0%	4%
CO	8%	0%	5%	NJ	0%	0%	4%
CT	-7%	0%	4%	NM	-10%	-1%	4%
DE	0%	0%	4%	NV	40%	2%	6%
FL	28%	1%	6%	NY	-8%	0%	4%
GA	14%	1%	5%	OH	-9%	0%	4%
HI	-2%	0%	4%	OK	-1%	0%	4%
IA	-11%	-1%	4%	OR	16%	1%	5%
ID	19%	1%	5%	PA	-9%	0%	4%
IL	-4%	0%	4%	RI	-7%	0%	4%
IN	-2%	0%	4%	SC	3%	0%	4%
KS	-5%	0%	4%	SD	-12%	-1%	3%
KY	-2%	0%	4%	TN	6%	0%	4%
LA	-5%	0%	4%	TX	25%	1%	5%
MA	-5%	0%	4%	UT	27%	1%	5%
MD	8%	0%	5%	VA	10%	1%	5%
ME	-10%	-1%	4%	VT	-6%	0%	4%
MI	-6%	0%	4%	WA	20%	1%	5%
MN	4%	0%	4%	WI	-4%	0%	4%
MO	-1%	0%	4%	WV	-15%	-1%	3%
MS	-4%	0%	4%	WY	-13%	-1%	3%
TOTAL	**7%**	**0.3%**	**4.5%**				

Table 6
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)
NY	3.0%	1.1%	5.2%	MO	0.2%	0.0%	0.4%
CT	2.9%	0.7%	5.1%	MN	0.1%	0.1%	0.1%
NH	2.7%	0.6%	5.0%	WI	0.1%	0.0%	0.3%
NJ	2.4%	0.6%	4.3%	FL	0.1%	0.0%	0.3%
TX	2.2%	0.8%	3.9%	ME	0.1%	-0.3%	0.5%
NC	1.8%	0.4%	3.4%	WA	0.1%	0.0%	0.3%
WV	1.3%	1.3%	1.3%	SD	0.1%	0.0%	0.2%
IL	1.2%	0.3%	2.2%	IA	0.1%	0.0%	0.2%
MI	1.0%	-0.2%	2.3%	ND	0.0%	0.0%	0.0%
HI	0.9%	-0.6%	2.5%	MS	0.0%	0.0%	0.0%
VT	0.9%	0.2%	1.6%	IN	0.0%	0.0%	0.0%
MA	0.8%	-0.2%	1.9%	ID	0.0%	0.0%	0.0%
AL	0.8%	0.0%	1.6%	OR	-0.1%	-0.1%	0.0%
CA	0.7%	0.1%	1.4%	AZ	-0.1%	-0.1%	-0.1%
DE	0.6%	-0.4%	1.6%	MD	-0.1%	-1.4%	-0.3%
OH	0.5%	0.0%	1.1%	CO	-0.1%	-0.1%	-0.1%
SC	0.5%	-0.2%	1.2%	RI	-0.2%	-0.3%	-0.1%
AK	0.5%	-0.6%	1.7%	PA	-0.2%	-0.6%	0.2%
MT	0.4%	0.1%	0.7%	VA	-0.2%	-0.2%	-0.2%
AR	0.4%	0.1%	0.7%	KS	-0.2%	-0.3%	-0.2%
WY	0.3%	0.3%	0.3%	KY	-0.3%	-0.8%	0.2%
NM	0.3%	-0.2%	0.7%	GA	-0.4%	-0.6%	-0.2%
NV	0.2%	-0.2%	0.7%	LA	-0.4%	-0.9%	0.1%
TN	0.2%	0.1%	0.3%	UT	-0.4%	-0.5%	-0.4%
US	**0.7%**	**0.0%**	**1.5%**				