Compensating Wage Differentials and the Impact of Health Insurance in the Public Sector on Wages and Salary

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In July 2012, the State Budget Crisis Task Force, led by former New York Lieutenant Governor Richard Ravitch and former Federal Reserve Board Chair Paul Volcker, released a report that examined the major threats to states' fiscal sustainability in the aftermath of the 2008 financial collapse. State and local expenditures on Medicaid and health care compensation for current employees and retirees were identified as the leading causes of long-term fiscal imbalances for state and local governments (State Budget Crisis Task Force 2012). In an estimate provided by the United States Government Accountability Office (GAO) in April 2012, health-related costs for state and local governments will be around 3.9 percent of GDP in 2012 and 7.1 percent of GDP in 2060 . In contrast, the sector's non-health-related costs—such as the wages and salaries of state and local employees—were projected to decline as a percentage of GDP, from about 10.4 percent of GDP in 2012, to 7.8 percent of GDP in 2060 (GAO 2012) .

This paper explores how the expanding share of health-related costs in state budgets affects state public sector wages and employment. We explore the variation in health care spending at the state level and examine its impact on the wages and hours of state and local government employees using individual-level micro data. We also analyze the impact of the large, and to-date mostly unaccounted for state expenses on retiree health benefits, on the wages of current state government employees.

In total, state and local governments reported an annual spending of $2.5 trillion in 2009 and employ over 19 million workers, or 15 percent of the national work force and 6 times as many employees as the federal government. These workers include state and local government administrators, but also teachers, police officers and hospital employees. At the same time, almost all states have balanced operating budget requirements, which restrict borrowing across fiscal years. Furthermore, the structural imbalance in state

budgets is exacerbated by the financial collapse of 2008; only recently, in the third quarter of 2011, have state and local government total tax receipts returned to pre-recession levels of 2007 (State Budget Crisis Task Force 2012).

Compared to their counterparts in the private sector, most public sector employees have employer-provided health insurance, enjoy lower deductibles and pay a much smaller share of the higher premium as a result of the lower deductibles (Clark et al., 2012). State governments also offer generous health benefits to retired public sector employees, in addition to defined benefit pension plans, which are rapidly disappearing in the private sector.

The theory of compensating wage differentials predicts that holding human capital and other variables influencing wages constant, individuals receiving higher fringe benefits are paid a lower wage than those receiving lower fringe benefits (Rosen 1986). Therefore, as the cost of health insurance rises, employers that provide its workers with health insurance will lower wages, in order to keep total compensation the same (Summers 1989). If employees value employer-provided health insurance at its full cost and are willing to accept a wage offset at the full cost of the benefit, then employment will be unchanged as in equilibrium. However, other complications are raised by the literature given health insurance's status as a fixed cost per worker and wages as marginal cost per hour worked. Specifically, an increase in fixed costs relative to marginal costs has led firms to substitute longer work weeks per employee for additional number of workers (Cutler and Madrian 1998).

The paper proceeds as follows. Section I presents previous evidence on labor market responses to health insurance coverage and increasing health care spending. Section II describes the individual and state-level data we use. Section III contains the econometric methodology used to estimate the compensating wage differentials and changes in hours

worked. Section IV presents the results, and in Section V, we discuss the policy implications given the empirical findings. The last section concludes.

I. Evidence on Labor Market Responses to Increasing Health Insurance Costs

A standard compensating wage differential framework would involve regressing wages on the availability or cost of employer-provided health insurance, with an expected negative coefficient on the health insurance variable. However, as Currie and Madrian (1999) put it, most estimates of the average market value of employer-provided health insurance are either positive (wrong-signed), insignificant, or both. The challenge lies in eliminating omitted variable bias where unobserved human capital variables are often correlated with employer-provided health insurance status (i.e., more capable workers are more likely to receive employer-provided health insurance and higher wages).

Of the recent papers that examine the relationship between wages and having health insurance, there is variation in the estimated value of health insurance as a percentage of wage compensation depending on sample selection and the estimation techniques used. For example, taking advantage of the rotating panel design of the Consumer Expenditure Survey (CEX) to track workers who changed health insurance status between the 2nd and 5th interviews, Miller (2004) used person fixed effects and found that having health insurance led to a 10-11% wage reduction among prime-aged male workers. Using husband's firm size and union membership as instruments for wife's health insurance coverage, Olson (2002) found that health insurance was valued at 20% of overall wage s among employed married women.

Studies that estimate the wage offset as a function of employer spending on health insurance report full or nearly full cost shifting to wages (Eberts and Stone 1985, Gruber

and Krueger 1991, Lubotsky and Olson 2010). There is also evidence of group-specific cost shifting—i.e., relatively slower wage increases for particularly expensive groups such as older workers, workers with family insurance coverage and women of child-bearing age (Sheiner 1995; Gruber 1994).

The implication that full cost shifting of employer health insurance payment to employee wages should have no effect on the equilibrium level of labor utilization is empirically confirmed by several studies (e.g., Gruber and Krueger 1991; Gruber 1994). However, despite the lack of overall change in labor input, the rise in health insurance costs has led to changes in the compositional mix of labor utilization—specifically, employers are responding to the rise in fixed employment costs by increasing hours per insured worker and decreasing employment (Cutler and Madrian 1998; Gruber 1994). There is somewhat mixed evidence on whether employers are expanding the share of the workforce that is ineligible for benefits (Montgomery and Cosgrove 1993; Buchmueller 1999).

However, there are several important issues unaddressed in the current literature. First, most of the findings on compensating wage differentials and hours do not distinguish between public and private sector workers, or are solely based on private sector industries. Cutler and Madrian (1998)'s finding that hours rose the most in industries with the fastest growth rates of health care costs excludes public sector employees. To the extent that health care compensation for its employees is threatening the fiscal sustainability of state governments, it becomes important to gather evidence on the response of public sector wages and hours to the rising health care costs.

Second, most estimates of health insurance-wage trade-off such as those in Miller (2004) and Olson (2002) use a single dummy variable for health insurance status, mostly due to data limitations. However, this covers up important distinctions, such as the employee's eligibility for health insurance despite his coverage status and the relative

contributions to the health insurance premium made by the employer/employee. The CPS individual health insurance data we use partially solves this problem, in that we include a categorical variable on the extent of the employer's contribution (none, partial or all).

Third, the wage and employment effects of state governments' staggering expenses on retiree health insurance have largely gone unexplored in the literature. Once having met some minimum years of service requirement, most full-time state and local government workers are eligible for employer-provided retiree health benefits (Clark and Morrill 2010). Under the Governmental Accounting Standards Board (GASB) Statement No.45 approved in 2004, states were mandated to report liabilities associated with retiree health benefits, or the present value of states' promise to contribute toward health insurance of all current and future retirees. Authors of several studies have expressed concerns about the large and growing size of total unfunded liabilities associated with state retiree health plans, where estimates ranged from $500 billion to $1.5 trillion (Pew Center on the States, 2007, 2010; Zion and Varshney, 2007; Standard & Poor's, 2007; Goldman Sachs, 2007). The substantial differences in plan characteristics and funding status of retiree health plans across states will allow us to exploit this variation and assess the impact of retiree health plans on state wages.

Lastly, the time period covered by our data, 1992-2011 is much more current than those used in previous estimates of labor market responses to rising health insurance costs, in which the most recent data comes from 1993.

II. Data & Summary Statistics

A. *Individual-Level Wages and Hours Data*

We linked person records from the 1992-2011 March Current Population Surveys (CPS), which contain demographic and health insurance data, with those in the Merged

Outgoing Rotation Groups (MORG) which report wages and earnings of household members. The March CPSs distinguish the class of worker by reporting whether the individual is employed by the private sector, the public sector (federal, state or local government) or is self-employed. The data set also indicates whether an individual is the policy holder for employer-provided health insurance. Additional information on health insurance includes a categorical variable for whether an employer paid for all, part or none of the health insurance premium.

Cross sections from the years 1992-2011 were then pooled together and following Cutler and Madrian (1998), analysis was restricted to prime-aged males between the ages of 25-54 employed in state or local governments. The focus on the labor market outcomes of men reflects the concern that the availability of public insurance such as Medicaid to women of child-bearing age and the potentially different labor market responses to health benefits by men and women could influence results. The age restrictions serve to eliminate changes in labor force participation due to school or retirement.

The advantage of using earnings data from MORG, instead of the March CPSs is that the March earnings data covers the previous calendar year rather than the time of the survey. Following Cutler and Madrian (1998), we restrict the sample to employees who worked 40 or more weeks since part-year workers, even if they work full-time when employed, are exempt from IRS non-discrimination rules that require firms to offer health insurance to all full-time workers if it is offered at all. This restriction eliminated 7.11% of the sample of state and local government workers or 3063 individuals, who worked less than 40 weeks per year. Hourly wages are measured by dividing earnings per week by the usual hours worked per week at the employee's main job. Individuals with earnings below $4.05 per hour in 1992 dollars (approximately the minimum wage during the period; 391

individuals, or 0.98% of the public sector sample) or above $42 per hour in 1992 dollars (roughly the lowest top-coding levels for earnings per week over the entire period; 2301 individuals, or 5.8% of the sample) are excluded.

Table 1 presents the summary statistics for the merged CPS data set. On average, state and local government employees worked 41.6 hours per week, and were compensated with an hourly wage of $15.03 ($1992) per hour during 1992-2011. 87% were policy holders for employer-provided health insurance, and the majority (56%) of them held a college degree or higher.

B. *State Retiree Health Benefits Data*

We use the most recent data as of spring 2012 on the funding status of state retiree health plans released by the Pew Center on the States using states' Comprehensive Annual Financial Reports (CAFR). Unfortunately there are no longitudinal data available—states have only recently started estimating and disclosing the financial liabilities associated with state retiree health plans under the GASB government mandate, and year-to-year changes often reflect changing actuarial practices rather than actual changes in underlying liabilities.

We define *Percent Funded* as the actuarial value of assets (AVA) that states have set aside to cover the future costs of retiree health benefits divided by total actuarial accrued liability (AAL), which refers to the present value of retiree health benefits that state government employees have earned in prior years and until the current time. *Percent Contributed* is defined as states' actual contribution toward retiree health benefits in 2010 divided by the annual required contribution (ARC), which represents the amount state governments should make to cover the given fiscal year's retiree health benefit expenses,

plus the amount needed to amortize any existing unfunded liability (UAAL) over a 30-year period. Appendix Table 1A reports the above actuarial estimates for all individual states minus Nebraska which does not report liabilities associated with retiree health benefits

C. *State-level Per Capita Personal Health Care Spending*

Per capita personal health care spending data by state of residence is available from the National Health Expenditures Data provided by the Center for Medicaid & Medicare Services (CMS). Personal health care spending includes the total amount spent on the treatment of specific medical conditions, but excludes administrative costs, net cost of health insurance provision, government public health activity, non-commercial research, and investment in structures and equipment (Cuckler et al., 2011). To produce per capita personal health care spending by state of residence, the CMS Office of the Actuary adjusts health spending estimates by state of provider to account for individuals traveling across states for health care services.

III. Econometric Methodology

A. *Relationship between Increasing Health Care Costs, and Wages and Hours*

a. Basic Model

The basic model follows the linear time trend model set forth by Cutler and Madrian (1998) and includes both hourly wages and hours worked per week as the outcome variables. In the following individual wage/hour determination equation:

$$Ln(\text{hourly wage}) \text{ or } \text{Hours Worked} = \beta_0 + \beta_1 * H_1 + \beta_2 * \text{Year} + \beta_3 * (HI * \text{Time}) + Z'\gamma + \varepsilon \quad (1)$$

The dummy variable *HI* indicates whether the employee is the policy holder for employer-provided health insurance. *Year* is a vector of year dummy variables. *Time* is a linear time trend. *Z* includes a set of demographic and job characteristics that influence

individual wages or labor supply, such as age, age squared, marital status, education level (dummy variables for less than high school, high school degree, some college and a college degree or beyond), state of residence and CPS industry and occupation codes. To reflect the increasing returns to education, we also include interaction variables of education dummies with a linear time trend (Katz and Murphy 1992).

The coefficient of interest, β_3, captures the effect over time of having employer-provided health insurance on wages and hours worked relative to workers without health insurance. According to the theory of compensating wage differentials, with hourly wage as the outcome variable, we would expect β_3 to be negative as the cost of fringe benefits rose. On the other hand, based on findings of the use of overtime labor, we would expect β_3 to be positive to reflect lengthened work weeks for those with health insurance.

It is worth noting that the estimation strategy will only be valid if employees with and without employer-provided health insurance would have similar trends in wages and hours conditional on demographic characteristics, in the absence of health insurance. In other words, the differences between the two groups are assumed to be the same over time. We compare public sector employees by their health insurance status. The trends in education achievement, age, marital status and union membership between the two groups with different health insurance statuses are similar. In terms of workforce educational trends, the share of workers without a high school degree declined in both groups with and without employer-provided health insurance, while the percentage of college graduates in the work force increased substantially. Older workers, ages 45-54, comprised a larger share

of the work force with and without employer-provided health insurance in 2011 than in 1992[1].

b. Employer Contribution toward Health Insurance

Aside from a dummy variable indicating whether an employee is the policy holder for employer-provided health insurance, the March CPSs also contain a categorical variable for whether the employer paid all, part or none of the health insurance premium. Therefore, we include dummy variables for zero, partial or full payment and interact them with a linear time trend, as in the slightly modified model below:

$$Ln(\text{hourly wage}) \text{ or } \text{Hours Worked} = \beta_0 + \beta_1 * Paid\_Part + \beta_2 * Paid\_All + \beta_3 * Year + \boldsymbol{\beta_4} * (Time * Paid\_Part) + \boldsymbol{\beta_5} * (Time * Paid\_All) + Z'\gamma + \varepsilon \quad (2)$$

The sample is now restricted to public sector employees with employer-provided health insurance, and we explore the variation in hourly wages and hours worked by differences in employer payment status. The omitted group includes employees for whom employers contributed none of the health insurance costs. All control variables including demographic and job characteristics, as well as state fixed effects, remain the same as in equation (1).

c. Incorporating State-Level Per Capita Personal Health Care Spending

1 An additional concern is that those with and without employer-provided health insurance in the public sector may belong to different sectors and thus bias the results due to threats to the identification strategy in equation (1). However, after examining the industry codes for those without health insurance, the four largest categories, construction (5.64%), elementary and secondary schools (24.91%), college and universities (14.89%), and justice, public order and safety activities (19.31%), are similarly represented among workers with employer-provided health insurance—with 6.87% for construction, 22.63% for elementary and secondary schools, 10.03% for colleges and universities, and 27.56% for justice, public order and safety activities.

To ascertain that the increase in health care spending over time is driving the effect of health insurance coverage on the wages and hours of public sector employees, we incorporate state-level health care spending data and estimate the dollar-to-dollar trade-off between health care spending and real wages.

We substitute annual earnings, computed as weekly earnings times number of weeks worked per year, for log (hourly wage) as the outcome variable, and alter equation (1) to include state-level per capita personal health care spending (PCPHCS) on the right hand side:

$$Annual\ Earnings=\beta_o+\beta_1*HI+\beta_2*PCPHCS+\boldsymbol{\beta_3}*(HI*PCPHCS)+\beta_4*Year+Z'\gamma+\varepsilon \quad (3a)$$

The coefficient of interest β_3 captures the effect of a dollar increase in state health care spending on the annual earnings of employees with employer-provided health insurance coverage. β_2 measures the effect of a dollar increase in state personal health care spending on the wages of public employees without employer-provided health insurance. All demographic and job-specific controls, as well as state fixed effects, are the same as in equation (1).

I also include hours worked as the outcome variable, and estimate the trade-off between percentage increase in state-level health care spending and changes in usual hours worked per week.

$$Hours\ Worked=\beta_o+\beta_1*HI+\beta_2*Log\ (PCPHCS)+\boldsymbol{\beta_3}*(HI*Log(PCPHCS))+\beta_4*Year+Z'\gamma+\varepsilon \quad (3b)$$

The coefficient of interest $\boldsymbol{\beta_3}$ captures the effect of a percentage increase in per capita personal health care spending on the usual hours worked per week of public sector employees with employer-provided health insurance.

B. *Relationship between Retiree Health Benefits and Wages of State Government Employees*

The March CPS's do not provide the amount of retiree health benefits earned by state employees each year. We use state-level variation in state governments' provision of retiree health benefits to assess the effect on public sector wages. State retiree health plans

differ in minimum years of service requirements, eligibility ages, and the continued provision of benefits beyond age 65 when individuals become eligible for Medicare. There also exist large variations in the amount of benefits accrued and the extent of employer contribution. For instance, some state governments like Alaska and California choose to pay the entirety of the retiree health insurance premium, while others such as Idaho and Indiana simply allow retirees access to government-purchased health plans. All of these factors can affect employer's net retiree health insurance costs, and therefore can impact wages.

However, aside from plan eligibility and generosity characteristics, that the degree of underfunding of state retiree health insurance systems can also influence wages is less obvious. To the extent that such underfunding is "permanent" and reduces the probability that promised retiree health benefits will be fully paid rather than simply reflecting an intertemporal transfer of health insurance costs, then states with more fully funded systems would pay lower wages (Ehrenberg 1980).

There are two measures of the funding status of state retiree health insurance systems. *Percent Funded* is the ratio of state assets to total retiree health insurance liability. *Percent Contributed* is the ratio of states' actual contribution to retiree health plans in 2010 to the annual required contribution (ARC) in 2010. We argue that *Percent Funded* provides a better estimate of permanent funding status as it reflects the amount of cash or investments states have set aside for the long-term provision of retiree health insurance. *Percent Contributed*, on the other side, describes only state contribution in 2010 including in many pay-as-you-go systems and the amount of contribution can vary year to year depending on the state's economic conditions. In this case, 2010 is during the middle of the

recession and since states were affected differentially, actual contributions in 2010 may not accurately reflect retiree health system's funding status.

We estimate the impact of state retiree health insurance system characteristics on average state government employee wages between 2007 and 2010, using the following specification:

Log (Hourly Wage)= $\beta_o+\beta_1*Log(Contribution\ Per\ Capita)+ \beta_2* (Percent\ Funded) + \beta_3* (1\text{-}49\%))+ \beta_4* (50\text{-}99\%) + \beta_5* (100\%) + Z'\gamma+\varepsilon$ (4)

We divide states' latest actual contribution to retiree health benefits by the number of full-time state government employees in to get an estimate of the generosity of state retiree health plans as measured by realized benefits in 2010. We further include *Percent Funded* as a measure of the system's permanent funding status. Last, we incorporate dummy variables for whether state governments pay none, 1-49%, 50-99% or all of the premiums associated with retiree health insurance, with zero payment as the control group. *Z* is the same set of individual and job specific characteristics influencing employee wages as that included in equation (1).

IV. Results

A. *Trends in Health Care Costs, Wages, and Hours of Work*

Figure 1 shows the trend in the national average of real ($1992) per capita personal health care spending from 1992 to 2011. Health care cost steadily increased over this period, with faster rate of growth since 2001. In 1992, the average per capita personal health care spending was about $2850; by 2009, the real spending has risen to about $4450, with a percentage increase of over 150%.

Figure 2 documents the trends in real hourly wages for public sector employees according to their employer-provided health insurance status. Real hourly wages increased by $1.40 between 1992 and 2011 for public sector employees without health insurance, and $0.58 for those with employer-provided coverage. While the steeper slopes seem to suggest faster rates of wage increase for employees without employer-provided health

insurance relative to those who receive such benefits, it is uncertain whether the different growth rates are due to rising health insurance spending and significant cost-shifting to wages. The overall trends do not take into account economic conditions, such as the recession in 2009 or demographic changes that could affect both health insurance coverage and wages.

Figure 3 presents the trends in hours worked for public sector employees by health insurance status. In contrast to the increase in weekly hours for employees with health insurance between 1979 and 1992 as documented in Cutler and Madrian (1998), usual hours worked per week fell for both groups in the public sector between 1992 and 2011.

B. *Relationship between Health Insurance Coverage and Health Care Costs, and Wages*

The results from estimating equation (1) are shown in the first column of Table 2. The relationship over time of having employer-provided health insurance on public sector wages is given by the coefficient on the key variable of interest, Time*Health Insurance, which is negative and highly statistically significant. Having health insurance in the public sector is associated with a 0.40% decline in wages per year, which, over the 20-year period between 1992 and 2011, is an 8% decrease. The demographic controls enter in the expected direction. Older, married, and better educated workers are more likely to have both higher wages and longer work weeks. Given the increase in public employers' spending on employee health insurance between 1992 and 2011[2], which is around $1970.76 in 1992 dollars, and the average annual salary of workers without health insurance in 1992, the cumulative estimate of 8% implies an employer health insurance

2 Calculated as the difference in average annual employer contribution toward health insurance for employees with employer-provided health insurance between 1992 and 2011, as reported on the March CPS

spending-wage trade-off of 97.8% in the public sector. The rough estimates are consistent with significant cost-shifting present in the public sector, and high growth rates in employer spending on health insurance.

Now we look at only those with public employer-provided health insurance, and examine the effect on wages based on employer contribution status. The results from estimating equation (2) are presented in the second column of Table 2. The relationship over time on public sector wages of having fully-paid employer-provided health insurance is -0.69% per year, and the coefficient is statistically significant. Therefore, during 1992-2011, wages declined by 13.8% for public sector employees with fully-paid health insurance relative to those whose employers did not contribute toward the cost of health insurance. This effect is larger than the estimate derived from having a single dummy for health insurance status. Having partially-paid health insurance leads to a smaller decrease in public sector wages per year, compared to having fully-paid coverage, at -0.51% per year or 10.2% cumulatively. However, this effect is not statistically significant.

The last column of Table 2 presents the dollar-dollar trade-off between health insurance spending and public sector wages. The coefficient on HI*PCPHCS in the public sector is -0.489, implying that a dollar increase in per capita health care spending leads to a 49 cents reduction in employee wages. However, the estimate of the health care cost-wage trade-off in the public sector is not significant at the 10% level. The 95% confidence interval for the estimate ranges from -1.37 to 0.39. It is important to note that state per capita personal health care spending includes spending from both privately-insured and publicly-insured populations. Since Medicaid and Medicare enrollees report both higher growth rates and higher levels of health care spending than privately-insured populations, there will be measurement error in the variable and as a result the estimated health care

spending-wage trade-off may be biased toward zero, given actual lower growth rates of spending among prime-aged males in the sample. Thus, the true effect may be closer to -1.

The potential endogeneity between state-level health care spending and state wages can also make our estimates of the degree of wage offset biased. For example, increases in the compensation for medical personnel within a state can drive up health care spending and included in our sample for measuring employee wages are these same health and hospital workers. Appendix Table 3 presents the results for regressions in Table 2 excluding state and local health and hospital workers. The coefficients are similar to those obtained using a full sample of state and local government employees. Following equation (1), having health insurance is associated with a 0.4% wage offset per year, or 8% during 1992-2011.

There is a greater degree of wage offset by employer contribution status once we exclude health personnel. Relative to those whose employers did not contribute toward their health insurance premium, those with partially-funded health insurance experience a 0.7% wage offset per year (or 14% between 1992-2011), and those with fully-funded health insurance receive a 0.9% wage reduction per year (18% between 1992-2011). The coefficient on HI*PCPHCS is -0.592, indicating greater extent of wage offset per dollar personal health care spending in comparison to the full sample of state and local government workers. However, this coefficient is not statistically significant.

C. *Relationship between Health Insurance Coverage and Health Care Spending, and Hours*

The results from estimating equation (1), with hours worked as the outcome variable are presented in the first column of Table 3. The coefficient on Time*Health Insurance suggests that on average hours declined by 0.04 hours per week per year for each public sector employees with health insurance relative to those without; however, this estimate isn't significant at conventional levels.

The second column of Table 3 presents the results from estimating the effect of employer's contribution toward health insurance on hours worked. Having partially-paid coverage is associated with a 0.04 hour decline in the length of the work week per year in the public sector, relative to the control group with zero employer contribution. The coefficient, although not statistically significant implies a shortened work week by 0.8 hour over the time period 1992-2011. The corresponding estimate of the effect over time on hours of having fully-paid health insurance is equal to -0.07 and sums to a 1.4 hour decline during 1992-2011 relative to those with zero employer contribution to health insurance premium. These public sector findings are in contrast to the economic intuition and empirical findings presented by Cutler and Madrian (1998) that as fixed employment costs rise, the hours of employees should increase in substitution for additional workers hired.

The last column of Table 3 presents the estimates from equation (4), on the trade-off between percentage increase in health care spending and changes in hours worked. The coefficient on HI*Log(PCPHCS) is -3.200 for public sector employees, implying a 0.03 hour decrease in the length of the work week for employees with health insurance coverage for every percentage increase in per capita personal health care spending. The effect is statistically significant at the 1% level. Whereas Cutler & Madrian (1997) found that the increase in hours for insured workers was primarily a result of full-time workers shifting into over-time, public sector employers may be unable to increase the hours of full-time, insured employees due to the high price of over-time labor among unionized employees. Studies using CPS have shown that union coverage substantially increases the likelihood of receiving premium pay for over-time employment (Ehrenberg & Schumann 1982; Trejo 1993). Facing high rates of unionization among insured employees and rising costs of

health insurance provision, public sector employers, therefore, may be enticed to expand the share of hours worked by employees not receiving health insurance, who were more likely to be part-time or non-unionized.[3]

Another important consideration is change in the composition of workers receiving employer-provided health insurance between 1992 and 2011. For instance, a decline in health insurance coverage over time for those with fewer hours of work relative to those who work more will bias the estimate of health insurance on hours worked upwards. As the pool of insured workers becomes increasingly populated by workers with longer work weeks, it will seem that hours of work are increasing over time among those with health insurance (Cutler and Madrian 1998). Figure 4 presents how the share of employees covered by employer-provided health insurance changes over time in the public and private sectors. Comparatively, the overall coverage rate has changed little in the public sector since 1992, and stayed at around 87% with a dip in the last three years. Therefore, compositional bias is less likely to be a problem in the public sector.

D. *Relationship between State Retiree Health Benefits and Public Sector Wages*

Table 4 presents the results from estimating equation (4). The coefficient on Log (State Contribution Per Employee) is positive: a 1% increase in retiree health benefits contribution per employee is associated with a 0.06% rise in hourly wages, and this effect is statistically significant. While the positive relationship between realized retiree health benefits and current wages departs from the prediction given by the theory of compensating wage differentials, the variable, contribution per employee, may be picking up the effects of other omitted variables that are positively correlated with state government employee wages. For instance, states with a higher quality work force may

3 The average rate of union coverage and part-time status between 1992 and 2011 are 32.1% and 11.1% for public sector employeess without employer-provided health insurance, and 46.6% and 1.6% for those with employer-provided health insurance.

earn higher wages and higher retiree benefits. Since we do not have longitudinal data available for retiree health variables, the cross-section regression is prune to omitted variable bias.

However, holding contribution per employee and other retirement system characteristics constant, a more fully funded retiree health insurance system is associated with lower wages. A one percentage point increase in *Percent Funded*—a measure of a state's retiree health benefits' permanent funding status—is associated with a 0.2% decline in hourly wages. Thus, a difference of 50 percentage points in funding status (between the lowest percent funded state and the second highest, Alaska, at 50%) would generate a wage offset of 10% holding other state and individual characteristics constant.

Relative to employees of state governments that do not contribute to retiree health insurance premium at all, those whose employers pay 1-49% of the premium paradoxically gain about 9.9% of hourly wages relative to the control group ($p<0.05$). However, workers whose employers pay 50-99% of the premium experience a 3.5% wage decline relative to those whose employers do not contribute. However, this effect is not statistically significant. Employees with fully-paid retiree health insurance experience a 6.2% wage decrease relative to the control group ($p<0.05$). The lifetime present value of health insurance coverage at retirement fully paid by one's employer is quantified to worth over $200,000 (Fidelity Investments, 2009). Therefore, a 6.6% wage offset between employees paying the entire premium and employees paying none is a reasonable estimate.

V. Conclusion

This paper has analyzed the impact on the wages and hours of public sector employees due to the rise in health insurance spending. The results suggest a substantial portion of the increase in employer's cost of providing health insurance has been shifted to

employees in the form of lower wages. During 1992-2011, public sector wages for those with employer-provided health insurance declined by about 8% relative to those without health insurance. The impact on hours worked is less clear.

The paper also presented preliminary evidence that holding other aspects of retiree health benefits constant, more fully funded state retiree health insurance systems lead to lower wages of current state employees. The identification of possible exogenous variation in state retiree health benefits uncorrelated with wages would further enrich our understanding of the wage trade-offs associated with retiree health insurance.

Figure 1. Trend in Per Capita Personal Health Care Spending

Source: National Health Expenditure Accounts, Center for Medicaid & Medicare Services, 2011.

Figure 2. Trends in Hourly Wages

Source: 1992-2011 March Current Population Survey (CPS) and Merged Outgoing Rotation Groups (MORG), available through the National Bureau of Economic Research.

Figure 3. Trends in Hours Worked

Source: 1992-2011 March Current Population Survey (CPS) and Merged Outgoing Rotation Groups (MORG), available through the National Bureau of Economic Research.

Figure 4. Share of Workers with Employer-Provided Health Insurance

Source: 1992-2011 March Current Population Survey (CPS) and Merged Outgoing Rotation Groups (MORG), available through the National Bureau of Economic Research.

Table 1. Sample Means

Variable	Public Sector
Hours per week	41.6
	(7.3)
Hourly wage ($1992)	$15.03
	($6.68)
Policy holder for employer-provided health insurance	0.87
	(0.34)
Age	40.8
	(8.1)
Married	0.72
	(0.45)
Less than high school	0.03
	(0.17)
High school graduate	0.23
	(0.42)
Some college	0.18
	(0.38)
College graduate	0.56
	(0.50)

Data source: 1992-2011 March Current Population Survey (CPS) and Merged Outgoing Rotation Groups (MORG). Sample includes men aged 25-54, with a real ($1992) hourly wage between $4.05 and $42, who were not self-employed and who worked at least 40 weeks in the previous calendar year. Standard deviations are in parentheses.

Table 2. The Effect of Employer-Provided Health Insurance on Public Sector Wages

VARIABLES	Log (Hourly Wage)	Log (Hourly Wage)	Annual Earnings
Model	(1)	(2)	(3)
Health Insurance			
Health Insurance (HI)	0.200***	--	7,247***
	(0.0181)		(1,695)
Time*Health Insurance	-0.00395***	--	--
	(0.00135)		
Paid_Part	--	0.146***	--
		(0.0431)	
Paid_All	--	0.200***	--
		(0.0436)	
Time*Paid_Part	--	-0.00511	--
		(0.00336)	
Time*Paid_All	--	-0.00690**	--
		(0.00342)	
Per Capita Personal Health Care Spending (PCPHCS)	--	--	2.888*
			(1.543)
HI*PCPHCS	--	--	-0.489
			(0.436)
Demographics			
Age	0.0581***	0.0549***	1,843***
	(0.00318)	(0.00339)	(145.2)
Age^2	-0.00058***	-0.000545***	-18.27***
	(3.94e-05)	(4.20e-05)	(1.728)
Married	0.0681***	0.0625***	2,872***
	(0.00569)	(0.00600)	(229.1)
Less than high school	-0.464***	-0.485***	-12,677***
	(0.0304)	(0.0343)	(952.8)
High school graduate	-0.262***	-0.255***	-7,569***
	(0.0140)	(0.0147)	(398.0)
Some college	-0.133***	-0.114***	-4,052***
	(0.0147)	(0.0153)	(672.5)
Time*Less than high school	-0.00257	-0.000924	-78.92
	(0.00242)	(0.00282)	(51.54)
Time*High school graduate	-0.000823	-0.00110	-57.55**
	(0.00105)	(0.00112)	(24.70)
Time*Some college	-0.00114	-0.00197	-4.782
	(0.00116)	(0.00123)	(44.45)
Constant	1.287***	1.394***	-20,326***
	(0.0654)	(0.0794)	(3,148)

Observations	36,885	32,054	33,501
R-squared	0.212	0.195	0.218

Cluster standard errors, clustered at the state level are included in parentheses. Year and state fixed effects are included in all regressions. Sample is weighted to national totals.
*** p<0.01, ** p<0.05, * p<0.1

Table 3. The Effect of Employer-Provided Health Insurance on Hours Worked in the Public Sector

VARIABLES	Hours Worked	Hours Worked	Hours Worked
Model	(1)	(2)	(3)
Health Insurance			
Health Insurance (HI)	3.463***	--	29.15***
	(0.369)		(7.316)
Time*Health Insurance	-0.0413	--	--
	(0.0272)		
Paid_Part	--	1.018	--
		(0.862)	
Paid_All	--	1.282	--
		(0.872)	
Time*Paid_Part	--	-0.0413	--
		(0.0634)	
Time*Paid_All	--	-0.0684	--
		(0.0643)	
Per Capita Personal Health Care Spending (PCPHCS)	--	--	-0.572
			(1.310)
HI*PCPHCS	--	--	-3.200***
			(0.887)
Demographics			
Age	0.308***	0.140**	0.300***
	(0.0605)	(0.0628)	(0.0766)
Age^2	-0.00374***	-0.00183**	-0.00362***
	(0.000738)	(0.000763)	(0.000927)
Married	1.118***	0.777***	1.082***
	(0.0993)	(0.0994)	(0.116)
Less than high school	-1.450***	-1.820***	-1.574***
	(0.371)	(0.373)	(0.353)
High school graduate	-0.618***	-0.884***	-0.658***
	(0.218)	(0.223)	(0.204)
Some college	-0.514*	-0.611**	-0.580**
	(0.268)	(0.268)	(0.277)
Time*Less than high school	-0.00784	0.0223	0.00529
	(0.0299)	(0.0294)	(0.0341)
Time*High school graduate	-0.00501	0.00343	-0.00123
	(0.0163)	(0.0168)	(0.0183)
Time*Some college	0.0255	0.0324	0.0332
	(0.0205)	(0.0206)	(0.0242)

Constant	31.05***	37.38***	36.19***
	(1.289)	(1.532)	(10.85)
Observations	36,906	32,067	32,368
R-squared	0.043	0.025	0.043

Cluster standard errors, clustered at the state level are included in parentheses. Year and state fixed effects are included in all regressions. Sample is weighted to national totals.

*** p<0.01, ** p<0.05, * p<0.1

Table 4. The Effect of State Retiree Health Benefits on Public Sector Wages

VARIABLES	Log (Hourly Wage)
Retirement System Characteristics	
Log (Actual Contribution Per Employee)	0.0609***
	-0.00857
Percent Funded	-0.00294***
	-0.000835
1-49% employer contribution	0.0990**
	-0.0396
50-99% employer contribution	-0.0346
	-0.0286
100% employer contribution	-0.0618**
	-0.031
Demographics	0.0600***
Age	-0.0112
	-0.000598***
Age^2	-0.000138
	0.118***
Married	-0.0213
	-0.349***
Less than high school	-0.0702
	-0.205***
High school graduate	-0.029
	-0.144***
Some college	-0.0299
	-1.03e-05**
Constant	-4.49E-06
	-4.59e-05***
	-4.96E-06
Observations	1.429***
R-squared	-0.22

Cluster standard errors at the state level are included in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1A. Actuarial Estimates of State Retiree Health Benefits

State	Latest Valuation	Latest Assets	Latest Liability	Latest UAAL	Latest Percent Funded	Latest ARC	Latest Contri
Alabama	2010	$847,868	$15,746,241	$14,898,373	5.4%	$1,181,606	$4
Alaska	2010	$6,205,626	$12,419,995	$6,214,369	50.0%	$1,112,645	$8
Arizona	2010	$1,570,308	$2,284,190	$713,882	68.7%	$121,374	$1
Arkansas	2010	$0	$1,866,079	$1,866,079	0.0%	$193,770	$
California	2010	$82,600	$77,371,000	$77,288,400	0.1%	$5,922,899	$1,7
Colorado	2010	$302,279	$2,162,506	$1,860,227	14.0%	$112,951	$
Connecticut	2010	$0	$26,697,800	$26,697,800	0.0%	$2,267,058	$5
Delaware	2010	$104,000	$5,884,000	$5,780,000	1.8%	$498,300	$1
Florida	2010	$0	$4,545,845	$4,545,845	0.0%	$336,419	$1
Georgia	2010	$680,816	$19,804,096	$19,123,280	3.4%	$1,809,514	$4
Hawaii	2010	$0	$14,007,480	$14,007,480	0.0%	$887,064	$2
Idaho	2010	$19,159	$155,332	$136,173	12.3%	$14,916	$
Illinois	2010	$56,049	$43,949,729	$43,893,680	0.1%	$3,301,420	$1,5
Indiana	2010	$19,287	$402,466	$383,179	4.8%	$54,290	$
Iowa	2010	$0	$538,200	$538,200	0.0%	$56,844	$
Kansas	2010	$12,751	$562,152	$549,401	2.3%	$93,045	$
Kentucky	2010	$1,303,166	$8,754,555	$7,451,389	14.9%	$901,848	$3
Louisiana	2010	$0	$10,030,052	$10,030,052	0.0%	$915,712	$2
Maine	2010	$153,800	$2,625,963	$2,472,163	5.9%	$156,951	$
Maryland	2010	$183,388	$16,530,102	$16,346,714	1.1%	$1,230,052	$3
Massachusetts	2010	$350,500	$16,568,600	$16,218,100	2.1%	$1,163,000	$3
Michigan	2010	$1,014,900	$45,476,000	$44,461,100	2.2%	$3,914,806	$1,3
Minnesota	2010	$0	$1,172,129	$1,172,129	0.0%	$124,894	$
Mississippi	2010	$0	$727,711	$727,711	0.0%	$55,991	$
Missouri	2010	$110,366	$3,180,260	$3,069,894	3.5%	$268,307	$1
Montana	2010	$0	$540,894	$540,894	0.0%	$53,276	
Nebraska	None						
Nevada	2010	$29,895	$1,706,543	$1,676,648	1.8%	$220,709	$
New Hampshire	2010	$57,818	$3,291,683	$3,233,865	1.8%	$237,508	$
New Jersey	2010	$0	$71,371,700	$71,371,700	0.0%	$5,470,600	$1,5
New Mexico	2010	$176,923	$3,523,665	$3,346,742	5.0%	$298,000	$1
New York	2010	$0	$56,826,000	$56,826,000	0.0%	$3,367,000	$1,2
North Carolina	2010	$1,033,440	$33,993,147	$32,959,707	3.0%	$3,091,397	$8
North Dakota	2010	$48,700	$161,982	$113,282	30.1%	$14,493	
Ohio	2009	$14,004,288	$43,200,585	$29,196,297	32.4%	$2,484,569	$8
Oklahoma	2010	$0	$2,918	$2,918	0.0%	$160	
Oregon	2010	$238,000	$767,586	$529,586	31.0%	$48,524	$
Pennsylvania	2010	$205,321	$17,465,836	$17,260,515	1.2%	$1,206,184	$7
Rhode Island	2010	$0	$774,665	$774,665	0.0%	$55,785	$

Table 2A. Comparison of Men with and without Employer-Provided Health Insurance (EPHI)

	Public Sector				
	Without EPHI			With EI	
	1992	2011	Change	1992	20
Education					
Less Than High School	8.7%	3.8%	-4.9%	4.0%	1.
High School Graduate	26.1%	26.1%	0.0%	25.8%	19.
Some College	14.9%	14.6%	-0.3%	16.8%	17.
College Graduate	50.2%	55.5%	5.3%	53.4%	61.
Age Group					
25-34	40.6%	31.3%	-9.3%	27.2%	24.
35-44	35.7%	31.3%	-4.4%	42.0%	36.
45-54	23.7%	37.3%	13.6%	30.8%	39.
Married	70.1%	71.1%	1.0%	72.2%	71.
Union member	27.0%	29.6%	2.6%	49.3%	44.

Sample includes men ages 25-54 who are not self-employed.

Appendix Table 3. The Effect of Employer-Provided Health Insurance on Public Sector Wages, Excluding Health and Hospital Employees.

VARIABLES	Log (Hourly Wage)	Log (Hourly Wage)	Annual Earnings
Model	(1)	(2)	(3)
Health Insurance			
Health Insurance (HI)	0.200***	--	7,760***
	-0.0185		-1,392
Time*Health Insurance	-0.00389***	--	--
	-0.00137		
Paid_Part	--	0.166***	--
		-0.0439	
Paid_All	--	0.225***	--
		-0.0444	
Time*Paid_Part	--	-0.00719**	--
		-0.00342	
Time*Paid_All	--	-0.00931***	--
		-0.00348	
Per Capita Personal Health Care Spending (PCPHCS)	--	--	5.717***
			-0.432
HI*PCPHCS	--	--	-0.592
			-0.369
Demographics			
Age	0.0570***	0.0535***	1,822***
	-0.00323	-0.00344	-110.3
Age^2	-0.000571***	-0.000528***	-17.96***
	-4.01E-05	-4.26E-05	-1.385
Married	0.0648***	0.0595***	2,841***
	-0.00582	-0.00613	-196.5
Less than high school	-0.450***	-0.470***	-12,244***
	-0.0314	-0.0353	-787.5
High school graduate	-0.252***	-0.246***	-7,004***
	-0.0143	-0.015	-437.1
Some college	-0.115***	-0.0991***	-3,610***
	-0.015	-0.0156	-510
Time*Less than high school	-0.00315	-0.00153	-83.16
	-0.0025	-0.0029	-70.99
Time*High school graduate	-0.00122	-0.00154	-80.93**
	-0.00107	-0.00114	-36.53

Time*Some college	-0.00203*	-0.00269**	-22.71
	-0.00119	-0.00125	-44.03
Constant	1.307***	1.402***	-32,020***
	-0.0665	-0.0807	-2,628
Observations	35,510	30,878	32,218
R-squared	0.209	0.193	0.221

Cluster standard errors, clustered at the state level are included in parentheses. Year and state fixed effects are included in all regressions. Sample is weighted to national totals.
*** p<0.01, ** p<0.05, * p<0.1

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