Accrual Measures of Pension-Related Compensation and Wealth of State and Local Government Workers

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Abstract

This paper develops a method to convert the normal costs and actuarial liabilities published by state and local government retirement systems for their defined benefit pension plans to measures consistent with national income accounting principles. It also standardizes the measures using a common discount rate. The method is applied to data for the years 2000 to 2006 to generate a set of national and state estimates of employer normal costs and liabilities which are then used to improve the estimates of compensation and property income in the National Income and Product Accounts (NIPA). Using a 6% discount rate, our estimated liability of state and local government retirement systems is about 4% lower than the published liability for 2006 and our estimate of normal costs is about 48% higher. Adopting these estimates would add $105 billion (or about 1.0%) to personal income in 2006. Revisions to state estimates of personal income would range from a 0.7% reduction in West Virginia to a 2.3% increase in New Jersey.

Accrual measures of pension-related compensation and wealth of state and local government workers[1]

Introduction

Although most parts of the U.S. National Income and Product Accounts (NIPA) are kept on an accrual basis, the income and outlay account is kept on a cash basis because of data limitations. An important component of the personal income of workers is that portion of their compensation which is saved in defined benefit (DB) pension funds. BEA estimates that state and local government employers contributed 6.7% of employee compensation to such pension funds in 2006 on a cash accounting basis. In recent years, a decline in the value of equities, low interest rates, and the continued growth in the liabilities of pension funds have raised concerns about the financial soundness of DB pension funds. In response, many pension plan sponsors contributed large lump sums to the funds, imparting some unusual volatility to compensation measured on a cash basis, and distorting comparisons of current labor costs across industries and regions.

Because the contributions employers make to pension funds generally do not match their workers' accruals of future pension benefits, neither do the assets held by pension funds match the workers' accrued pension wealth. This in turn affects estimates of the property income (dividends, interest, and rents) of pension funds and constitutes a second distortion in the measurement of personal income in the NIPA because the property income of pension funds is attributed to persons.

[1] I would like to thank Marshall Reinsdorf, and Ann Dunbar for helpful discussions, and Bruce Baker, Sean Puckett, Karla Allen, Michelle Grier, Jonas Wilson, Devin McIntosh, Evan Lin, and Darob Malek-Madani for data assistance; however, any errors in this paper are my sole responsibility. An earlier version of this

This paper investigates whether national income accounts can measure the household sector's pension compensation and wealth on an accrual basis using publicly available financial and actuarial reports of the pension funds. In particular, this paper looks at the pension funds for employees of state and local governments.[2] These pension funds are not only a large proportion of all funds in the U.S.,[3] they continue to be the primary type of pension fund for state and local government workers.

State and local government retirement systems differ from private pension plans in several important dimensions.

(1) Employees often contribute a large share of their salaries to state and local plans in addition to the amounts employers contribute whereas in the private sector employee contributions are rare.[4]

(2) State and local plans are exempt from most of the regulations (including the Employee Retirement Income Security Act (ERISA)) that private plans are subject to. Some state and local plans (e.g. the Pre-1996 Fund in the Indiana State Teachers' Retirement System) are unfunded and financed on a pay-as-you-go basis. Pay-as-you-go financing is prohibited by ERISA.

(3) Some state and local employees do not participate in the federal Old Age, Survivors' and Disability Insurance (financed by a 6.2% tax on covered earnings) and so

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[2] Some pension plans also provide for retiree health care benefits and until recently did not report contributions and benefits for health care separately from cash pension benefits. In this paper we make adjustments as necessary to exclude retiree health care benefits.

[3] Employer contributions to state and local government employee retirement systems were $65.3 billion in 2006 while employer contributions to private defined benefit pension plans were $93.3. Federal DB contributions separate from defined contribution (DC) contributions are not published. See NIPA Table 6.11D.

[4] Of course, *all* contributions to the pension fund are out of employee compensation, the distinction between employee and employer contributions arises in a national accounting framework because

their contributions to defined benefit and defined contribution retirement funds are larger than for those who do participate.[5]

(4) Some state and local plans have automatic cost of living adjustments to pension benefits. This is rare in the private sector (Bodie 1990a).

(5) In the regulatory filings of private plans, the main measure of liability is based on benefits accrued as of the valuation date and ignores projected salary increases. Valuations of public plans, on the other hand, usually take into account expected salary increases associated with promotions, inflation, and productivity growth.

(6) State and local plans, unlike private sector plans, are not insured by the Pension Benefit Guaranty Corporation.

(7) Accounting standards differ. Private plans generally follow the standards set by the Financial Accounting Standards Board (FASB) while public plans follow the Government Accounting Standards Board (GASB).

(8) Data sources differ. Under ERISA, most private plans are required to report detailed accounting and actuarial information on Form 5500. State and local plans are exempt from those reporting requirements but do provide some information in response to a Census Bureau survey of government employee retirement systems.[6]

Because the pension concepts and terminology of accountants and actuaries are not familiar to all economists, this paper begins with a presentation of formulae for pension benefit accruals and liabilities and then compares them with the normal cost and actuarial liability measures of actuaries. The paper next presents cash estimates of

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employee contributions are deductions from amounts recorded in the NIPA as wages and salaries; employer contributions are not and must be separately estimated.

defined benefit (DB) pension compensation and wealth for the years 2000-06 and compares them to the published actuarial estimates. Then the paper considers two important adjustments needed to convert these published actuarial estimates into measures consistent with national income accounting principles using a common discount rate. After making these adjustments a very different picture emerges of household income and saving behavior.

In addition to improving the National Income and Product Accounts, the proposed measures should be useful in other contexts such as evaluating to what extent there is a compensating wage differential for state and local government workers corresponding to their pension benefit accruals (Ehrenberg 1980) and improving surveys of worker compensation.

[5] "Approximately one-fourth of all employees of state and local government do not participate in Social Security, including nearly one-half of all public school teachers and most or substantially all public employees in Alaska, Colorado, Louisiana, Maine, Massachusetts, Ohio, and Nevada" (Brainard 2006 p.7).
[6] The Census Bureau has recently expanded its survey to collect actuarial data about the retirement systems.

I. The Accrual of Pension Benefits

Most of the issues pertinent to this paper can be illustrated with a model of a simple pension plan. In this model, a worker vests immediately upon hire, there are no breaks in service, benefits begin at age r, administrative costs are zero, there are no special provisions for early retirement, and there are no cost of living adjustments to benefits after retirement. B is the *accrued retirement benefit* to be paid each period (year). B is some function of covered salary W^*, length of covered service s, and a multiplier k. The accrued retirement benefit as of the worker's current age ($h+s$, where h is the age when he was hired) is given by[7]

$$B(h+s) = ksW^*(h+s), \quad h+s<r. \tag{1}$$

The expected present value of future benefits, as of the retirement age r, for an employee with $r-h$ years of service is

$$L(r) = \int_r^{\infty} B(r)S(r,a)e^{-i(a-r)}da. \tag{2}$$

where i is a discount rate and $S(r,a)$ is a survival rate, the probability that a retiree will survive from age r to age a and collect his pension benefit.[8] $L(r)$ is a liability of the plan to the employee.

$B(r)$ is given as of age r. Therefore it can be pulled outside the integral in Eq. (2) and the liability written as

$$L(r) = B(r)A(r), \tag{3}$$

[7] This model is based on Barnow and Ehrenberg (1979).

[8] In this model we consider only mortality risk. Defined benefit pension plans also typically have provisions for disability and survivorship benefits as well as provisions for workers who leave after vesting but before they are eligible to begin receiving retirement benefits. Although we do not model these risks we do take account of them in the subsequent empirical work. See Winklevoss (1993) for a mathematical treatment of these risks.

(4) $$A(r) = \int_r^{\infty} S(r,a)e^{-i(a-r)}da$$

where $A(r)$ is an annuity factor, the present value as of the retirement age r, of a lifetime annuity of \$1 per period. The annuity factor is the product of a survival probability and a discount rate.

The expected present value of an employee's accrued retirement benefit at any time $h+s$ prior to retirement is the expected present value of future benefits as of the retirement age adjusted for the probability that the worker may die prior to retirement age (and therefore receive no pension) and discounted to time $h+s$. This is given by

(5) $$L(h+s) = B(h+s)A(r)S(h+s,r)e^{i(h+s-r)},$$

where $S(h+s,r)$ is the probability that he will survive from age $h+s$ to r.

Our interest is in the worker's accrual of future benefits for an additional period of service to his employer. This is found by taking the derivative of Eq. (5) with respect to s:

(6) $$\frac{dL}{ds} = \left(\frac{1}{s} + \frac{dW^*/W^*}{ds} + \frac{dS/S}{ds} + i\right)L.$$

The first two terms in the parenthesis represent the accrual of additional pension benefits because of another year of service. When an active employee works an additional year the expected present value of his pension grows not just because he has accumulated another year of service (as indicated by the first term), but also because the salary on which his benefit is calculated is now higher (as indicated by the second term).

The third and fourth terms represent amounts that accrue whether or not the participant in the pension plan provides another year of service; they accrue to both active and separated employees. The third term represents the change in a participant's survival

probability given that he has lived another period. This will be positive because the survival probability is calculated over a shorter time span. For example, the probability of living an additional 5 years is higher than the probability of living an additional 6 years, $dS/ds > 0$. Lastly, the fourth term represents the unwinding of the time discount, that is, future pension benefits are discounted one less period.

The investment income on the accumulated assets is expected to cover the increase in L due to the unwinding of the time discount. Transfers between those who died during the year (and thus lost their future pension benefits) and those who survived are expected to cover the increase in L due to the change in the survival probability.

We define the expected present value of the pension benefits that accrue to a worker for another year of service as

$$N(h+s) = \frac{dB}{ds} A(r) S(h+s, r) e^{i(h+s-r)} = \left(\frac{1}{s} + \frac{dW^*/W^*}{ds} \right) L(h+s) . \tag{7}$$

From a national income accounting perspective, N is that part of the worker's current compensation which is saved in a pension fund (measured on an accrual basis) corresponding to what the NIPA calls employer contributions for employee pension funds (which is measured on a cash basis).

The property income of a pension fund on an accrual basis, P, is an imputation equal to the product of the discount rate and the liability

$$P(h+s) = iL(h+s) . \tag{8}$$

II. Actuarial Perspective

In the previous section we derived formulae for the expected present value of the pension benefits that accrue to a worker for another year of service (Eq. 7) and the expected present value of accumulated pension benefits (Eq. 5). These correspond to what actuaries for private sector pension plans call the normal cost and the plan termination liability of the accrued benefit funding method.[9] The plan termination liability depends only on mortality risk. When other risks are considered (e.g. separation risk) the liability is called the plan continuation liability by actuaries and the accumulated benefit obligation (ABO) by accountants.[10] It corresponds to the legal obligation of the plan to employees should the plan be terminated. We will use ABO in the rest of this paper in reference to this liability.

State and local retirement systems generally do not use the ABO method or publish its associated normal cost and liability. Instead they use one of several funding methods developed by actuaries that we will refer to collectively as PBO methods.[11] These methods, which include the entry age, projected unit credit, and aggregate methods, have the following features:

- In calculating liabilities and normal costs, these methods use a projected final average salary as of a worker's retirement age, $W^*(r)$, rather than his current average salary, $W^*(h+s)$. $W^*(r)$ incorporates assumptions about future promotions, inflation, and economy-wide productivity gains (hence the reason for calling these projected methods).

[9] See Eq. 5.1a in Winklevoss (1993) p.69.
[10] See Winklevoss (1993) p.176.
[11] Winklevoss (1993) p.180 appears to restrict PBO to the constant dollar version of the projected unit credit method.

- In addition to taking into account future salary growth, these methods take into account future worker separations. That is, in addition to mortality risk, these methods also account for separation (or termination) risk.
- Lastly, these methods smooth the rise in normal costs and liabilities as a worker ages by requiring higher employer contributions to a pension fund early in a worker's career and lower contributions at the end of his career than the ABO method would require. Hence the liabilities of the PBO methods, representing the expected present value of benefits *allocated* to date, are higher than the ABO liability and come into equality with the ABO liability only at retirement.

The various PBO methods differ from each other in how they allocate the projected benefits over a worker's career. The entry age method (constant percent version) does so in such a fashion that normal costs as a percent of salary are constant across the career. The projected unit credit method (constant dollar version), on the other hand, allocates the accrued retirement benefit as of retirement age, $B(r)$, in equal dollar amounts across a worker's career of $r-h$ years. This is seen in the following set of equations for the normal cost and actuarial liability for the projected unit credit method:[12]

(9) $$N_{puc}(h+s) = \frac{B(r)}{r-h} S(h+s,r) A(r) e^{i(h+s-r)},$$

$$= \frac{ksW^{*}(r)}{r-h} S(h+s,r) A(r) e^{i(h+s-r)},$$

(10) $$L_{puc}(h+s) = \frac{s}{r-h} B(r) S(h+s,r) A(r) e^{i(h+s-r)}$$

[12] For the projected unit credit normal cost see Eq. 6.8 in Winklevoss (1993) p.85; for the liability see Eq. 5.6a on p.74.

where N is the normal cost and the subscript puc indicates that it is for the projected unit credit method. Note that in this equation $S(h+s,r)$ now represents a combined mortality and separation risk. The dependence of normal cost on a projection of $W^*(r)$ is clearly seen in Eq. (9).

Ex ante, the sum of expected discounted normal costs from age of hire to retirement age equals the accrued retirement benefit. In practice, however, the experience of a pension plan will usually deviate from expectations. In addition, plan provisions and assumptions may change over time so that normal costs actually contributed by an employer to its pension fund will not cumulate to the retirement age liability based on the latest version of plan. Actuaries use the term supplemental costs to designate those costs which are required to balance cumulative normal costs actually contributed with the retirement age liability.

One PBO method which is used by a small number of very large public retirement systems is the so-called aggregate method. In the aggregate funding method the expected present value of the accrued retirement benefit summed over all participants in the retirement plan less accumulated assets of the retirement plan, $X(h+s)$, is divided by the expected present value of aggregate future salaries to obtain a "normal cost" rate. The "normal cost" rate is multiplied by the aggregate salaries for a given year to obtain the "normal cost" for that year

$$N_{agg}(h+s) = \left(\frac{B(r)A(r)S(h+s,r)e^{i(h+s-r)} - X(h+s)}{\int_{h+s}^{r} W(a)S(h+s,a)e^{i(h+s-a)}da} \right) W(h+s). \tag{11}$$

Although actuaries call this a normal cost, it is a fundamentally different concept from the normal cost of the projected unit credit and the entry age methods. First, the

aggregate method does not recognize an unfunded liability. Instead, supplemental costs arising from actuarial losses (deviations of experience from assumptions) or past failures to adequately contribute to the pension fund are amortized over the future career of a worker, combined with the pension cost for an additional year of service, and deemed to be the normal cost. Second, N_{agg} is defined in terms of the value of accumulated assets and so is sensitive to swings in asset prices. Third, in order to dampen the effect of volatile asset prices on N_{agg} it is common practice to use an actuarial value of assets (for example, a five-year average of the market value of assets) for $X(h+s)$ rather than the market value of assets.

Economists have not yet reached a consensus on the correct way to measure a pension plan's liability (Wilcox 2006, Brown and Wilcox 2009). Some economists (Lazear 1979, Ippolito 1985, and Lazear and Moore 1988) advocate the use of PBO; others recommend ABO (Gold 2008); and Bodie (1990b) believes that the correct measure exceeds the ABO but is not the PBO. The choice between these views is important because the difference between ABO and PBO liabilities can be very large.

The next section of the paper is empirical. It consists of a brief presentation of the current unsatisfactory cash estimates of household income and wealth from state and local government retirement systems in the NIPA and a similar presentation of actuarial estimates based on data as published by the retirement systems.

III. Cash and PBO Actuarial Estimates

A cash accounting statement of wealth and income for members of state and local government-administered public-employee retirement systems is presented in Table 1. The estimates are from the Census Bureau survey of these plans which is the basis for the current NIPA estimates published in Table 6.11D.[13]

State and local government retirement systems earned about $145 billion on their investments in 2000 (line 3 plus line 9). Declining equity prices and low interest rates substantially reduced financial returns for these systems in the following two years. They sustained holding losses of $77.9 billion in 2001 and $69.6 billion in 2002. As a consequence, employer contributions rose sharply in subsequent years (line 2). From an average of $40.1 billion per year in 2000-02, employer contributions rose 69% to $67.8 billion in 2006.[14] Relative to payroll, employer contributions rose from 8.00% in 2000 to 10.84% in 2006 (line 16).

The PBO actuarial estimates in this section are based on a sample of 124 of the largest state and local government retirement systems, representing 91% of the membership in all systems as reported in the 2002 Census Bureau census of state and local government-administered public-employee retirement systems.[15] Some smaller systems were added to the sample in order that it might account for at least 75% of

[13] Since fiscal years for most state and local governments end on June 30, we converted the Census estimates to calendar years by a simple average of adjacent years.

[14] Among state and local government retirement systems in the US it is common for a portion of the contributions made to pension funds to be deducted from salaries (the employee's contribution) and a portion (the employer's contribution) to be paid over and above the employee's salary. Employee contributions averaged $27.2 billion per year from 2000-02 and increased 25% to $34.0 billion in 2006 (line 19).

[15] Membership is a count of active and inactive members and all beneficiaries receiving periodic payments (retired on age, service, or disability as well as survivors of deceased members), but not lump sum recipients. The actuarial data were collected by BEA primarily from the comprehensive annual financial reports and actuarial valuation reports of the systems. The fiscal year data in these reports were converted

membership in almost every state. Aggregate amounts reported in the tables below are sums and averages of the sampled systems weighted by membership to represent the entire population.

Ninety-eight of the sampled retirement systems published an actuarial liability based on the entry age funding method, 21 used the projected unit credit method, 2 used the frozen initial liability (aka frozen entry age) method, 2 used the aggregate method and 1 used the frozen attained age.

Some retirement systems recently switched their funding method to the entry age method. We extrapolated the new entry age liability back to 2000 using Eq. (12).

$$L_t = L_{t-1} + N_t + i(L_{t-1} + N_t) - B_t - \tfrac{1}{2} iB_t \tag{12}$$

where B represents the benefits paid by the retirement system and i is the discount rate used by the system. This equation requires an estimate of entry age normal cost for the earlier years. Since normal cost rates are relatively stable over time unless large changes are made to plan provisions or actuarial or economic assumptions, we assumed that the new entry age normal cost rate (normal cost divided by covered payroll) was a reasonable approximation of the normal cost rate in earlier years as well. Multiplying it by covered payroll provided an estimate of N while an estimate of B was obtained from the financial reports of the systems.[16]

Table 2 presents summary PBO measures of wealth and income for 2000-06. It combines, without adjustment, estimates of actuarial liabilities and normal costs

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to calendar years by averaging, taking into account differences in system fiscal years. For more details see the data appendix.

[16] Details about other adjustments that were made to the data for individual retirement systems are provided in the appendix.

calculated using different funding methods.[17] In the measurement of actuarial income, employer's normal cost is used rather than the employer contributions used in the measurement of cash income. Employer's normal cost was $41.0 billion in 2000 and rose to $51.7 billion in 2006 (line 2) about 8.3% of covered payroll in both years (line 13). This contrasts with the rise in employer cash contributions from 8.0% in 2000 to 10.8% in 2006 in response to very low returns on assets.

Imputed interest income (line 3) is computed using the assumed investment rate of return from actuarial valuation reports and the actuarial liability. The weighted average interest rate is very stable at about 8% (line 14) while the actuarial liability rises from $2.2 trillion in 2000 to $3.3 trillion in 2006 (line 6). Together they yield interest income which rises steadily from $178 billion in 2000 to $262 billion in 2006. Again this contrasts with cash property income (dividends and interest), which declined in 2001 and 2002.

Table 2, Line 9 also shows that over this period plan assets have been about 2 to 16% lower than their actuarial liabilities, with the smallest unfunded liability occurring in 2000 before the effects of the unfavorable investment returns were felt and the largest unfunded liability occurring in 2002 as employers began increasing their contributions.[18]

[17] Note that under cash accounting DB pension plans are in the household sector, so pension assets are part of household wealth and the operations of the plans are an activity of households. Therefore the administrative and investment expenses of the plans are included in household income (and household consumption). Under accrual accounting, the plans are in the sector of the employer (state and local government) and so the administrative and investment expenses are not part of household income nor household consumption.

[18] The unfunded liability should be interpreted carefully because of the relationship between a retirement system and its sponsoring government. The size of a retirement system's unfunded liability depends on how and where the sponsoring government wishes to record its liabilities. For instance, by issuing pension obligation bonds and contributing the proceeds to the fiduciary fund for its retirement systems, the state of Illinois increased the assets of the systems and reduced their unfunded liabilities. The liability represented by the bonds was recorded on the statement of net assets of the sponsoring (primary) government. Although this maneuver appears to improve the finances of the retirement systems there has been no net change for the state government in its entirety.

Table 3 presents the annual required contribution (ARC), a measure required by GASB. ARC is defined as the employer's normal cost plus an amount to amortize the unfunded liability in 30 or fewer years.[19] Employers contributed about 90% of the required amount in 2000, but even with the sharp rise in the contributions subsequently, the percent of ARC contributed fell continuously to 81% in 2005 before rising to 83% in 2006.

Lastly, Table 3 also presents the distribution of the actuarial liability between active members (lines 3 and 5) and retirees and beneficiaries (line 4). The bottom panel displays the distribution as percentage shares. The retiree and beneficiary share rose from 44.85% in 2000 to 50.58% in 2006. (These estimates are based on a smaller sample than the estimates in Table 2; thirty-two of the retirement systems in the sample did not report the solvency test results on which Table 3 is based.)

In the next section we discuss the conversion of the PBO actuarial estimates into ABO estimates.

[19] In practice the periods and methods used by retirement systems vary considerably making comparisons between ARCs of different retirement systems difficult.

IV. ABO Estimates

In this section we discuss the estimation of ABO normal costs and liabilities.[20] Two estimation strategies were considered. The first strategy is to use the equations developed in Section 1 and data on retirement system membership and plan provisions to directly estimate the ABO normal costs and liabilities. A shortcoming of this approach is that the equations pertain only to retirement benefits and ignore survivorship, death, and disability benefits. Furthermore retirement systems commonly have multiple tiers for which crucial parameters vary, requiring substantially greater data collection effort.

The second strategy is to use the equations of Section 2 as well as those of Section 1 together with a set of assumptions about member and plan characteristics to estimate a relationship between the PBO funding methods and the ABO method. One advantage of this approach is that it ties the resulting ABO estimates to published PBO measures which are based on complete details of membership, plan provisions, and types of benefits. Another advantage is that it requires the collection of fewer items for each retirement system that the direct approach. Although the relationship between the ABO and PBO measures is sensitive to the assumptions made, choosing them with care can yield useful results. This is the strategy adopted in this paper.

The strategy is implemented in two steps. First, PBO measures are collected from actuarial and financial reports of the retirement systems and converted to ABO estimates by simulating ABO and PBO pension models for individual workers with different age/service characteristics. Normal costs and liabilities are then weighted by the distribution of active employees by age and length of service and conversion ratios calculated. The liability conversion ratio is the liability computed using the ABO method

divided by the liability computed using one of the PBO methods. A similar conversion ratio is calculated for normal costs. The ratios change over time as the age/service distribution of employment changes. Multiplying a retirement system's published liability and normal cost by the relevant conversion ratio yields the ABO measure we are seeking. In the second step of the process, standardization on a common discount rate, the ABO estimates are multiplied by discount rate conversion factors based on formulae developed by the Pension Benefit Guarantee Corporation.

Conversion of PBO Estimates to ABO Estimates.[21] We selected parameters similar to those used by state and local government retirement systems: Present values are calculated assuming an 8% discount rate; pension benefits are equal to 2% of the average salary in the final five years of employment times the number of years of service;[22] age of hire varies from 20 to 55; retirement age is 65; the entry salary for a worker hired at age 20 is $25,000; salaries rise 1% per year due to economy-wide productivity growth; in addition, an individual worker's salary rises with age. This is represented by a salary scale in which a 64-year old worker earns 2.8 times as much as a 20-year old.[23] Mortality is based on the male RP-2000 mortality tables for employees

[20] See Gold and Latter (2008) and Novy-Marx and Rauh (2009) for alternative approaches.

[21] We use the ABO liabilities published by the New York City retirement systems in their comprehensive annual financial reports; all the other retirement systems in our sample publish PBO liabilities.

[22] The Teacher Retirement System of Texas and the Florida Retirement System are examples of systems that use the average of the five highest years of earnings. Brainard (2006 p.7) reports that the median multiplier for employees who participate in OASDI is .0185 while the median multiplier for those do not participate is .0220.

[23] The salary scale is from Winklevoss (1993) Table 2.10, p.27. The salary assumptions mean that a worker's salary depends on his age but not on his years of service:

$$W(h+s) = \sigma(h+s)W(20)e^{\rho(h+s-20)}$$

Where $\sigma(h+s)$ is the salary scale, ρ is the rate of productivity growth, and $W(20)$ is the entry age salary for a 20 year old.

and healthy annuitants prepared by the Society of Actuaries. Disability decrements and separation decrements (which vary by age of hire) are from Winklevoss (1993).[24]

Estimates of the ABO and projected unit credit liabilities for various ages and years of service are presented in Panels A and B of Table 4. These are expressed as a percentage of the age 65 liability, which is the same for both funding methods. The rapid growth of the liability with a given worker's age is seen by reading along the diagonals of Panel A. For instance, the ABO liability for a worker age 27 with 7 years of service is only 0.03% of his age 65 liability. It remains low for most of his career—even at age 57 (with 37 years of service) it is only 32.43% of the age 65 liability. Because the projected unit credit method was designed to smooth the backloaded trajectory of the ABO liability it is higher than the ABO liability at every age—as is apparent from Panel C.

Similar estimates of normal costs by age and years of service are presented in Table 5. From Panel C it is clear that projected unit credit normal costs are higher than ABO normal costs at the beginning of a worker's career and lower at the end.

The assumed distribution of workers by age and years of service in 2000 and 2006 are presented in Table 6. In 2000 the average worker was 43 years old and had worked 8.3 years for the plan sponsor (Panel C). In 2006 the average worker was 44.4 years only and had 8.5 years of tenure. These age/service distributions were used to calculate a weighted average of the ratio of ABO liabilities and normal costs to the liabilities and normal costs of the other funding methods (Table 7). The ABO/projected unit credit liability ratio rises from 0.77 in 2000 to 0.81 in 2006. The ABO/entry age ratio is lower

[24] The termination decrements are from Table 2.3, p.19 and the disability decrements are from Table 2.7 p.23.

but it also rises over time. The normal cost ratios are mostly above one during this period.

As noted, these conversion ratios are sensitive to the assumptions used, in particular the assumptions about wage growth. Using the same salary scale assumption as before but assuming that economy-wide wages increase at a 2% annual rate (rather than 1%) reduces the conversion ratios to those given in Panel B. This assumption does not affect the ABO liability or normal cost but raises the liabilities and normal costs of the other methods which are based on a projected final year average salary. The ABO/EA conversion ratio for 2006 is reduced from 0.56 to 0.52 while the ABO/PUC ratio is reduced from 0.81 to 0.74.

Lastly, it should be noted that in making the conversion, it is necessary to adjust only the actuarial liability for active employees; the actuarial liabilities for inactive employees who have separated or for beneficiaries are identical under all funding methods.

Conversion to Common Discount Rate. Bader and Gold (2003), Wilcox (2006 pp.253-6), Novy-Marx and Rauh (2008) and others have criticized current actuarial practice that uses an investment rate of return to discount future pension liabilities of state and local government retirement systems.

For funding purposes, Wilcox recommends that liabilities should be discounted using the risk free nominal yield curve, or if that is not possible, a single risk-free rate. He assumes that taxpayers will bail out an insolvent plan. Historically, state and local pension plans, unlike private plans, have always paid their pension obligations in full, even when bondholders of bankrupt state and local governments have sustained losses.

The Pension Benefit Guaranty Corporation has developed formulae for changing the discount rate assumption embedded in an actuarial liability. The "termination" formula for the actuarial liability to retired participants is

(13) $$\rho_R = e^{-.0538(i^* - i)}$$

and the formula for the liability to active and separated participants is

(14) $$\rho_A = e^{-.1502(i^* - i)}$$

where i is the discount rate on which the liability was originally calculated and i^* is the desired discount rate.

Having converted the PBO liabilities to ABO liabilities as described in the previous section, and relying on Eq. (7) which shows that the ABO normal cost is proportional to the ABO liability, we use the same discount rate conversion formulae for normal costs and for liabilities. The discount rate conversions can have a very large effect on the estimates. For instance, when converting from the typical 8% discount rate assumed by state and local government retirement systems to a 5% risk free market rate, ρ_A equals 1.6 and ρ_R equals 1.2.

Results using the market yield on 20-year Treasury securities are presented in Table 8. They depict different saving behavior than the cash and PBO estimates. Employer's normal cost using the ABO method was $55.5 billion in 2000 (line 2), 40% higher than employer cash contributions and 35% higher than PBO normal cost.[25] ABO

[25] As an example of the conversion of liabilities and normal costs from a PBO basis to ABO, consider the case of the California Public Employees Retirement System which used the entry age funding method and a 7.75% discount rate in its June 30, 2006 valuation. It reported an annual covered payroll of $38,047 million, an employer's normal cost rate of 10.548%, and an actuarial accrued liability of $228,131 million, of which $111,400 million was for terminated employees, retirees, and beneficiaries. Employer's normal cost was $4.01 billion (38.047 x .10548) on a PBO basis. The entry-age conversion factor for normal costs from Table 7 is 1.145 and ρ_A=1.428 to convert from the 7.75% discount rate used by the System to a

normal cost grew at a compound rate of 7.5% from 2000-06. As a percentage of covered payroll, employer's normal cost was 11% to 14% in 2000-06 (line 12). This contrasts with PBO normal cost which was approximately 8.3% of covered payroll and employer cash contributions which were 7% to 11% of payroll.

Imputed interest in 2000 was $112.7 billion (line 3), substantially more than the $83.1 billion cash estimate of property income but less than the $178.3 billion imputed interest on the PBO liability. Imputed interest on the ABO liability grew at a 6.7% compound rate 2000-06.

Household saving in DB pension plans rose over this period at a 4.9% rate, or from $93.4 to $124.3 billion per year (line 5). This contrasts with large decelerations and accelerations in saving when measured on a cash basis and a growing level of annual saving when measured on an actuarial basis (from $144.6 billion in 2000 to $186.2 billion in 2006).

The ABO liability was $2.02 trillion in 2000 (line 6). This was less than the $2.16 trillion assets held by the retirement systems (line 7). However, the $144 billion surplus in 2000 became a $112 billion deficit in 2001 (line 8). Subsequently, the deficit grew to $527 billion in 2003 but by 2006 it had fallen to $289 billion.

Table 9 presents a similar set of estimates but uses a constant 6% discount rate, the same rate as used by the private sector on their Form 5500 filings. Because the discount rate is consistently higher than the market rate used in Table 8, the liability and

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5.38% market discount rate. ABO normal costs are therefore $6.56 billion (4.01 x 1.145 x 1.428), 64% higher than entry age normal costs.

The ABO liability is calculated by multiplying the PBO liability toward active employees by the entry age conversion factor for liabilities from Table 7 (.563) and ρ_A to get $93.8 billion ((228.131-111.400) x .563 x 1.428). To this is added the liability toward other members, adjusted to the market

normal cost are lower. The constant discount rate smoothes some of the swings over time in Table 8. For instance, employer's normal cost as a percentage of covered payroll ranges from 11% to 12% in Table 9 versus a range of 11% to 14% in Table 8.

Cost of Living Adjustments. Although most state and local pension plans provide automatic cost of living adjustments (COLA) to retirement benefits, none were fully indexed and most had a cap of 3% per year or less. As indicated in Table 10, 93 of the systems in our sample provide automatic COLAs while 31 did not.[26] Of those with automatic COLAs, 34 were independent of the rate of inflation. For instance, the Florida Retirement System increases retirement benefits 3% per year regardless of the rate of inflation and the COLA in the Wisconsin Retirement System is dependent on the actual rate of return on assets exceeding the assumed rate of return (among other things). Of the 58 systems with COLAs dependent on the rate of inflation, 36 are capped at 3% per year or less (often with carryover provisions from years when inflation exceeds 3% to years when it is less than 3%). Four systems do not have a cap, but their COLAs are only a percentage of the inflation rate. For instance, the Teachers' Pension and Annuity Fund of New Jersey provides a COLA equal to 60% of the change in the CPI with no cap.[27]

In practice, then, even when a retirement plan has an automatic COLA dependent on the rate of inflation, the cap is usually so low that it is likely to be binding and the maximum cost of living adjustment always made. It will be convenient to assume that all COLAs in state and local government retirement plans are similar to Florida's constant

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discount rate using ρ_R. This liability is \$126.6 billion (111.4 x 1.136). The total ABO liability is then \$220.4 billion (93.8 + 126.6), 3.4% less than the entry age liability.

[26] However, many systems without automatic COLAs provide occasional ad hoc COLAs.

[27] This summary glosses over various other complex COLA provisions in some state and local government pension plans. For instance, many plans do not compound COLAs. Other plans limit COLAs to only a

annual increase. It can be easily shown that if this is the case, the normal cost and liability conversion factors in Table 7 are unchanged. If the retirement benefit increases at a constant rate of π then the expression for the annuity factor given in Eq. (4) can be written as

$$A(r) = \int_r^{\infty} S(r,a) e^{(\pi - i)(a-r)} da \,. \tag{15}$$

This raises the liability given by Eq. (5) and normal costs given by Eq. (7) in the same proportion it raises the liability given by Eq. (10) and normal costs given by Eq. (9). In other words, the liability and normal cost ratios are unchanged.

State Estimates. Table 11 presents estimates of normal costs as a percentage of covered payroll by state.[28] These estimates are based on the constant 6% discount rate assumption. There is substantial variation across states in these costs. At the low end in 2006 are Rhode Island and Massachusetts (both 5.1%). At the high end are the District of Columbia (27.7%) and Nevada (26.7%). Nevada is one of the states whose state and local government employees do not participate in social security and hence their employers do not pay the 6.2% social security payroll tax. However, the same is true of Alaska, Colorado, Louisiana, Massachusetts, and Ohio, all of which have below average normal cost rates.

There is even greater variation in normal costs relative to current cash estimates. In 2006, the normal costs and cash contributions in Texas were approximately equal. In

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portion of the retirement benefit (for instance, the first $12,000 or excluding the amount based on employee contributions).

[28] In converting the PBO estimates to ABO estimates we used the same set of assumptions for all retirement systems. Although it might be worthwhile to use system-specific assumptions, particularly regarding average age and years of service of active workers, the gain must be balanced against the cost of collecting the relevant data, which in many cases is not even published. The gain is likely to be greatest for retirement systems for police and firemen. Even so, they are a relatively small subset of the population.

contrast, normal costs in New Jersey were more than 21 times as much as the current cash estimates ($2.51 billion versus $119 million).

V. Conclusions

The need for actuarial measures of pension compensation and wealth has long been recognized.[29] One difficulty has been that state and local government pension plans in the U.S. generally do not publish the actuarial measures needed for national income accounts and the measures they do publish are not based on a consistent set of funding methods and assumptions.

This paper developed a method to convert PBO normal costs and liabilities to the ABO measures needed for national income accounts using a common discount rate. The method was applied to data for the years 2000 to 2006 to generate a set of national and state estimates. Not surprisingly, the ABO estimates are quite different from the currently published cash and actuarial estimates.

Estimates of ABO normal costs and liabilities based on a market discount rate could be higher or lower than published normal costs and liabilities for several reasons. (1) The discount rate used by state and local government retirement systems is usually substantially above the market discount rate as represented by the yield on risk free treasury securities, making published estimates smaller than market based estimates. (2) The funding methods used by state and local governments in the U.S. are variations of the projected benefit obligation (PBO) method which takes into account future salary

[29] "It is difficult to carry out economic analysis based primarily on accrual concepts in a world where activity is reported on a cash basis. Particularly in the pension area, the personal income and saving statistics produced by the National Income and Product Accounts differ substantially from the concepts used in most economic analyses. In the corporate sector, cash accounting tends to distort the measurement of pension commitments and thereby corporate profits. Accounts based on cash also fail to recognize the relationship between the federal government and the household and business sectors created by the Pension Benefit Guaranty Corporation insurance. Finally, tax expenditure estimates based solely on a cash flow analysis do not provide an accurate measure of the benefits of the tax-favored treatment of pensions.

"The time is right for improving the data on pensions. Great strides have been made in the area of cross-sectional surveys of individuals; these improvements should permit better estimates of the extent to which employees reduce their other saving in response to guaranteed pension benefits. Comparable

increases. In contrast, the preferred measure in this paper is an accumulated benefit obligation (ABO) which ignores future salary increases. This makes PBO estimates larger than the ABO estimates. (3) As shown in Section II, PBO funding methods smooth the rise in normal costs which occurs over a worker's career. All else equal, this makes the ABO liability lower than the PBO liability except at the age of retirement when they are equal. On the other hand, it makes ABO normal costs lower than PBO normal costs in the early years of a career and higher than PBO normal costs at the end of a career.

The net effect of these factors in 2006 is that the ABO liability (assuming a 6% discount rate) is about 4% lower than the PBO liability and ABO normal costs are almost 50% higher than PBO normal costs.

In addition to national estimates, estimates were prepared for states, across which there is substantial variation. For instance, ABO normal costs ranged from 27% above PBO normal cost in New York in 2006 to 73% above in Minnesota and New Hampshire. ABO normal costs ranged from 5% of covered payroll in Rhode Island and Massachusetts to 27% in Nevada (and 28% in the District of Columbia).

Adopting actuarial accounting for employer contributions to DB pension plans in the state and local government sector will have a large effect on NIPA measures of compensation and personal income receipts on assets. We estimate that employer contributions to pension funds in 2000 would be 39% higher than the NIPA cash estimate and 17% higher in 2006 (Table 12). As a percent of compensation, employer contributions would be 7.7% on an actuarial basis rather than 6.7% on a cash basis. The

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improvements are needed at the macro level; revising our national accounts to make use of available data should be given high priority" (Munnell and Yohn 1992).

property income of state and local government retirement plans (attributed to households in the NIPA) would be 41% higher than the cash estimate in 2000 and nearly twice as high in 2006. Together the two changes would add $51 billion (or 0.6%) to total personal income in 2000 and $105 billion (1.0%) in 2006.

Across states the adoption of actuarial accounting would raise personal income in 2006 by as much as 2.3% (in New Jersey) and lower personal income by as much 0.7% (in West Virginia—see Table 13). The reduction of personal income in West Virginia (and even larger reductions in Oregon in 2002-04) reflect the fact that personal income counts as current income the large lump sum contributions those states made to reduce the unfunded actuarial liabilities of their retirement systems that arose because contributions in prior years were insufficient. Similarly, the pension obligation bonds Illinois issued to improve the financial statements of its retirements systems raised the state's 2003 personal income as currently measured but would have no effect on personal income if the proposed actuarial accounting is adopted.

The ABO estimates presented here are dependent on the quality of the data published by the retirement systems and the consistency with which different retirement systems apply a given actuarial funding method. Although estimates for many systems are based on complete information from 2000 to the present, estimates for other systems are based on a single year of primary data which we extrapolated back to 2000 assuming a constant normal cost rate. Even over the short six year period considered in this paper, there has been some improvement in the availability and quality of the underlying actuarial data. For example, some systems which use the aggregate actuarial funding method have begun publishing entry age normal costs and liabilities.

Appendix: Notes on the Data

General. Some of the data used in this paper (actuarial liability, covered payroll, annual required contribution, investment rate of return, employer's normal cost, and the distribution of the actuarial liability between active and retired members, cost of living adjustments) were collected directly from the Comprehensive Annual Financial Reports (CAFR) and Actuarial Valuation Reports (AVR) of the retirement systems. Usually actuarial valuations are performed every year but some systems perform them every other year.

The actuarial valuation dates for most retirement systems is June 30th; a common alternative valuation date is December 31st. A few systems use other valuation dates. Fiscal year data were converted to calendar years using a weighted average of adjacent years, the weights depending on the system's fiscal year. (Fiscal year data from the Census Bureau survey were converted to calendar years assuming that all systems used a June 30th fiscal year.)

Normal Cost. By design, normal cost is rather stable from year to year unless plan provisions, economic assumptions (e.g. interest, inflation, and wage rates), or actuarial assumptions (separation, retirement, mortality, and disability rates), are substantially changed. Therefore it was felt reasonable to extrapolate normal cost to a common 2000-06 sample period for all systems (when actual data were missing) by holding the normal cost rate constant and multiplying it by covered payroll.

The actuarial valuation reports we examined typically use payroll and other data as of the valuation date to calculate a normal cost rate for a future fiscal year. For instance, the June 30, 2007 AVR for the Vermont State Employees' Retirement System

reports the calculations of a normal cost rate for the 2010 fiscal year. As a general rule, we used the normal cost rate calculated using data as of the valuation date as an estimate of the normal cost rate for the year ending on that valuation date. In the Vermont example, we used the normal cost rate calculated for fiscal year 2010 as an estimate of the normal cost rate for the year ending June 30, 2007. This is correct (for an individual) when the entry age funding method is used because the normal cost rate is the same for every year of that individual's career. For the system, the rate will not be identical every year because the composition of active members changes, but the rate will nevertheless usually be stable. This means that we can multiply the normal cost rate by the covered payroll for the year ending on the valuation date to estimate normal cost for that year.

For the systems that did not use either the entry age or the projected unit credit funding methods, we made adjustments and assumptions such as:

- Wisconsin's official actuarial method is the frozen initial liability but it also publishes some entry age estimates in its valuation report. In this paper we used the published entry age liability and normal cost and calculated an unfunded "actuarial accrued liability" (AAL) as the difference between the entry age liability and the actuarial value of assets. We then amortized the "unfunded actuarial accrued liability" (UAAL) over 30 years using a constant dollar amortization payment and added the amortization payment to the entry age normal cost to obtain an entry age annual required contribution (ARC).
- The State Teachers Retirement System of Vermont and the Vermont State Employees' Retirement System adopted the entry age funding method in their June 30, 2006 valuation reports. Formerly they used the frozen initial liability

method. We used the entry age normal cost rate from the 2006 report for all earlier years.

- South Dakota and North Carolina Local Governmental use the frozen initial liability. They do not publish an entry age AAL. We treated their published actuarial data as if they were entry age.
- The Tennessee Consolidated Retirement System (consisting of two plans: the State employees, Teachers, & Higher Education Employees Pension Plan (SETHEEPP) and the Political Subdivisions Pension Plan (PSPP)) began publishing an entry age AAL in its June 30, 2008 CAFR. Previously it published a frozen initial liability AAL. We estimated a normal cost for the system for 2007 as a weighted average of the published normal cost rates for State and Higher Education participants and for Teacher participants (a normal cost for PSPP participants was not published). The weights were estimated from the data in the schedule of active members by salary. We assumed that the normal cost rate for earlier years was equal to the 2007 rate. We then estimated an entry age AAL for earlier years using Eq. (12).
- The New York City (NYC) Police, Fire, Teachers', and Employees' retirement systems use the frozen initial liability funding method but they also publish a "market value accumulated benefit obligation." This is the accrued liability that we are attempting to estimate. Unfortunately the NYC systems do not also publish a corresponding normal cost. We roughly calculated these costs using Eq. (12) and other data published in the NYC CAFRS.

- The District of Columbia Police, Fire, and Teachers systems use the aggregate funding method. They also began publishing an entry age AAL as of October 1, 2006. We roughly calculated an entry age normal cost rate by subtracting the entry age UAAL from the present value of future employer normal costs (the published amount based on the aggregate method) and dividing the result by the present value of future payroll. Then using Eq. (12) we calculated an entry age AAL for 2000-2005. Using these estimates of entry age normal cost and entry age AAL, we calculated an entry age ARC, assuming a level dollar amortization payment.

Several adjustments were necessary to enforce consistency between the normal cost data collected for the various retirement systems:

- The Government Accounting Standards Board requires that covered payroll for the system be published in a Schedule of Funding Progress. In most cases, this is the payroll used in this paper to calculate normal cost. Some retirement systems (e.g. Florida Retirement System and Teachers' Retirement System of Alabama) include DROP salaries in covered payroll, but not in the payroll used to calculate normal cost. In the case of the Teachers' Retirement System of Alabama, covered payroll was 12.5% higher than the valuation payroll in 2005. For these systems, we used valuation payroll rather than covered payroll to estimate normal cost.
- Sometimes administrative expenses are included in the published normal cost rate (e.g. Florida Retirement System); other times they are omitted (e.g. Teachers' Retirement System of Alabama); and in some cases it is not known (e.g. Kansas

Public Employees Retirement System). Where necessary we adjust normal cost to exclude administrative costs.

- Sometimes death benefits and term life insurance are omitted from the published normal cost rate (e.g. Teachers' Retirement System of Alabama). We adjusted it to include those costs. The Texas Municipal Retirement System has an optional supplemental death benefits (term life insurance) plan. We included the cost of this plan in the employer's normal cost.
- Some systems (e.g. Teacher's Retirement System of Oklahoma) include the cost of medical benefits in normal cost. We removed that cost when it could be identified.
- Some systems (e.g. Kansas Public Employees Retirement System, Oklahoma Public Employees Retirement System) include interest in the normal cost rate because the employer contribution is not due until some time after the valuation date. We excluded these interest payments.
- Some systems (e.g. California Teachers' Retirement System) do not publish *employer's* normal cost or *employer's* normal cost rate. They publish a *total* normal cost and a member contribution rate. The statutorily set member and employer contribution rates will only by chance equal the normal cost rate. How the difference between the normal cost rate and the statutory rates will be paid is unspecified. We arbitrarily defined the employer's normal cost rate as the total rate less the statutory members' rate.
- Some systems (e.g. Ohio Police and Fire Pension Fund) exclude from normal cost those contributions to the retirement fund that were not made by the employer or

the members. In the case of the Ohio Police and Fire Pension Fund there are state "subsidies" that are omitted from the published normal cost. We added these subsidies to normal cost.

- Some systems (e.g. State Teachers Retirement System of Ohio) include in the covered payroll published in the Schedule of Funding Progress the salaries paid to members who participate only in a defined contribution plan. We estimated normal cost by multiplying the normal cost rate by a valuation payroll which excluded such salaries.
- Some systems (e.g. Alaska Teachers' Retirement System beginning with the June 30, 2006 valuation date) use an annualized payroll rather than a fiscal year payroll.
- In some systems (e.g. Employees' Retirement System of Georgia) the employer pays the employee contribution. This is known as "pick-up." We assumed that QCEW wages do not reflect this employer pick-up and treated the pick-up as another component of the employer normal cost.

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Table 1. Household wealth in, and income from, state and local government defined benefit pension plans: Cash accounting approach[1]

Billions of dollars (or as noted)

		2000	2001	2002	2003	2004	2005	2006
1	Household Income	122.6	109.5	110.6	128.6	141.0	147.8	161.2
2	Employer contributions to DB pension plans	39.5	38.8	42.1	53.1	59.8	60.9	67.8
3	Property income from plan assets (gross of investment and administrative expenses)[2]	83.1	70.6	68.5	75.5	81.3	86.9	93.4
4	*Less:* Investment and administrative expenses	6.0	7.5	7.6	7.6	9.0	10.0	12.5
5	*Less:* Benefits net of employee contributions	74.7	82.7	91.6	101.1	109.3	117.4	127.5
6	Benefits and Withdrawals	100.4	109.6	119.6	130.5	140.1	149.0	160.5
7	Employee contributions	25.7	27.0	27.9	29.4	30.8	31.6	33.0
8	*Equals:* Household saving in DB plans	42.0	19.3	11.3	19.8	22.7	20.4	21.2
9	*Plus:* Holding gains or loss on plan assets	61.8	-77.9	-69.6	113.6	201.8	187.7	288.0
10	*Plus:* Net transfers and other changes	22.0	53.2	47.4	24.7	29.2	-9.9	50.7
11	*Equals:* Change in DB plan assets	125.8	-5.3	-10.9	158.1	253.8	198.2	359.9
12	Closing DB plan assets[3]	2,163.1	2,157.8	2,146.9	2,305.0	2,558.8	2,757.0	3,116.9
	Addenda:							
13	Active membership (millions)	13.5	13.8	14.1	14.1	14.1	14.2	14.4
14	Total membership (millions)	22.4	23.2	23.9	24.3	24.8	25.4	26.1
15	Covered payroll	493.6	521.6	542.7	556.9	573.3	596.0	625.7
16	Employer contributions as a % of covered payroll	8.00	7.44	7.75	9.53	10.42	10.22	10.84
17	Employer contributions (6.11D, 30)	39.6	38.8	41.8	56.1	55.4	61.9	65.3
18	Benefits (6.11D, 43)	100.3	109.6	120.6	131.9	140.6	149.7	161.6
19	Employee contributions (6.11D, 52)	25.8	27.1	28.6	30.1	31.1	32.3	34.0

Notes:

[1]Data in this table are based on a tabulation of the data in the "Individual Unit File" from the Census Bureau surveys of state and local government administered public-employee retirement systems; BEA's National Income and Product Accounts (NIPA); and covered payroll data collected as described in the text. NIPA table and line numbers are in parentheses.

[2]Property income is dividends, interest, and rent.

[3]Total cash and investment holdings.

Table 2. Household wealth in, and income from, state and local government defined benefit pension plans: PBO approach[1]

Flows are measured for years ending on December 31; stocks are measured as of December 31.

Billions of dollars (or as noted)

		2000	2001	2002	2003	2004	2005	2006
1	Household income	219.3	236.2	251.7	265.2	278.6	294.7	313.6
2	Employer's normal cost (net of administrative expense)[2]	41.0	43.9	46.1	46.9	47.4	49.0	51.7
3	Imputed interest on actuarial liability[3]	178.3	192.3	205.7	218.3	231.2	245.7	261.9
4	*Less:* Benefits net of employee contributions	74.7	82.7	91.6	101.1	109.3	117.4	127.5
5	*Equals:* Household saving in DB pension plans	144.6	153.6	160.1	164.1	169.2	177.3	186.2
6	Actuarial liability of DB plans[2]	2,218.1	2,393.3	2,560.7	2,730.6	2,902.4	3,088.3	3,296.3
7	Plan assets (market value)[4]	2,163.1	2,157.8	2,146.9	2,305.0	2,558.8	2,757.0	3,116.9
8	Unfunded actuarial liability	55.0	235.5	413.8	425.6	343.6	331.2	179.3
9	Funded ratio (%)	97.52	90.16	83.84	84.41	88.16	89.27	94.56
	Addenda:							
11	Unfunded actuarial liability as a percentage of covered payroll	11.13	45.16	76.25	76.43	59.94	55.58	28.66
12	Employer's normal cost per active member (dollars)	3,034	3,171	3,276	3,334	3,362	3,440	3,582
13	Employer's normal cost as a % of covered payroll	8.31	8.42	8.49	8.43	8.27	8.22	8.26
14	Investment rate of return assumption (%)	8.04	8.04	8.03	7.99	7.96	7.95	7.95

Notes:

[1]Estimates are based on a sample of retirement systems, weighted by membership to represent the entire population, as described in the text.

[2]Liabilities and normal costs as reported by the retirement systems using entry age, projected unit cost, or other funding methods.

[3]Using investment rate of return assumed by retirement systems (line 14).

[4]Total cash and investment holdings.

Table 3. Annual required contribution and solvency test results[1,2]

Flows are measured for years ending on December 31.

Billions of dollars (or as noted)

		2000	2001	2002	2003	2004	2005	2006
1	Annual required contribution (ARC)	36.9	38.5	42.5	51.2	61.9	69.4	75.7
2	Percent contributed	90.01	87.46	82.84	81.74	81.71	81.19	83.01
		Billions of dollars						
3	Active Member Contributions	331.9	348.0	364.7	376.5	394.3	412.8	433.6
4	Retirees & Beneficiaries	994.9	1083.6	1184.1	1301.3	1429.8	1547.0	1667.1
5	Active Members (Employer Financed Portion)	891.3	961.7	1012.0	1052.8	1078.3	1128.5	1195.5
		Percent of Actuarial Liability						
6	Active Member Contributions	14.96	14.54	14.24	13.79	13.58	13.37	13.15
7	Retirees & Beneficiaries	44.85	45.28	46.24	47.66	49.26	50.09	50.58
8	Active Members (Employer Financed Portion)	40.18	40.18	39.52	38.56	37.15	36.54	36.27

Notes:

[1]Estimates are based on a sample of retirement systems, weighted by membership to represent the entire population, as described in the text.

[2]32 systems did not report solvency test data. Some systems combined the retiree health liability with the pension liability.

Table 4.

A. ABO liability per worker for various ages and years of service (as a percent of age 65 liability)

	Years of service								
Age	2	7	12	17	22	27	32	37	42
22	<0.01	…	…	…	…	…	…	…	…
27	0.01	0.03	…	…	…	…	…	…	…
32	0.04	0.12	0.18	…	…	…	…	…	…
37	0.13	0.37	0.55	0.70	…	…	…	…	…
42	0.36	1.03	1.51	1.87	2.15	…	…	…	…
47	1.00	2.72	3.88	4.71	5.33	5.82	…	…	…
52	2.40	7.19	9.86	11.64	12.91	13.87	14.61	…	…
57	7.38	16.80	23.67	26.82	28.93	30.43	31.56	32.43	…
62	26.60	48.19	55.08	58.52	60.58	61.96	62.95	63.68	64.26

B. Projected Unit Credit liability per worker for various ages and years of service (as a percent of age 65 liability)

	Years of service								
Age	2	7	12	17	22	27	32	37	42
22	0.01	…	…	…	…	…	…	…	…
27	0.03	0.10	…	…	…	…	…	…	…
32	0.10	0.31	0.48	…	…	…	…	…	…
37	0.25	0.79	1.19	1.50	…	…	…	…	…
42	0.61	1.81	2.67	3.30	3.80	…	…	…	…
47	1.43	4.06	5.80	7.04	7.97	8.70	…	…	…
52	2.99	9.31	12.76	15.07	16.71	17.95	18.91	…	…
57	8.20	19.29	27.18	30.80	33.22	34.94	36.24	37.24	…
62	27.15	50.40	57.60	61.20	63.36	64.80	65.82	66.60	67.20

C. Ratio: ABO to Projected Unit Credit liabilities

	Years of service								
Age	2	7	12	17	22	27	32	37	42
22	0.25	…	…	…	…	…	…	…	…
27	0.32	0.30	…	…	…	…	…	…	…
32	0.40	0.38	0.38	…	…	…	…	…	…
37	0.50	0.47	0.47	0.47	…	…	…	…	…
42	0.60	0.57	0.57	0.57	0.57	…	…	…	…
47	0.70	0.67	0.67	0.67	0.67	0.67	…	…	…
52	0.80	0.77	0.77	0.77	0.77	0.77	0.77	…	…
57	0.90	0.87	0.87	0.87	0.87	0.87	0.87	0.87	…
62	0.98	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96

Table 5.

A. ABO normal cost per worker for various ages and years of service (as a percent of salary)

	Years of service								
Age	2	7	12	17	22	27	32	37	42
22	0.03	…	…	…	…	…	…	…	…
27	0.12	0.15	…	…	…	…	…	…	…
32	0.32	0.41	0.47	…	…	…	…	…	…
37	0.72	0.88	1.02	1.15	…	…	…	…	…
42	1.42	1.70	1.94	2.18	2.42	…	…	…	…
47	2.70	3.11	3.50	3.89	4.28	4.67	…	…	…
52	4.22	5.61	6.22	6.82	7.43	8.03	8.64	…	…
57	7.71	8.56	10.22	11.07	11.91	12.76	13.60	14.44	…
62	12.77	14.60	15.64	16.68	17.72	18.76	19.81	20.85	21.89

B. Projected Unit Credit normal cost per worker for various ages and years of service (as a percent of salary)

	Years of service								
Age	2	7	12	17	22	27	32	37	42
22	0.12	…	…	…	…	…	…	…	…
27	0.35	0.36	…	…	…	…	…	…	…
32	0.75	0.79	0.79	…	…	…	…	…	…
37	1.37	1.42	1.42	1.42	…	…	…	…	…
42	2.27	2.33	2.33	2.33	2.33	…	…	…	…
47	3.69	3.73	3.73	3.73	3.73	3.73	…	…	…
52	5.07	6.01	6.01	6.01	6.01	6.01	6.01	…	…
57	8.35	8.41	9.22	9.22	9.22	9.22	9.22	9.22	…
62	12.75	13.53	13.53	13.53	13.53	13.53	13.53	13.53	13.53

C. Ratio: ABO to Projected Unit Credit normal costs

	Years of service								
Age	2	7	12	17	22	27	32	37	42
22	0.27	…	…	…	…	…	…	…	…
27	0.34	0.42	…	…	…	…	…	…	…
32	0.43	0.51	0.60	…	…	…	…	…	…
37	0.53	0.62	0.72	0.81	…	…	…	…	…
42	0.63	0.73	0.83	0.93	1.04	…	…	…	…
47	0.73	0.84	0.94	1.04	1.15	1.25	…	…	…
52	0.83	0.93	1.03	1.14	1.24	1.34	1.44	…	…
57	0.92	1.02	1.11	1.20	1.29	1.38	1.47	1.57	…
62	1.00	1.08	1.16	1.23	1.31	1.39	1.46	1.54	1.62

Table 6.

A. Distribution of employment, 2000 (percent of total employment)

	Years of service								
Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+
<25	2.92	...	...	...	...	...	...	...	...
25-29	5.71	0.72	...	...	...	...	...	...	...
30-34	6.17	2.48	0.73	...	...	...	...	...	...
35-39	6.97	4.15	2.48	1.00	...	...	...	...	...
40-44	7.23	5.05	3.77	2.96	1.15	...	...	...	...
45-49	5.81	4.81	4.01	3.76	2.39	0.56	...	...	...
50-54	3.55	3.31	3.13	2.55	1.69	0.82	0.15	...	...
55-59	1.70	1.71	1.36	1.14	0.64	0.25	0.09	0	...
60+	0.84	0.85	0.65	0.43	0.20	0.09	0.02	0.01	0

B. Distribution of employment, 2006 (percent of total employment)

	Years of service								
Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+
<25	3.36	...	...	...	...	...	...	...	...
25-29	6.20	0.87	...	...	...	...	...	...	...
30-34	5.70	2.73	0.53	...	...	...	...	...	...
35-39	5.74	3.41	1.55	0.49	...	...	...	...	...
40-44	6.08	3.94	2.42	1.79	0.52	...	...	...	...
45-49	5.89	4.16	3.11	2.74	2.02	0.87	...	...	...
50-54	4.38	4.09	3.38	2.92	2.42	1.66	0.19	...	...
55-59	2.78	2.35	2.21	2.00	1.20	0.72	0.16	0.04	...
60+	1.44	1.34	0.95	0.74	0.49	0.27	0.10	0.04	0

C. Average age and years of service, by year

Year	Average Age	Average years of service
2000	43.0	8.3
2001	43.7	8.4
2002	43.7	8.4
2003	43.7	8.3
2004	44.0	8.4
2005	44.3	8.4
2006	44.4	8.5

Table 7.

A. Ratio of ABO to Entry Age (EA) and Projected Unit Credit (PUC) liabilities and normal costs
(wages grow 1% per year plus salary scale)

	Liabilities		Normal Costs	
Year	ABO/EA	ABO/PUC	ABO/EA	ABO/PUC
2000	0.496	0.773	1.003	0.978
2001	0.521	0.789	1.048	0.995
2002	0.535	0.797	1.082	1.006
2003	0.535	0.796	1.072	1.005
2004	0.557	0.810	1.128	1.021
2005	0.553	0.808	1.118	1.019
2006	0.563	0.813	1.145	1.026

B. Ratio of ABO to Entry Age (EA) and Projected Unit Credit (PUC) liabilities and normal costs
(same assumptions as used for Panel A, except wages grow 2% per year plus salary scale)

	Liabilities		Normal Costs	
Year	ABO/EA	ABO/PUC	ABO/EA	ABO/PUC
2000	0.455	0.689	0.966	0.947
2001	0.481	0.708	1.015	0.971
2002	0.495	0.718	1.053	0.988
2003	0.494	0.717	1.044	0.986
2004	0.518	0.735	1.104	1.010
2005	0.514	0.731	1.093	1.006
2006	0.523	0.738	1.122	1.017

Table 8. Household wealth in, and income from, state and local government defined benefit pension plans: ABO approach with market discount rate[1]

Flows are measured for years ending on December 31; stocks are measured as of December 31.
Billions of dollars (or as noted)

		2000	2001	2002	2003	2004	2005	2006
1	Household income	168.1	195.3	202.7	218.5	229.6	233.6	251.8
2	Employer's normal cost (net of administrative expense)	55.5	63.4	74.0	76.5	79.3	82.5	85.6
3	Imputed interest on actuarial liability[2]	112.7	131.9	128.6	141.9	150.3	151.0	166.2
4	*Less:* Benefits net of employee contributions	74.7	82.7	91.6	101.1	109.3	117.4	127.5
5	*Equals:* Household saving in DB pension plans	93.4	112.6	111.1	117.3	120.3	116.2	124.3
6	Actuarial liability of DB plans	2,019.0	2,270.3	2,620.1	2,821.6	3,054.4	3,283.5	3,406.3
7	Plan assets (market value)[3]	2,163.1	2,157.8	2,146.9	2,305.0	2,558.8	2,757.0	3,116.9
8	Unfunded actuarial liability	-144.1	112.4	473.2	516.6	495.6	526.5	289.3
9	Funded ratio (%)	107.14	95.05	81.94	81.69	83.77	83.97	91.51
	Addenda:							
10	Unfunded actuarial liability, % of covered payroll	-29.19	21.56	87.20	92.77	86.45	88.35	46.24
11	Employer's normal cost per active member (dollars)	4,103	4,579	5,267	5,436	5,625	5,793	5,929
12	Employer's normal cost, % of covered payroll	11.23	12.15	13.64	13.75	13.83	13.85	13.68
13	Discount rate (%)	5.58	5.81	4.91	5.03	4.92	4.60	4.88

Notes:

[1]Estimates are based on a sample of retirement systems, weighted by membership to represent the entire population, as described in the text.

[2]Using discount rate as given on line 13.

[3]Total cash and investment holdings.

Table 9. Household wealth in, and income from, state and local government defined benefit pension plans: ABO approach with 6% discount rate[1]

Flows are measured for years ending on December 31; stocks are measured as of December 31.
Billions of dollars (or as noted)

		2000	2001	2002	2003	2004	2005	2006
1	Household income	175.3	193.3	207.1	219.4	232.4	246.2	266.0
2	Employer's normal cost (net of administrative expense)	55.0	60.8	64.2	65.9	67.6	69.8	76.4
3	Imputed interest on actuarial liability[2]	120.3	132.5	142.8	153.5	164.8	176.4	189.6
4	*Less:* Benefits net of employee contributions	74.7	82.7	91.6	101.1	109.3	117.4	127.5
5	*Equals:* Household saving in DB pension plans	100.6	110.6	115.4	118.3	123.1	128.8	138.5
6	Actuarial liability of DB plans	2,005.1	2,207.7	2,380.8	2,558.1	2,747.2	2,939.3	3,159.7
7	Plan assets (market value)[3]	2,163.1	2,157.8	2,146.9	2,305.0	2,558.8	2,757.0	3,116.9
8	Unfunded actuarial liability	-158.0	49.9	233.9	253.0	188.4	182.3	42.7
9	Funded ratio (%)	107.88	97.74	90.18	90.11	93.14	93.80	98.65
	Addenda:							
10	Unfunded actuarial liability, % of covered payroll	-32.01	9.57	43.10	45.44	32.87	30.59	6.83
11	Employer's normal cost per active member (dollars)	4,068	4,395	4,569	4,683	4,792	4,902	5,295
12	Employer's normal cost, % of covered payroll	11.14	11.66	11.84	11.84	11.78	11.72	12.22
13	Discount rate (%)	6.00	6.00	6.00	6.00	6.00	6.00	6.00

Notes:

[1]Estimates are based on a sample of retirement systems, weighted by membership to represent the entire population, as described in the text.

[2]Using discount rate as given on line 13.

[3]Total cash and investment holdings.

Table 10. Cost of living adjustment (COLA) provisions in state and local government pension plans, 2006

Cost of Living Adjustment Provision	Number of Systems
No automatic COLA provisions; ad hoc adjustment occasionally granted	31
Automatic COLA provisions	93
Independent of inflation rate	34
Dependent on inflation rate	59
COLA capped at 2%	5
COLA capped at 2.5%	6
COLA capped at 3%	25
COLA capped at 3.5%	1
COLA capped at 4%	4
COLA capped at 5%	8
COLA capped at 6%	4
COLA capped at 9%	2
No cap	4

Table 11. Employer normal costs as a percent of covered payroll, by state [6% discount rate]
For the year ending on December 31

State	2000	2001	2002	2003	2004	2005	2006
Alabama	7.8	8.0	8.0	7.9	7.9	7.8	8.7
Alaska	7.0	7.1	7.1	6.6	6.8	6.4	5.9
Arizona	14.0	14.5	14.6	14.5	15.3	16.3	16.7
Arkansas	13.6	14.0	13.8	14.0	13.1	12.0	12.2
California	13.7	14.9	15.4	15.7	16.2	16.6	17.6
Colorado	10.9	12.5	13.0	13.3	13.6	10.6	10.2
Connecticut	5.7	5.8	4.9	4.0	3.9	4.7	5.8
Delaware	10.5	11.0	11.1	11.4	11.6	11.4	11.6
D.C.	24.3	25.3	25.8	26.0	26.9	26.9	27.7
Florida	15.1	15.6	15.8	15.6	15.4	15.6	16.4
Georgia	12.5	12.9	13.0	13.1	12.0	10.9	11.3
Hawaii	8.4	7.8	8.0	8.3	8.4	8.1	8.8
Idaho	11.8	11.3	10.6	10.5	10.4	10.8	11.8
Illinois	10.7	10.4	10.6	10.6	11.5	12.0	13.0
Indiana	7.8	8.2	7.8	7.5	7.7	8.3	8.8
Iowa	6.7	7.0	7.1	7.4	7.6	7.6	8.4
Kansas	4.4	4.6	5.2	5.3	5.5	5.8	5.8
Kentucky	9.6	10.1	10.0	9.9	10.0	8.9	8.1
Louisiana	9.3	9.6	9.7	9.8	9.7	9.7	10.1
Maine	8.4	8.7	8.8	9.0	9.2	9.2	9.7
Maryland	10.6	10.9	11.0	11.3	11.6	11.7	11.7
Massachusetts	4.5	4.2	4.7	4.4	4.7	4.9	5.1
Michigan	9.8	10.1	10.4	10.5	10.7	10.0	10.4
Minnesota	6.9	7.1	7.2	7.0	6.5	6.5	6.6
Mississippi	5.4	5.7	5.7	5.8	6.0	6.2	7.0
Missouri	13.3	13.4	13.8	14.1	14.1	14.1	14.6
Montana	5.6	6.0	6.2	6.3	6.4	6.4	6.9
Nebraska	6.2	6.5	6.0	6.2	5.8	5.2	5.9
Nevada	23.1	23.9	24.2	24.7	25.2	25.4	26.7
New Hampshire	7.1	7.4	7.5	7.6	7.8	7.8	8.2
New Jersey	10.3	10.5	10.5	10.6	10.7	10.7	10.6
New Mexico	8.5	9.2	9.7	10.3	10.9	11.3	12.2
New York	16.9	17.3	16.8	17.1	17.1	17.4	18.0
North Carolina	7.0	7.3	7.5	7.5	7.8	7.8	7.9
North Dakota	4.9	5.1	5.2	5.3	5.7	6.3	6.5
Ohio	7.6	7.9	7.8	7.7	8.0	7.9	7.8
Oklahoma	6.9	7.2	7.3	7.5	7.5	7.6	8.1
Oregon	12.9	17.4	18.1	17.9	6.8	5.1	6.2
Pennsylvania	10.8	12.0	12.3	12.5	12.3	11.8	12.2
Rhode Island	4.2	4.6	4.5	4.4	4.6	4.7	5.1
South Carolina	5.9	6.1	6.0	5.6	5.6	5.9	6.1
South Dakota	5.7	5.9	6.0	6.3	6.5	6.5	6.9
Tennessee	11.8	12.3	12.4	12.7	12.9	13.1	13.8
Texas	8.5	9.1	9.2	8.7	8.1	7.2	7.4
Utah	15.6	16.3	17.3	17.4	18.5	18.4	19.4
Vermont	8.0	8.4	8.3	8.3	8.6	8.7	9.4
Virginia	12.9	13.4	13.6	14.3	13.7	12.8	13.5
Washington	15.0	14.4	15.0	13.2	11.3	11.1	11.2
West Virginia	5.1	5.4	5.5	5.6	5.8	5.9	6.4
Wisconsin	9.6	10.7	10.8	10.7	11.0	11.0	11.3
Wyoming	7.3	7.7	7.9	7.8	8.3	8.2	8.4
All states plus D.C.	11.1	11.7	11.8	11.8	11.8	11.7	12.2

Note: Estimates are based on a sample of retirement systems, weighted by membership to represent the entire population, as described in the text.

Table 12. Effect of actuarial accounting on personal income and saving and select components: ABO approach with 6% discount rate[1]

Billions of dollars (or as noted)

		2000	2001	2002	2003	2004	2005	2006
	Current cash estimates							
1	Personal income (2.1, 1)	8,429.7	8,724.1	8,881.9	9,163.6	9,727.2	10,269.8	10,993.9
2	Compensation, state & local government (6.2D, 92)	716.9	761.9	809.0	856.5	893.8	936.9	979.5
3	Employer contributions to pension funds, state & local govt (6.11D,30)	39.6	38.8	41.8	56.1	55.4	61.9	65.3
4	As a percent of compensation	5.5	5.1	5.2	6.5	6.2	6.6	6.7
5	Property income of state & local DB pension funds[2]	85.1	70.6	69.6	77.5	82.1	87.4	95.5
6	Personal saving (2.1, 33)	168.5	132.3	184.7	174.9	181.7	32.5	70.7
7	As a percent of personal income	2.0	1.5	2.1	1.9	1.9	0.3	0.6
	Using ABO approach with 6% discount rate							
8	Personal income	8,480.3	8,808.0	8,977.6	9,249.5	9,822.1	10,366.8	11,099.1
9	Compensation, state & local government	732.3	783.9	831.4	866.4	905.9	944.9	990.7
10	Employer's normal cost, state & local DB plans	55.0	60.8	64.2	65.9	67.6	69.8	76.4
11	As a percent of compensation	7.5	7.8	7.7	7.6	7.5	7.4	7.7
12	Imputed interest on actuarial liability of state & local DB plans	120.3	132.5	142.8	153.5	164.8	176.4	189.6
13	Personal saving	219.1	216.2	280.4	260.8	276.6	129.5	175.9
14	As a percent of personal income	2.6	2.5	3.1	2.8	2.8	1.2	1.6
	Difference							
15	Personal income	50.6	83.9	95.7	85.9	94.9	97.0	105.2
16	Compensation, state & local government	15.4	22.0	22.5	9.9	12.1	8.0	11.1
17	Employer contributions to pension funds, state & local govt	15.4	22.0	22.5	9.9	12.1	8.0	11.1
18	Property income of state & local DB pension funds	35.2	61.9	73.2	76.0	82.7	89.0	94.1
19	Personal saving	50.6	83.9	95.7	85.9	94.9	97.0	105.2
	Percent difference							
20	Personal income	0.60	0.96	1.08	0.94	0.98	0.94	0.96
21	Compensation, state & local government	2.14	2.89	2.78	1.15	1.36	0.85	1.13
22	Employer contributions to pension funds, state & local govt	38.76	56.83	53.75	17.59	21.86	12.92	17.00
23	Property income of state & local DB pension Funds	41.38	87.62	105.13	98.17	100.77	101.84	98.55
24	Personal saving	30.01	63.42	51.80	49.11	52.20	298.38	148.80

Notes:

[1]NIPA Table and line numbers are in parentheses.

[2]Property income is dividends, interest, and rent. This is an unpublished estimate.

Table 13. Effect of actuarial accounting for pensions on personal income by state: ABO approach with 6% discount rate
For the year ending on December 31
Percent of personal income

State	2000	2001	2002	2003	2004	2005	2006
Alabama	0.4	0.7	0.8	0.8	0.9	0.8	0.8
Alaska	1.1	1.8	1.9	1.7	1.6	1.0	0.5
Arizona	1.1	1.3	1.5	1.5	1.4	1.3	1.3
Arkansas	0.3	0.5	0.7	0.7	0.6	0.3	0.3
California	0.9	1.3	1.6	1.4	1.3	1.2	1.2
Colorado	0.6	1.0	1.2	1.3	1.4	1.2	1.2
Connecticut	0.6	0.7	0.9	0.9	0.9	0.8	0.7
Delaware	0.4	0.8	0.8	0.7	0.7	0.7	0.7
D.C.	0.3	0.6	0.7	0.6	0.5	0.4	0.4
Florida	0.4	0.8	0.9	0.8	0.7	0.7	0.7
Georgia	0.5	0.8	1.1	1.1	1.0	0.8	0.8
Hawaii	1.0	1.1	1.0	0.9	0.8	0.6	0.6
Idaho	0.7	0.8	0.8	0.8	0.8	0.8	0.8
Illinois	0.9	1.2	1.4	-0.2	0.9	1.8	1.9
Indiana	-0.2	0.0	0.1	-0.4	0.2	0.2	0.2
Iowa	0.3	0.6	0.7	0.7	0.7	0.7	0.8
Kansas	0.3	0.5	0.6	-0.1	0.4	0.6	0.6
Kentucky	0.5	1.0	1.2	1.2	1.2	1.1	1.0
Louisiana	0.8	1.0	1.1	1.0	1.0	0.9	0.8
Maine	0.6	0.5	0.7	0.9	1.1	1.0	1.0
Maryland	0.3	0.6	0.6	0.6	0.6	0.6	0.7
Massachusetts	0.4	0.8	1.0	1.1	1.2	1.0	1.0
Michigan	0.6	0.8	1.0	1.0	0.9	0.7	0.8
Minnesota	-0.9	-0.3	-0.2	-0.3	-0.2	-0.2	-0.2
Mississippi	0.4	0.7	0.9	0.9	0.9	0.8	0.8
Missouri	1.0	1.4	1.5	1.7	1.7	1.7	1.8
Montana	-0.1	0.3	0.5	0.3	0.5	0.4	0.4
Nebraska	-0.4	-0.1	0.2	0.2	0.2	0.2	0.2
Nevada	0.1	0.6	0.8	0.7	0.7	0.8	0.9
New Hampshire	0.2	0.3	0.4	0.4	0.5	0.5	0.5
New Jersey	1.8	2.0	2.2	2.2	2.2	2.3	2.3
New Mexico	0.7	1.1	1.3	1.4	1.5	1.5	1.7
New York	1.6	2.0	2.0	1.9	1.6	1.3	1.3
North Carolina	-0.6	0.1	0.2	0.0	0.2	0.2	0.1
North Dakota	0.1	0.3	0.4	0.5	0.5	0.4	0.5
Ohio	0.0	0.4	0.4	0.4	0.6	0.6	0.6
Oklahoma	0.1	0.4	0.5	0.5	0.6	0.5	0.5
Oregon	-0.3	0.0	-1.3	-1.7	-1.0	0.3	0.3
Pennsylvania	0.8	1.3	1.4	1.3	1.4	1.3	1.3
Rhode Island	0.4	0.7	0.8	0.6	0.7	0.7	0.7
South Carolina	-0.4	0.0	0.1	0.2	0.2	0.2	0.3
South Dakota	0.4	0.6	0.6	0.6	0.6	0.6	0.7
Tennessee	0.4	0.7	0.7	0.7	0.6	0.5	0.5
Texas	0.2	0.6	0.6	0.6	0.5	0.4	0.4
Utah	0.6	1.0	1.3	1.0	1.3	1.2	1.2
Vermont	0.8	0.9	0.9	0.8	0.8	0.7	0.8
Virginia	0.5	0.8	0.9	0.9	0.9	0.7	0.8
Washington	1.4	1.6	1.8	1.7	1.6	1.6	1.5
West Virginia	-0.4	-0.2	-0.1	-0.1	-0.3	-0.7	-0.7
Wisconsin	0.8	1.3	1.3	1.2	1.7	1.5	1.4
Wyoming	0.1	0.7	0.8	0.8	0.9	0.5	0.5
All states plus D.C.	0.6	1.0	1.1	0.9	1.0	0.9	1.0