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The Determinants and Trends in Public-Private Wage and Fringe Benefit Differential

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The Determinants and Trends in Public-Private Wage and Fringe Benefit Differential

DISSERTATION

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the College of Business and Economics at the University of Kentucky

By
Sun Ki Choi
Lexington, Kentucky

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ABSTRACT OF DISSERTATION

The Determinants and Trends in Public-Private Wage and Fringe Benefit Differential

The decline in private sector wages in the aftermath of the Great Recession reopened a longstanding debate about whether public sector employees make more than private sector employees. However, much of this debate has only focused on the difference in wages over the past few years. This paper uses the Current Population Survey from 1995-2013 to examine how the federal-private wage differential has evolved over time. Wage regressions are estimated by year for federal and private sector workers. I then use these estimates to calculate the federal-private wage differential. This is augmented with selectivity bias corrections for each year. Probit estimates of the probability of receiving employer-provided health insurance and a pension plan are also estimated for each year. The findings suggest that the federal pay differential is invariably positive, but fell during the 1990s, began to rise in the early 2000s, and has continued to rise to the end of the sample period. In this paper, I also examine the difference in wage and fringe benefit between state/local government employees and private sector employees. For the analysis, this paper uses the American Community Survey from 2012-2014 to examine how the state/local-private wage gaps vary by state. Probit estimates of the probability of receiving employer-sponsored health insurance are also estimated. The findings present a wide range of the wage differentials between state/local government employees and private sector counterparts. On the other hand, public employees enjoy higher probability of receiving health insurance through a current employer.

KEYWORDS: wage differential, public-private, federal wage system, compensation

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Date: July 20, 2016

The Determinants and Trends in Public-Private Wage and Fringe Benefit Differential

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Date: July 20, 2016

To my wife, EuiJin, parents, Dr. Byoung-Ryol Choi and Mrs. In Cho, and my adorable sun, Henry.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Chapter 1 Introduction

There is a long standing debate in economics about whether government employees receive higher wages than private sector employees. Much of this debate centers around the wide range of estimates for wage differentials between public and private sector employees. Recently, the Congressional Budget Office (Falk, 2012)(CBO, 2012) announced that wages were 2 percent higher for workers in the public sector than for private sector workers with similar observable characteristics. However, if the CBO did not control for similar observable traits, the difference between average public and private sector wages for all workers rises from 2 percent to 9 percent. Previous research finds a much greater federal wage premium than the CBO. Another study by the Richwine and Biggs (2011) found that the federal pay system gives the average federal employee an hourly wage that is 22 percent more than the average private workers' controlling for observable skills and characteristics. This gap becomes even larger (30 to 40 percent) if it includes fringe benefits since the federal pay system provides more generous healthcare and pension plans. The American Enterprise Institute (Biggs and Richwine, 2011) reports that compared to similar private sector employees, the federal employees are paid 14 percent more as a salary premium. That is, private employees toil 13.7 months to earn what federal employees do in 12. This premium gets larger, considering benefit premium, up to 44 percent. Both institutions have released studies concluding that federal employees receive a compensation premium over comparable private-sector workers, and that Congress can make targeted reductions in federal compensation without harming the quality of public services. The CBO, Heritage, and AEI studies all conclude that federal employees enjoy a premium in combined salaries and fringe benefits over comparable private sector employees. However, methodological differences do exist across the

three studies, and these make very different estimations. Therefore, this dissertation explores and examines commonly used models to estimate wage equations, both basic model and models to account for unobservables.

Putting the theoretical assumptions aside, the main question is whether federal workers receive more in total compensation[1] than they would outside of government. In any case, it is important to consider not only wages but fringe benefits (Rosen, 1987). Further, the analysis of fringe benefit differentials needs to also take into account employee characteristics because fringe benefits are a form of compensations similar to wages and salaries. Thus, in this paper, I examine the wage and fringe benefit differential between private and federal sectors in the U.S. using the March Current Population Survey (CPS) and CPS Merged Outgoing Rotation Group (CPS MORG) from 1995 to 2013. When analyzing fringe benefits, the outcomes analyzed are the probabilities that the private sector and federal sector workers receive health insurance and retirement pension benefits[2] from their employers. I find that there are substantial changes in this differential during the last two decades. However, the federal wage premium, during the sample period, is always positive. The gap becomes narrower by the end of the 1990s and gets wider in the early 2000s. Controlling for observable and unobservable characteristics that affect workers' wages is a crucial factor. Therefore, I augmented with methods to deal with the unobservables. The findings indicate that "ability" is not unidimensional, but rather federal and private sector wages are best analyzed as a Roy model (Roy, 1951; Heckman and Honore, 1990). In Roy model, workers self-select the sector that gives them the highest expected earnings. Equilibrium in each market equates supply and demand, while a self-selection condition means that the marginal worker is indifferent between the two sectors. The Heckman-Lee[3] selectivity bias approach is therefore preferable

[1]Total compensations include wage and fringe benefits.

[2]This includes defined benefit and defined contributions plan such as Thrift Saving Plan (TSP) for federal workers and 401(k) for private sector workers.

[3]Lee, Lung-Fei, Lee (1978)

to instrument variable (IV) or fixed effect (FE).

Federal deficits motivated looking at federal pay. A companion analysis would be to examine state/local government pay. Though previous work does not show as large differentials as with federal workers, examining state/local is still worthwhile. Also, the state/local wage differential varies across states and it makes sense to understand this variation. In this paper, I also examine the wage and fringe benefits differential between state and local government employees and private sector employees in the U.S. using the American Community Survey (ACS) between 2012 and 2014. For the analysis of the fringe benefit differential, the outcome variables are the probability of receiving employer-sponsored health insurance, indices for state government pension generosity[4], and state pension underfunding status. I find that wage differentials of state and local government employees to private sector employees vary by states. There are states with positive wage premium (e.g. Massachusetts, New York), negative wage premium (e.g. Georgia, Indiana, Kentucky), and statistically no wage premium (e.g. Alaska, Michigan, Rhode Island) for state government workers. In addition, the wage premium for local government employees also varies by states, from some with positive premium (e.g. California, Maryland, Ohio) , some with negative premium (e.g. Mississippi, Oklahoma, Texas) and some with statistically no wage premium (e.g. Illinois, Maine, New Hampshire). Using estimates of the state-private and the local-private wage differential, I examine how these vary depending on the level of government intervention, degree of business friendliness, and economic performance ranking.

Various studies have used different data and estimating methods in reaching a wide range of conclusions regarding wage differentials between state/local and private sector employees. For example, Bender and Heywood (Bender and Heywood) find that state government workers earned an average 11.4 percent less than private

[4]Annual benefit , Total retirement income replacement rate for full-career state government retiree.

sector workers of similar tenure and education and local government employees earn 11.6 percent less. The Center for State and Local Government Excellence (SLGE, 2011) reported its research findings with the Boston College research team[5] that state and local employees have a wage penalty of 9.5 percent without considering pension contributions and 4 percent wage penalty after considering pension contributions. Lawrence Mishel of the Economic Policy Institute and Joydeep Roy of Columbia University and New York City's Independent Budget Office argued that any pay differentials should be considered in light of differences in working conditions. In reference to the public school teachers' example, they said, "A more balanced assessment would consider other dimensions of teacher working conditions: the hierarchical nature of the job, the inflexible work hours, the relative inflexibility of vacation planning, the frequently unsafe working conditions, the lack of private office space, and the stress of being "on stage" nearly all day in front of students."

In contrast, according to recent Employer Costs for Employee Compensation survey from U.S. Bureau of Labor Statistics, as of December 2015 (BLS, 2016), state and local government workers earned total hourly compensation of nearly 40 percent higher than private sector employees. This difference includes over 24 percent higher wages and salaries and over 55 percent greater total benefits. However, this does not control for individual worker characteristics.

The main question for these findings is whether state and local government workers are overcompensated or undercompensated, regarding wage and fringe benefits, relative to comparable private sector employees. In either case, overpaid or underpaid, it is essential to estimate these differentials, not only wage but also fringe benefits such as health insurance and retirement benefits because the latter are important aspects of compensation. Further, the analysis of fringe benefit differentials needs to take into account of employee characteristics because pensions are a form of compensation

[5]Alicia H. Munnell, Jean-Pierre Aubury, Josh Hurwitz, and Laura Quinby

similar to wages and salaries (Bewerunge et al., 2012).

The remainder of this paper proceeds as follows: in chapter 2, I discuss the past literature examining the public and private wage differentials in section 1. In addition, I scrutinize Federal rules on compensation such as retention pay. Section 2 describes the main dataset, the CPS MORG and March CPS, and presents summary statistics for the main variables. Section 3 presents the models that I use to estimate federal-private wage differentials and fringe benefit differentials. The handling of the unobservables is outlined in here. This section reviews and compares existing methods for controlling unobservable characteristics. Three methods that are considered in this section are a Heckman model, IV, and FE. Based on the analysis of heterogeneity from the error term, I will test which model is most suitable to use in estimating wage differentials. The test mainly focuses on the dimension of unobservable characteristics. That is, whether it is one dimensional unobservables such as "ability" or multi-dimensional ones so I also need to consider comparative advantage across sections. Chapter 3 presents the wage differentials from OLS wage equations and Heckman model in section 1. Probit estimtes of the probability of receiving employer-provided health insurance and a pension plan are also presented. Additionally, I examine the determinants of the time path of the federal-private wage differential using national-level political and economic indices. Nineteen wage differentials from each year are used as a time series. This shows the factors that make changes to wage gap. Section 2 concludes. In chapter 4, I review the previous literature examining state-local and private wage gaps in first section. Section 2 explains and describes the main dataset, the ACS, and presents the descriptive statistics for the key variables. Section 3 presents the estimation of wage differentials from the OLS wage equations. The analyses of benefit differentials are outlined in Section 4. In Section 5, I examine the effects of exogenous variables regarding the state policy environment such as government intervention in state economics, economic perfor-

mance ranking, and others as well as variables that represent economic condition for each state such as state-level unemployment rate, mean salary, etc. on the estimation of wage and fringe benefit differentials. Lastly, Section 6 concludes. At last, I summarize overall findings in chapter 5.

Chapter 2 Federal-Private Wage and Fringe Benefit Differentials

2.1 Previous Literature

Wage differentials between public and private sector employees has been well documented starting with Smith's seminal series of papers (Smith, 1975, 1976; Bailey, 1977). Smith (1975) found that in 1960, federal workers were paid more than comparable private sector workers and that in 1970 they still enjoyed that advantage. This difference implied that the reforms made in the federal pay system was conceived and implemented in error. She also found that the wage differentials relative to the private sector were significant for federal and local government workers, but that of the state government workers was statistically insignificant (1976). This finding showed that the level of government - federal, state, or local- matters when estimating wage differentials between the private and public sector. In 1990, there was deeper research conducted both between and within these sectors. Katz and Krueger (1991) argued that in the 1980s there was a sharp rise in the skill differentials within the private sector. However, that sharp increase did not occur equivalently in the public sector. Education differentials, which are highly correlated with skill differentials, and overall wage inequality barely increased in the federal government sector, and increased only moderately in the state and local government sectors Autor et al. (2008). In addition, their examination of regional pay variation indicates that wages in state and local governments respond substantially to changes in local economic conditions. These papers concluded that the approximately 2.1 million non-postal federal employees received a positive wage differential of 10 percent - 35 percent that can be interpreted as an economic rent. However, Moulton (1990) reexamined the federal-private wage

differential using data from 1974-1979 and found that the federal-private wage differential appears to have narrowed considerably. In addition, he discovered that after accounting for detailed occupational and locational characteristics of the federal work force and including sampling weights, the federal wage premium was 4-6 percentage points smaller than previously thought. He obtained a point estimate for the wage differential of 3.1 percent using national data. Further, with respect to administrative and professional occupations in the high-wage, urban areas, the estimated gaps are smaller, near zero, or slightly negative.

Borjas (2002) investigated the changes in wage gap due to the changing in wage structure. His evidence suggests that the public sector worker in high-skilled groups, or who does quite well within a particular skill group, will increasingly want to quit the public sector and enter the private sector under the circumstance of the relative compression of wages in the public sector. Thus, over time, the public sector should find it increasingly more difficult to attract high-skill workers from their current private sector positions, and retain high-skill workers. His previous research finds that there exists the racial and sexual wage differentials among similar skilled workers and these statistics are related to characteristics of the agency's constituency (Borjas, 1980, 1982, 2005). Donahue (2008) presents extensive evidences to show that the wage distribution of private and public sector employees diverges at the lower and upper bottom of the wages. The entry-level jobs in government tend to be paid more, with better security and benefits, than those of private sector. In the higher wage ranges, private sector earnings exceed those in government by substantial margins. He observes that public sector employees stay closer together in their earnings, with the lower-paid workers pulled up toward middle-class and higher-paid workers pulled downward toward middle-class status. More recent research about public-private sector wage differentials includes Bewerunge et al. (2012) who used the Health and Retirement Study (HRS). They found that federal workers earned a wage premium

of about 17.2 percent, taking differences in employee characteristics into account.

There are three institutions that conduct recent research about federal wage premium- CBO, the Heritage Foundation, and AEI. All studies conclude that federal employees enjoy their premium of wage and fringe benefits. However, methodological differences do exist across the studies, CBO finds a much smaller wage differential compare to Heritage and AEI. Sherk (2010) finds that federal wage premium is 22 percent and premium that combined wages and benefits for federal employees' is approximately 30 to 40 percent more than comparable private sector employees. The average private-sector employees' annual fringe benefits are $9,882, while the federal government pays $32,115, on average, to the workers. Biggs and Richwine (2011) also find that comparing to private sector workers, the federal government pays their workers 14 percent salary premium, 67 percent benefit premium. Thus the total compensation from wage and benefits is approximately 44 percent. The CBO (2012) reports that it would have found a 2 percent average wage premium. The reason of this discrepancy is that AEI and the CBO control for firm size while Heritage does not. For example, estimate of the CBO rises to 9 percent if it does not control for firm size. There is not a clear reason why larger business offer higher wages and benefits than smaller ones, some research suggest that higher pay at large firms could represent a compensating differential for aspect of large businesses that employees dislike, such as bureaucracy and ired tape (Biggs et al., 2012). Based on this, federal government employees should have wage premium compare to private sector employees since federal government is one of the largest employer in the U.S.. However this explanation about wages still remains state-local government employees wage unexplained. The CBO and AEI also find that the differential is depending on education level of employees. They find that the most educated federal employees have the smallest salary premium. The CBO reports that workers whose highest level of education was no more than a high school, a bachelor's degree, and a professional

degrees or doctorate earned 21 percent more, roughly the same, and 23 percent less, on average, than private sector counterparts. Similarly, AEI studies shows federal workers with only a high school education are paid over 22 percent more than comparable counterparts, while graduate degree holders make only 3.9 percent more than private sector workers, on average.

The investigations about the public-private wage differentials have been active in many other countries. Several studies in European Union (EU) countries find pay differentials in favor of the public sector that are generally higher for women, for workers at the low end of the wage distribution, and in the Education and the Public Administration sectors rather than the Health sector. Notable differences emerged across EU countries: Greece, Ireland, Italy, Portugal and Spain exhibited higher public sector premia than other countries (Bargain and Melly, 2008; Giordano et al., 2011; De Castro et al., 2013; Bargain and Melly, 2008; Blackaby et al., 2012; Van der Gaag and Vijverberg, 1988).

There are a host of studies have examined whether state and local workers are overcompensated relative to their private sector counterparts. So far, researchers have no real disagreement about state-local workers as a group are not paid more than their private sector counterparts. The controversy arises on the benefit [1] side. The question whether the value of the benefits provided to state-local workers offsets the wage penalty (Munnell et al., 2011). Several researchers conclude that the benefits do not totally offset the wage penalty based on Employer Costs for Employee Compensation (ECEC) from Bureau of Labor Statistics (see for example Allegretto (2015)). The response by one set of critics is that the ECEC survey understates state and local employee compensation in three ways: 1) Contributions to defined benefit pensions and to 401(K) plans are not comparable. Public sector pension plans guarantee

[1] Compensations include paid leave, such as vacation, holiday or sick pay; supplemental bonus pay, such as bonuses and overtime; insurance, such as life and health coverage; retirement and savings, such as employer contributions to defined benefit and defined contribution plans; and legally required benefits, such as Social Security and Medicare.

participants a return of 8 percent, while 401(K) plans do not guarantee such high rate. 2) It omits retiree health since employers generally do not prefund these plans and therefore do not make payments for active employees. In addition, covered employees can buy retiree health insurance at group rather than individual rates, which raises the value of these benefits above the employer's normal cost. 3) Public sector workers have much greater job security than their private sector counterparts, and this advantage has a baseline value of 6 percent (Biggs and Richwine, 2011). Biggs and Richwine conclude that proper accounting for retiree health, defined benefit pension, and job security raise the premium to 30 percent. In recent years, there has been significant workers interest in job security. This increased interest has been driven at least in part by the state of the economy since the recession began in 2007. The argument is that job security, like wages and other benefits, is a major goal of collective bargaining. During this recession, employment in the state-local sector is down 3.1 percent since its peak, compared to 5.6 percent in the private sector. Rosen and Bewerunge also find that pension wealth accumulation is greater for employees in all three government sectors than for private sector workers, even after taking worker characteristics into account. On the other hand, they find no evidence that highly educated individuals are penalized by taking jobs in the public sector, either with respect to wages or pension wealth in their 2012 research.

2.1.1 Federal Rules on Compensation

In the competitive labor market, the private sector and federal government are potential competitors as employers. Therefore the federal government tries to recruit or retain well-qualified employees using both its basic pay system and its special rate[2]. To compare wages between public and private sector workers, it is essential to un-

[2]Special rate is higher rate of basic pay for a group or category of General Schedule(GS) positions in one or more geographic areas to address existing or likely significant handicaps in recruiting or retaining well-qualified employees.

derstand how federal rules are set for their employees and how competitive they are compared to the private sectors. According to U.S. Office of Personnel Management (OPM), the federal pay system can roughly be divided into two sections. One is the basic rules for government-wide employees. The basic pay rules are also divided into two parts, General Schedule (GS) and Federal Wage System (FWS). The GS classification and pay system covers majority of the approximately 1.5 million civilian white-collar federal employees in professional, technical, administrative, and clerical positions. The GS has 15 grades from GS-1 (lowest) to GS-15 (highest). Each grade is classified by job based on the responsibility, level of difficulty, and qualifications required. Each grade has 10 within grade steps that are each worth approximately a 3 percent increase in the wage. The FWS was established for Federal blue-collar workers comparable to prevailing private sector rates in each local wage area. The FWS covers for Federal trade, craft, and laboring employees. There are two basic principles for FWS: 1) wages are set according to local prevailing rate, and 2) there will be equal pay for equal work and pay distinctions in keeping with work distinctions. For each wage area, OPM identifies a lead agency. The lead agency is responsible for conducting wage surveys, analyzing data, and issuing wage schedule under the two principals above. Employees are paid the full prevailing rate at step 2 in each grade. The highest step in FWS, step 5, the wage of employees is 12 percent above the prevailing rate of pay.

The OPM establishes a higher rate of basic pay for a group or category of GS positions in one or more geographic areas to address existing or likely significant handicaps, due to low wage, in recruiting or retaining well-qualified employees. The special rates address staffing problems caused by significantly higher non-federal pay rates than those payable by the federal government within the area, location, or occupational group involved. This includes the remoteness of the area or location involved, the undesirability of the working conditions or nature of the working involved, or any

other circumstances OPM considers appropriate. Most of GS employees are entitled to locality pay, which is a geographic-based percentage rate that reflects pay levels for non-federal workers in certain geographic areas as determined by surveys conducted by the U.S. Bureau of Labor Statistics (BLS). There are currently 34 locality pay areas, which cover the lower 48 States and Washington D.C., plus Alaska, Hawaii, and the U.S. territories and possessions. For compensating extraordinarily difficult living conditions and undesirable working condition, the federal government pays both a cost-of living allowance (COLA) and a post differential. A post differential means an addition to basic pay that is payable in selected non-foreign areas. A post differential is a recruitment incentive based on conditions of the environment in the non-foreign area that differ significantly from conditions in the U.S. as a whole. However, post differentials plus the COLA cannot exceed 25 percent of basic pay. These rules are incorporated into the examination of federal pay relative to private pay.

2.2 Data

The primary data source is the Current Population Survey Merged Outgoing Rotation Group (CPS MORG) from the National Bureau of Economic Research (NBER) between 1995 and 2013. In recent years, each monthly CPS has included about 140,000 individuals living in approximately 70,000 households. Upon selection into the CPS ORG sample, household members are surveyed in four consecutive months, not surveyed for the subsequent eight months, and then interviewed for four more consecutive months. The ORG questions concern the respondent's periodicity of pay, hourly wage, usual weeks worked per year at that rate, usual hours worked a week, and overtime pay. These work and income questions differ from March CPS variables because the March CPS questions use a reference period of the last week or last year, not current pay or usual hours. Matching current individual characteristics with the current income and work responses are sometimes more proper than matching cur-

rent characteristics with last year's pay and work conditions. One another advantage from using MORG data instead of March CPS is that I can have more observations and more balanced data. Because MORG data covers all months, not only March, the information from it will be more balanced.

Table 3.1 summarizes the mean wages of private workers and public sector workers from 1995 to 2013. Wage information does not contain annual bonuses which likely affects private sector more than public sector. Since many previous studies indicated that there were different wage trends among public sector workers, federal, state, and local government workers are presented separately. The focus of this paper, however, is the federal-private differential. Figure 3.1 shows the unadjusted ratio over time. The ratio of average federal to average private sector employees' wages has been fallen, and then increased over time for full time workers with age between 18 and 70. The wage ratio for state-local government workers has been declining over the period as expected. However, average wages for state and local government workers, with similar education level and worker's characteristics, are equal or higher than those in private sector. Since these trends occur before controlling for many other factors, it is necessary to reexamine the trends after controlling for those factors to get more accurate results.

Table 3.2 and Figure 3.4 shows comparison for health insurance and pension plan benefits using March CPS data. The compensation is more generous in the federal sector. Comparing the probability of receiving employer sponsored fringe benefits, on average, the federal employees have enjoyed 11 percent higher for health insurance and 30.4 percent higher for pension plan than private sector employees, on average. That is, 80 percent of private sector employees receive employment based health insurance from their current employer, in comparison to 91 percent of federal employees. The retiree pension plans are much more prevalent for federal employees than in the private sector. An estimated 50.7 percent of private sector workers have retirement

plans coverage. On the other hand, the federal government workers have 81.1 percent coverage.

Table 3.3 gives the summary statistics of variables that are included in this research. All wages in the data are expressed in 2012 dollars value using the CPI. In the sample, 4 percent of individuals were working in the federal government and had 20.8 years of experience on average. Slightly less than half of the entire sample's labor force was female and 9.8 percent of workers in this sample answer that they have union membership and 74 percent of interviewees are white. Among ten major occupations, the federal government employees are working mainly in management, professional, service, and administrative occupations. Mostly these four occupations are white-collar jobs. I also control 34 locality areas carefully in this dissertation which is one of contribution in the literature. The federal government offers 34 different wage schedules which are dependent on the location. Most of areas off the general wage schedule are metropolitan areas. Due to the higher cost of living in metropolitan areas, private sector workers receive higher wages. Thus, these variables help to control for wage differences due to cost of living. The higher proportion of federal government workers stays in these metropolitan areas by 7 percent. Table 3.4 summarizes mean values of key variables from the CPS MORG data for both sector workers. There are a couple of common trends across sectors, federal government and private sector. First, the average year of education attained is increasing. Across both sectors, the average education level increased the most in the federal government- from 14 years in 1995 to 15.04 years in 2013. Second, the overall age in both sectors increased over the period. The aging workforce can be explained by the Post- World War II Baby Boom Generation. It created an unusually large birth cohort for the U.S. population, resulting in a large aging population today. Differences do exist, however, among these sectors. For example, the average education level for federal employee is higher than for private sectors workers. The federal workers

attained 1.3 more years of education relative to their private sector counterparts.

2.3 Models

This section presents models that are used to estimate the federal-private wage differential. I employ two models to find the wage differential, the basic OLS wage equations and the Heckman model. With the OLS model, I estimate separate two equations, year-by-year; one for federal workers only, one for all private sector workers from 1995 to 2013. The equations that I used to estimate the OLS models are below. Here, dummy variable d_{it} equals 1 if the worker is employed in the federal sector and 0 otherwise:

$$ln(Y_{it}^{f}) = \beta_{0t}^{f} + \beta_{it}^{f} X_{it} + \epsilon_{it}^{f} \quad if \quad d_{it} = 1, \ \ where \ \ t = 1995, \cdots, 2013 \tag{2.1.1}$$

$$ln(Y_{it}^{p}) = \beta_{0t}^{p} + \beta_{it}^{p} X_{it} + \epsilon_{it}^{p} \quad if \quad d_{it} = 0, \ \ where \ \ t = 1995, \cdots, 2013 \tag{2.1.2}$$

The Y_{it} is hourly wage[3] for workers. The term X_{it} is a vector of individual characteristics and demographics such as gender, union, race, MSA, region, occupation[4], and locality. The ϵ_{it} is the disturbance term. After obtaining estimated coefficients, the predicted wage differential is computed, using sample means. Below are brief explanations of the variables used in the model:

In addition, I narrow the sample to full-time workers only; thus, I dropped the workers who worked less than 35 hours per week. I use the workers whose age range is between 18 and 70 years.

[3]The wage rate is used, if reported. Otherwise, this is reported earnings divided by reported usual hours over that time span.

[4] 1) Management, business, and financial 2) Professional 3) Service 4) Sales 5) Office and administrative support 6) Farming, fishing, and forestry 7) Construction and extraction 8) Installation, maintenance, and repair 9) Production 10) Transportation and material moving

The OLS model assumes that the 'Public' variable is uncorrelated with disturbance term, implying that sectoral differences in unobserved characteristics do not affect the estimated wage differential. However, if they are correlated, due to some unobservable characteristic such as ability, then the estimations from the OLS model are biased (Olsen, 1980). Thus in here, I relax this assumption.

Let

$$ln(Y_{it}^f) = \beta_{0t}^f + \beta_{it}^f X_{it} + \phi_i + \theta_i^f + \epsilon_{it}^f \quad if \quad d_{it} = 1 \tag{2.2}$$

$$ln(Y_{it}^p) = \beta_{0t}^p + \beta_{it}^p X_{it} + \phi_i + \theta_i^p + \epsilon_{it}^p \quad if \quad d_{it} = 0 \tag{2.3}$$

where ϕ_i is absolute advantage for both federal and private employee such as 'ability' and ϵ_{it} is white noise for each sectors. If a worker has unobservable absolute advantage in working, he/she can earn higher wage in both sectors. The terms θ_i^f and θ_i^p reflect comparative advantages in sectors for each. For example, a person can be well-suited to government work and not for the private sector, implying a large θ_i^f and low θ_i^p. Naturally, other cases are possible. If $\theta_i^f = \theta_i^p$, then this collapses to the absolute advantage case with only ϕ_i. These equations can be re-written as

$$ln(Y_{it}^f) = \beta_{0t}^f + \beta_{it}^f X_{it} + \epsilon_{it1} \quad if \quad d_{it} = 1 \tag{2.4}$$

$$ln(Y_{it}^p) = \beta_{0t}^p + \beta_{it}^p X_{it} + \epsilon_{it0} \quad if \quad d_{it} = 0 \tag{2.5}$$

where $\epsilon_{it1} = \phi_i + \theta_i^f + \epsilon_{it}^f$ and $\epsilon_{it0} = \phi_i + \theta_i^p + \epsilon_{it}^p$. The standard way to deal with two dimensional unobservables is using Heckman-Lee method. Other methods such as IV and FE model deal only with uni-dimensional ability. As shown below,

using Heckman-Lee, I can test whether the unobservable ability is uni-dimensional or two-dimensional. To do so, I start with standard Heckman-Lee assumptions of joint normality. The probability of a workers choosing federal depends on the wage differential s/he earns and exogenous factors such as the ease finding federal relative to private jobs. Let the latter factor be represented by the vector Z_i which includes state-level unemployment rate, employment growth rate, and the ratio of federal employees to overall employees in each state. Then the probability of $d_{it} = 1$, being federal government employees, is :

$$Pr(d_i = 1) = X_i\delta + Z_i\gamma + \alpha\phi_i + \tau(\theta_i^f - \theta_i^p) + u_i \tag{2.6}$$

This equation can be written as

$$d_i = V_i\psi + \epsilon_2 \tag{2.7}$$

$$d_i = \begin{cases} 1 \;\; if \;\; \epsilon_2 > -V_i\psi \\ 0 \;\; if \;\; \epsilon_2 \leq -V_i\psi \end{cases}$$

where $\epsilon_2 = \alpha\phi_i + \tau(\theta_i^f - \theta_i^p) + u_i$ and $V_i = f(X_i, Z_i)$. Since equation (2.6) estimate probability of being federal government employee, I can assume that τ is positive. That is, a person who has comparative advantage for federal government work should have $\theta_i^f > \theta_i^p$ and is more likely to be federal worker. Whether the use of the Heckman-Lee model is appropriate or not depends on the findings.

The expectation of disturbance term for federal government worker and private sector worker, separately, from equation (2.2) and (2.3) are

$$E(\epsilon_1|fed_i = 1) = E(\epsilon_1|\epsilon_2 > -V_i\psi) = \frac{\sigma_{12}}{\sigma_2}[\frac{f(V_i\psi)}{1 - F(V_i\psi)}] \tag{2.8}$$

$$E(\epsilon_0|fed_i = 0) = E(\epsilon_0|\epsilon_2 \leq -V_i\psi) = \frac{\sigma_{02}}{\sigma_2}[\frac{-f(V_i\psi)}{1 - F(V_i\psi)}] \tag{2.9}$$

where σ_{12} is the covariance of ϵ_1 and ϵ_2 and σ_{02} is the covariance of ϵ_0 and ϵ_2. f is standard normal density function and F is cumulative normal density function.
From (2.8)

$$\begin{aligned}\sigma_{12} &= Cov(\epsilon_1, \epsilon_2) \\ &= Cov(\phi_i + \theta_i^f + \epsilon_i^f, \alpha\phi_i + \tau(\theta_i^f - \theta_i^p) + u_i) \\ &= \alpha\sigma_\phi^2 + \tau(\sigma_f^2 - \sigma_{fp})\end{aligned} \tag{2.10}$$

From (2.9)

$$\begin{aligned}\sigma_{02} &= Cov(\epsilon_0, \epsilon_2) \\ &= Cov(\phi_i + \theta_i^p + \epsilon_i^p, \alpha\phi_i + \tau(\theta_i^f - \theta_i^p) + u_i) \\ &= \alpha\sigma_\phi^2 + \tau(\sigma_{fp} - \sigma_p^2)\end{aligned} \tag{2.11}$$

where σ_{fp} is covariance between θ_i^f and θ_i^p, σ_f^2 and σ_p^2 are variance of θ_i^f and θ_i^p, respectively.

If there exists only absolute advantage, $\phi_i \not\equiv 0$ and $\theta_i^f \equiv \theta_i^p \equiv 0$, then from equation (2.10) and (2.11) :

$$\sigma_{12} = \alpha\sigma_\phi^2 \tag{2.12}$$

$$\sigma_{02} = \alpha\sigma_\phi^2 \tag{2.13}$$

in this case, I can estimate wage differential between two sector employees using any models that allows us to control unobservables since I have uni-dimensional unobservables. Combined equation (2.7), (2.12), and (2.13), if higher ability employees are more likely to be federal government worker ($\alpha > 0$), then $\sigma_{02}= \sigma_{12} > 0$. On the contrary to this, if higher ability employees are more likely to be private sector

worker ($\alpha < 0$), then $\sigma_{02} = \sigma_{12} < 0$.

If there exist both absolute advantage and comparative advantages, $\phi_i \not\equiv 0$ and $\theta_i^f \not\equiv 0 \not\equiv \theta_i^p$, then it will back to equation (2.10) and (2.11). Note that depending on the size of each variance and covariance, σ_{12} and σ_{02} can be either sign.

Notice if $\phi_i \equiv 0$ and $\sigma_{fp} = 0$ then the coefficient $\sigma_{12} > 0$ and $\sigma_{02} < 0$.

The nature of the cross-equation correlation is readily tested with the Heckman-Lee methodology. To estimate wage equation using Heckman-Lee model, I use probit model the same as equation (7) and wage equations in (4) for federal employees and (5) for private employees. I include in the vector Z_i variables intended to capture the relative availability of federal in the workers' location. They are worker's states' unemployment rate, real GDP growth rate, employment growth rate, and the ratio of federal government workers to all employees. Using probit estimations and wage equations, I can have wage equations as:

$$ln(Y_{it}^f) = \beta_{0t}^f + \beta_{it}^f X_{it} + \frac{\sigma_{12}}{\sigma_2}[\frac{f(V_i\psi)}{1 - F(V_i\psi)}] + \nu_1 \quad if \quad d_{it} = 1 \tag{2.14}$$

$$ln(Y_{it}^p) = \beta_{0t}^p + \beta_{it}^p X_{it} + \frac{\sigma_{02}}{\sigma_2}[\frac{-f(V_i\psi)}{1 - F(V_i\psi)}] + \nu_0 \quad if \quad d_{it} = 0 \tag{2.15}$$

where $\frac{\sigma_{12}}{\sigma_2}[\frac{f(V_i\psi)}{1-F(V_i\psi)}]$ is inverse Mills ratio and ν_1 and ν_0 are white noise. According to Garen (1987), the error terms from each wage equation can be varying depending on the value of federal dummy. This can be proved by comparing coefficients of inverse Mills ratio from Heckman model. Equation (1) can be generalized to allow the coefficient and error term to vary depending on the value of Public dummy. Then combining equation (14) and (15) using d_i will be

$$ln(Y_{it}) = \upsilon_1 X_{it} + \upsilon_2 X_{it} d_i + \varphi_0(1-d_i)[\frac{-f(V_i\psi)}{1 - F(V_i\psi)}] + \varphi_1(1-d_i)[\frac{f(V_i\psi)}{1 - F(V_i\psi)}] + \mu_2 \tag{2.16}$$

where $\varphi_0 = (\sigma_{02} \ / \ \sigma_2)$ and $\varphi_1 = (\sigma_{12} \ / \ \sigma_2)$. Using $\hat{\psi}$ instead of ψ and estimating (16) by OLS is consistent. This approach allows the cross-equation correlation between error terms to differ depending on the value of federal dummy variable so that $\varphi_0 \neq \varphi_1$. That is, comparing the coefficients of inverse Mills ratio will give evidence that unobservable characteristics include only absolute advantage in working for either sector or in addition to the absolute advantage, the comparative advantage also exists in it.

Fringe benefits, such as retirement pensions and health insurance, may be a critical factor in compensation. Thus, it is essential step to compare fringe benefits in addition to wages between sectors. For the analysis of the fringe benefit differential between federal and private sector employees, I use two benefits: employer-provided health insurance and retirement pension plan. To analyze the binary choice of whether or not employers offer health insurance and pension plans to their employees I use a probit model, where

$$P(Y_{it} = 1) = \Phi(X'_{it}\rho)$$

i indexes the individual, and t indexes time. In this estimation, Y_{it} is the health insurance provision status of workers or the retirement pension plan offer status from their current employer, $\Phi(\cdot)$ is the distribution function for the standard normal. The vector of observable characteristics X_{it} is the same as in the OLS model. I run separate probit equations by year for health insurance and pension plan.

Chapter 3 Findings

3.1 Results

Table 3.5 and Figure 3.5 summarize the estimated wage gap between two sector workers. Calculating wage differentials, year by year, using two separate equations from each sector, I find that federal government workers have been received between 4.16 percent and 17.14 percent more than their counterparts in private sector. These findings suggest that the federal pay differential is invariably positive, but fell during the 1990s, began to rise in the early 2000s, and has continued to rise to the end of the sample period.

Additional OLS wage regressions are estimated by year and separately for federal and private sector workers with only four occupations which dominates federal employment. According to OPM, they are mostly white-collar workers. Table 3.6 and Figure 3.6 indicate the federal wage gap for only four occupations workers from 1995 to 2013. Overall trend of differentials are quite similar to the previous case, however, these federal wage premia are more stable and higher, with a minimum of 8.8 percent and maximum of 16.91 percent, than that all occupation workers.

These findings are based on OLS wage equations which assume no correlation between sectoral choice and unobservable characteristics in disturbance term. Since, however, sometimes this is strong assumption, I use Heckman model to relax this assumption by dealing with two-dimensional unobservables. Followings are results after controlling the unobservable characteristics.

Table 3.7 and Table 3.8 show the summary of coefficients write out from Heckit procedure in case of all occupations and only four occupations, respectively. With all occupations, the coefficients for private sector are consistently positive, however, the coefficients for public sector workers are relatively unstable and volatile compared to

private sector coefficients. Based on the test statistics, I conclude that the coefficients are not same. This implies that comparative advantage matters. Except couple years, they are statistically different from each other. With a sample of only four occupation employees, a fewer number of sample years shows that the coefficients write out from Heckit procedure are statistically different. But still there exists years with different coefficients, such as 1999, 2000 and so on. I also experimented similar correlation tests with other functional forms, such as linear probability model and logit model, but the nature of the finding was the same. In addition to correlation test, I conducted sensitivity test to find robust evidences for existing comparative advantage in error term from wage equations. For this analysis, I estimate a probability of being federal employee with probit, logit, and LPM. With estimated probabilities from each model, I calculate residuals, and then plug this into the wage equations to compare the sign of coefficients. At first, I test with linear residual term and find statistically significant positive coefficient of public sector and negative coefficient of private sector in the wage equation for all three residual terms. I also find same signs of coefficients from the second test, with linear term and square term of residuals, and the third test, with linear, square, and cubic term of residuals. That is, all three models that estimate probability of being federal government employees have residuals with similar distribution. Thus, the comparative advantage matters not only in probit model, which is used in Heckit model, but also in other models. In sum, the IV approach and the FE model can only deal with uni-dimensional ability. However results from Table 3.7 and Table 3.8 show the evidence that there exist 2-dimensional ability. Because the assumption about uni-dimensional unobservables is violated with data during sample periods, they are inappropriate to use for estimating the wage differential. Therefore, this paper uses Heckman-Lee model to calculate wage differentials.

Table 3.9 and 3.10 indicate the summary of federal wage gap to comparable private

sector workers, year by year, from 1995 to 2013 utilizing Heckman model. From Table 3.9 and Figure 3.7, the federal government employees' wage premium comparing to private sector workers is at least 4.76 percent and it increases up to 17.25 percent, after controlling detailed demographics and characteristics, including locality. This means that federal pay gap is invariably positive during sample period. The wage differential has evolved from the 1990s to 2013. In the 1990s, the wage premium for federal government employees decreased gradually, however, it began to rise in the early 2000s, and has continued to rise to the end of the sample period. Table 3.10 and Figure 3.8 describe the summary of the wage differential between federal and private only the four selected occupations. The lowest federal wage premium is 8.95 percent in 2003 and maximum premium is, in 2013, 17.23 percent. The path of the wage differential for these occupations is slightly different from all occupations. The wage premium with all occupations began to increase at the beginning of the 2000s, but the pay gap with only the four occupation employees decreased until 2003. The wage gap was higher in the 90's but fell, then rising in the 2000s. I also estimated federal-private wage differential using different exogenous factors such as real GDP growth rate, the ratio of federal spending to state GDP, and so on. However, the estimation is very close to what I have in here. To test whether these differentials are statistically different, I utilize 95% confidence interval. Comparing 95% confidence interval, I find that they are not statistically same. For example, upper limit of wage differential in 1999 is 10.44 percent. This is less than lower limit of wage differential from 1995 and estimates after 2006. This result is similar to estimates using only 4 selected occupation workers. The upper limit is 11.3 percent in 2003. However, this value is lower than the value of lower limit from 1995, 1997, and all years after 2006.

For the deeper analysis, I utilize decomposition method in wage differentials from Heckman model. I used to decompose the difference in a distributional statistics between two sectors into five explanatory factors: education, gender, race (black), union

membership status, and locality. Table 3.11 and Figure 3.2 show the time trend of five differences that are calculated as (β^f - β^p) for education, gender, race (black), union membership status. Estimates of locality is calculated as sum of (β^f - β^p) * X_i, year by year. I cannot find similar pattern of the overall wage differential from these estimates. I also examine correlation test between the differences from those five explanatory variables and wage differential estimates from Heckman model. The correlation test results are summarized in Table 3.13. Correlation coefficients also indicate that differences in coefficients between federal and private sector wage equations do not help explain the time pattern of the overall differential. Another approach utilizing decomposition method is examining effect from average value difference between federal and private employees. Table 3.12 and Figure 3.3 present the time trend of estimates from ($\bar{X}^f$ - $\bar{X}^p$) * β^p. To examine the similarity of pattern between overall wage differentials and these differences, I conduct correlation test and results are shown in Table 3.14. Correlation test indicates that education level, union member status, and locality variables are highly correlated with wage differentials from both all occupations and four selected occupations. The wage differential estimation from all occupation employees is relatively more correlated than that comes from four selected occupations. Education level and locality measures are positively correlated with wage differentials and union member status is negatively related. That is, as employees are better educated and more likely to live in one of 34 locations, which federal government offers special rate for their employees, the wage gap between two sector employees increases. On the contrary to this, as higher proportion of employees become union members, wage differential decreases. This trend helps to explain the time pattern of the overall wage differential. As I already indicated, proportion of union member out of entire employees is decreasing faster in private sector compare to federal government employees and wage differential has been increased since early 2000s. Therefore, I find evidence, using decomposition method, that education level,

union member status, and locality measures help explain the time pattern of the overall wage differential.

In addition, Figure 3.9 shows that wage premium with only the four occupations is relatively higher until 2002 and fluctuated less during the sample period. Even though there are some differences in patterns of federal pay gap, in general, the paths of wage differentials are similar. Furthermore, the analogous pattern was observed from OLS estimation. Therefore it is worthwhile to compare the pattern with and without controlling for unobservable characteristics. Figure 3.10 shows the estimated federal wage premium from both OLS and Heckman model. The wage gap from Heckman model is at most 0.8 percent larger and is at minimum 0.55 percent smaller than that from OLS. Even though they do not exactly match each other, the gap between two estimations is less than 1 percent during overall period. Thus, I can conclude that Heckman model estimates are preferred, but the magnitude of selection problem is not very large. People have speculated one both sides of this; that private sector gets better workers and others say the public sector gets better workers. My results show that it is not just an ability difference, but a comparative advantage. And of small magnitude. Figure 3.11 summarizes the comparison of four occupations workers only. The finding and the conclusions are very similar to all workers.

The two main components of the fringe benefits are health insurance and retirement pension plans that are providing from a current employer. Using probit model, I estimate probability differential of receiving employer-sponsored health insurance and retirement pension plans.

Table 3.15 shows the marginal effects of the fringe benefit differential between federal and private sector workers. Federal government workers enjoy much higher probability of receiving an employer-provided retirement pension. It decreased until the early 2000s, but it rose beyond the period so that federal workers have an over 20 percent greater likelihood of being covered. Figure 10 shows the trend of pension

plan differentials. Magnitudes are high and all differentials are statistically significant. The second column in Table 3.15 is for employer-sponsored health insurance. The results for health insurance are less dramatic than for pensions. As seen in Figure 11, magnitudes are lower and not all sample periods show statistically significant differentials. Most recently, since year 2010, the estimations are at least marginally significant.

I find from previous results that wage differentials vary by years. Therefore, I investigate the reasons why they are so different across years. For the analysis of the determinants for the wage differentials, I examine the relationship between the yearly estimated wage differentials[1] and national-level data for economic and political variables. Variables used to explain the variation in the federal-private wage differential are the unemployment rate of workers between 25 and 54, federal spending to GDP ratio, and the President during sample period. Table 3.16 summarizes regression results of two specifications. They are regressed with the same explanatory variables on different wage differentials. In specification 1, I examine the economics condition effects on wage differentials. Specification 1 shows the effect of economic condition variables on wage differentials for all employees and four selected occupations employees separately. Regardless of occupation, federal spending to GDP ratio increases wage differential, however, the effect of unemployment rate is statistically insignificant. For all workers, 1 additional percent federal spending to GDP will increase wage differential 2.4 percent, on average. For four selected occupation workers, the effect of increasing federal spending to GDP smaller than all workers' as much as 0.5 percent. The federal spending usually increase when economic condition is bad and the private sector workers wage growth relatively small during economic condition is bad. However, public sector worker's wage increases by GS or FWS, that is, less depending on economic condition. Therefore, the wage gap could be larger when

[1]These are from Heckman model

the period of federal spending increases.

In specification 2, I add president variables to test the effect of each president on wage differential during sample period and to check how the effect of economic variables will change. Two equations with all employees and four selected occupations employees show similar estimate for federal spending to GDP ratio on wage differential to without controlling president. However, controlling for the president, the unemployment rate becomes statistically significant. Unemployment rate negatively related with wage differentials from both equation in specification 2. That is, one additional percent in unemployment rate will derive 2.8 and 2.4 percent drop in wage differential for all occupation employees and four selected occupation employees, respectively. This finding is interesting since additional control over political variable, actually makes effect of economic variable more significant. In addition, dummy variable for President Bush increased wage differential 3.3 percent relative to the presidential term of Clinton. Although it is not statistically significant, wage differential is getting wider as presidents changed from President Clinton to President Bush and from President Bush to President Obama. In addition to these variables, I test with extra state-level variables such as real GDP growth rate, and employment growth rate. However, the results are similar.

3.2 Conclusion

The recent serious economic conditions in the U.S. provoked debates about public sector worker pay. The main concern about these arguments is whether public sector workers earn the same wage or not. There is much research about wage differential between the public and private sectors, however, most of them have examined only the wage, and none have examined the time trend. This paper does both. Further, I pay careful attention to the potential bias from unobservables.

The OLS estimation for federal wage premium with all workers is between 4.16

percent and 17.14 percent. For the four selected occupations that I examine, the estimates range between 8.8 percent and 16.91 percent. I also explore three general methods, fixed effects (FE) model, IV approach and the Heckit model, to control for unobservable characteristics that might cause biased OLS estimations. Since FE model and IV approach only control for one dimensional unobservable, such as ability, Heckman selection correction model is used in this research due to its ability to control two dimensional unobservables as in a Roy model. The estimation of wage differential from Heckman model is between 4.76 percent and 17.25 percent for all employees and between 8.95 percent and 17.23 percent for the four occupations. These findings suggest that the federal pay differential is invariably positive, but fell during the 1990s, began to rise in the early 2000s, and has continued to rise to the end of the sample period. Potential reason for this differential comes from the different incentive in the private sector and the public sector. Private firms go bankrupt if they overpay, however public sector does not. The latter is more influenced by political factors and less so by economics factors. It gives less pressure for the public sector to minimize cost.

The probability of receiving fringe benefits, employer-provided health insurance and a pension plan, are also estimated. Federal employees enjoy much higher probability of receiving employer-provided pensions. It decreased until the early 2000s, but it rose beyond the period to above 20 percent more than private sector workers' probability. Probit estimates of the probability of receiving employer-provided health insurance shows a smaller magnitude than pensions and not all sample periods show statistically significant differentials. However, since 2010, the effect is marginally significant. The federal government employees gradually have a higher probability of receiving employer-sponsored health insurance than their counterparts of up to 8.45 percent.

Finally, I examine the factors that affect the wage differential over time. Among

economic and political indices, the real GDP growth rate is negative and the employment growth rate and federal spending to GDP ratio are positively related to the wage gaps.

Tables

Table 3.1: Real Average Hourly Earnings, by Worker Category, 1995-2013 CPS MORG.

	Federal	State	Local	Private	Federal/Private	State/Private	Local/ Private
1995	25.354	21.781	22.602	19.962	1.270	1.091	1.132
1996	25.452	21.658	22.173	19.796	1.286	1.094	1.120
1997	25.314	21.905	22.321	20.149	1.256	1.087	1.108
1998	25.945	22.619	22.762	21.061	1.232	1.074	1.081
1999	26.712	22.932	23.098	21.603	1.237	1.062	1.069
2000	26.432	22.928	23.065	21.727	1.217	1.055	1.062
2001	26.999	23.220	23.139	22.321	1.210	1.040	1.037
2002	27.594	23.887	23.477	22.624	1.220	1.056	1.038
2003	27.397	23.600	23.199	21.914	1.250	1.077	1.059
2004	28.242	23.688	23.604	21.932	1.288	1.080	1.076
2005	28.594	23.402	23.100	21.780	1.313	1.074	1.061
2006	29.034	23.349	23.128	21.689	1.339	1.077	1.066
2007	29.283	23.703	23.468	21.833	1.341	1.086	1.075
2008	28.587	23.762	23.518	21.985	1.300	1.081	1.070
2009	29.664	24.074	23.924	22.546	1.316	1.068	1.061
2010	29.574	24.286	24.065	22.339	1.324	1.087	1.077
2011	29.541	23.778	23.873	22.128	1.335	1.075	1.079
2012	30.291	23.579	23.480	22.281	1.360	1.058	1.054
2013	30.359	23.644	23.507	22.198	1.368	1.065	1.059

Data are from the Census Bureau .

Table 3.2: Percentage of workers receiving fringe benefit

	Health Insurance		**Pension Plan**	
	Private	Federal	Private	Federal
1995	0.786	0.906	0.511	0.839
1996	0.802	0.929	0.504	0.858
1997	0.800	0.916	0.510	0.857
1998	0.799	0.918	0.511	0.812
1999	0.805	0.862	0.537	0.812
2000	0.828	0.905	0.531	0.806
2001	0.838	0.932	0.534	0.788
2002	0.845	0.936	0.535	0.791
2003	0.831	0.910	0.516	0.830
2004	0.823	0.918	0.513	0.790
2005	0.807	0.904	0.511	0.804
2006	0.786	0.879	0.497	0.801
2007	0.777	0.928	0.472	0.790
2008	0.789	0.881	0.511	0.805
2009	0.791	0.915	0.502	0.820
2010	0.762	0.885	0.487	0.781
2011	0.763	0.916	0.482	0.826
2012	0.763	0.894	0.487	0.778
2013	0.757	0.904	0.483	0.813

Data are from the Census Bureau .

Table 3.3: Summary Statistics, 1995-2013 Current Population Survey Merged Outgoing Rotation

	Entire Sample		Federal		Private	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Wage	21.73	13.208	27.92	13.908	21.45	13.108
Health Insurance	0.807	0.395	0.909	0.287	0.802	0.398
Pension Plan	0.522	0.500	0.809	0.393	0.509	0.500
Federal Employee	0.041	0.198				
School	13.396	2.563	14.439	2.394	13.351	2.561
Age	40.234	12.014	44.686	10.817	40.045	12.025
Female	0.436	0.496	0.441	0.496	0.436	0.496
Union	0.098	0.298	0.295	0.456	0.090	0.286
Msa						
Balance	0.479	0.500	0.469	0.499	0.479	0.500
Non-Metropolitan	0.237	0.425	0.216	0.411	0.238	0.426
Experience	20.839	12.153	24.247	11.082	20.694	12.175
Region						
Midwest	0.246	0.431	0.175	0.380	0.249	0.433
South	0.308	0.462	0.410	0.492	0.304	0.460
West	0.235	0.424	0.263	0.440	0.234	0.423
Race						
Black	0.091	0.288	0.164	0.370	0.088	0.284
Asian	0.043	0.203	0.052	0.222	0.043	0.203
Others	0.131	0.337	0.104	0.306	0.132	0.339
Occupation						
Professional	0.170	0.375	0.254	0.435	0.166	0.372
Service	0.119	0.324	0.094	0.292	0.120	0.325
Sales	0.114	0.317	0.014	0.116	0.118	0.322
Administrative support	0.148	0.355	0.311	0.463	0.141	0.348
Farming, fishing, and forestry	0.012	0.109	0.006	0.079	0.012	0.110
Construction	0.060	0.237	0.017	0.129	0.062	0.240
Installation, maintenance, and repair	0.046	0.209	0.034	0.181	0.047	0.211
Production	0.097	0.296	0.021	0.145	0.101	0.301
Transportation	0.074	0.262	0.033	0.178	0.076	0.264
Locality						
Atlanta	0.011	0.107	0.008	0.092	0.012	0.107
Boston	0.018	0.133	0.012	0.109	0.018	0.134
Buffalo-Niagara	0.003	0.053	0.002	0.049	0.003	0.054
Chicago	0.027	0.162	0.016	0.127	0.028	0.164
Cincinnati	0.006	0.077	0.004	0.063	0.006	0.077
Cleveland	0.009	0.095	0.006	0.076	0.009	0.096
Columbus	0.005	0.070	0.004	0.062	0.005	0.070
Dallas	0.013	0.113	0.008	0.088	0.013	0.114
Dayton	0.003	0.053	0.005	0.071	0.003	0.052
Denver	0.012	0.109	0.013	0.113	0.012	0.109
Detroit	0.015	0.123	0.009	0.092	0.016	0.125
Hartford	0.006	0.076	0.003	0.050	0.006	0.077
Houston	0.011	0.106	0.005	0.071	0.012	0.107
Huntsville	0.002	0.043	0.004	0.060	0.002	0.042
Indianapolis	0.005	0.068	0.004	0.060	0.005	0.069
Los Angeles	0.037	0.188	0.022	0.146	0.037	0.190
Miami	0.012	0.107	0.007	0.086	0.012	0.108
Milwaukee	0.006	0.080	0.003	0.058	0.007	0.080
Minneapolis	0.014	0.116	0.008	0.088	0.014	0.117
New York	0.045	0.208	0.030	0.170	0.046	0.209
Philadelphia	0.021	0.145	0.018	0.132	0.022	0.145
Phoenix	0.009	0.096	0.005	0.071	0.010	0.097
Pittsburgh	0.007	0.085	0.005	0.070	0.007	0.086
Portland	0.008	0.087	0.005	0.069	0.008	0.088
Raleigh	0.004	0.065	0.003	0.053	0.004	0.066
Richmond	0.003	0.055	0.004	0.060	0.003	0.055
Sacramento	0.004	0.060	0.003	0.054	0.004	0.060
San Diego	0.006	0.076	0.009	0.094	0.006	0.075
San Jose	0.014	0.117	0.011	0.103	0.014	0.118
Seattle	0.009	0.097	0.008	0.090	0.010	0.097
Washington	0.038	0.192	0.172	0.377	0.033	0.178
State of Alaska	0.012	0.107	0.030	0.170	0.011	0.104
State of Hawaii	0.013	0.113	0.027	0.161	0.012	0.110

Data are from the Census Bureau.

Table 3.4: Detailed Summary of Key Variables in Federal Government and Private Sector Workers

	School		Age		Female		Union		White		Management		Professional		Sevice		Administation	
	Federal	Private	Federal	Private	Federal	Private	Federal	Private	Federal	Private	Federal	Private	Federal	Private	Federal	Private	Federal	Private
1995	14.026	13.123	42.531	38.140	0.447	0.429	0.331	0.115	0.700	0.785	0.231	0.146	0.224	0.145	0.067	0.101	0.357	0.147
1996	14.051	13.107	43.048	38.334	0.445	0.431	0.325	0.111	0.705	0.779	0.230	0.148	0.226	0.145	0.068	0.103	0.345	0.145
1997	14.142	13.113	42.936	38.434	0.439	0.433	0.325	0.107	0.712	0.769	0.219	0.151	0.226	0.149	0.076	0.102	0.354	0.142
1998	14.128	13.145	43.418	38.662	0.442	0.433	0.333	0.105	0.698	0.763	0.224	0.153	0.221	0.152	0.076	0.104	0.355	0.142
1999	14.220	13.163	44.107	38.888	0.434	0.431	0.331	0.105	0.700	0.756	0.238	0.156	0.225	0.155	0.074	0.104	0.341	0.138
2000	14.159	13.170	44.101	38.964	0.423	0.431	0.319	0.100	0.694	0.741	0.220	0.156	0.231	0.155	0.067	0.103	0.348	0.139
2001	14.244	13.229	44.417	39.303	0.429	0.433	0.320	0.098	0.692	0.744	0.228	0.160	0.242	0.160	0.073	0.106	0.319	0.137
2002	14.255	13.273	44.748	39.661	0.446	0.435	0.320	0.095	0.684	0.751	0.226	0.164	0.236	0.162	0.085	0.107	0.330	0.134
2003	14.278	13.290	44.925	39.976	0.452	0.438	0.304	0.090	0.685	0.745	0.201	0.151	0.243	0.162	0.098	0.125	0.333	0.151
2004	14.323	13.307	45.037	40.125	0.441	0.436	0.289	0.087	0.678	0.737	0.196	0.151	0.253	0.163	0.110	0.129	0.314	0.147
2005	14.435	13.320	45.247	40.213	0.436	0.435	0.276	0.085	0.672	0.731	0.196	0.151	0.251	0.165	0.111	0.128	0.311	0.146
2006	14.513	13.332	45.613	40.351	0.439	0.434	0.277	0.080	0.676	0.718	0.200	0.153	0.260	0.164	0.106	0.130	0.313	0.145
2007	14.630	13.393	45.298	40.596	0.436	0.437	0.258	0.080	0.659	0.714	0.208	0.157	0.269	0.168	0.103	0.129	0.299	0.142
2008	14.599	13.467	45.444	40.861	0.448	0.438	0.274	0.083	0.661	0.716	0.203	0.161	0.272	0.174	0.100	0.131	0.295	0.141
2009	14.662	13.547	45.493	41.302	0.449	0.442	0.276	0.077	0.672	0.719	0.215	0.168	0.262	0.182	0.112	0.136	0.284	0.139
2010	14.729	13.597	45.026	41.437	0.441	0.444	0.266	0.076	0.658	0.714	0.205	0.166	0.278	0.187	0.122	0.138	0.270	0.140
2011	14.816	13.638	45.565	41.634	0.440	0.442	0.274	0.075	0.668	0.711	0.214	0.168	0.289	0.187	0.110	0.136	0.266	0.138
2012	14.941	13.694	45.683	41.777	0.441	0.436	0.258	0.071	0.668	0.707	0.223	0.176	0.305	0.188	0.108	0.136	0.252	0.132
2013	15.041	13.748	45.799	41.890	0.442	0.438	0.260	0.072	0.645	0.703	0.224	0.176	0.295	0.191	0.117	0.134	0.249	0.131

Data are from the Census Bureau .

Table 3.5: Wage Differential, OLS, Year-by-Year, 1995-2013 CPS MORG

Year	OLS Wage Differential
1995	0.138***
	(0.015)
1996	0.129***
	(0.018)
1997	0.115***
	(0.017)
1998	0.065***
	(0.021)
1999	0.042
	(0.027)
2000	0.079***
	(0.014)
2001	0.089***
	(0.012)
2002	0.082***
	(0.014)
2003	0.117***
	(0.017)
2004	0.089***
	(0.015)
2005	0.129***
	(0.014)
2006	0.154***
	(0.015)
2007	0.151***
	(0.014)
2008	0.151***
	(0.013)
2009	0.158***
	(0.014)
2010	0.166***
	(0.014)
2011	0.147***
	(0.016)
2012	0.161***
	(0.019)
2013	0.171***
	(0.016)

Note: standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Data are from the Census Bureau.

Table 3.6: Wage Differential, OLS, Year-by-Year, 4 Occupations, 1995-2013 CPS MORG

Year	OLS Wage Differential (4 Occ.)
1995	0.149***
	(0.012)
1996	0.143***
	(0.011)
1997	0.141***
	(0.012)
1998	0.115***
	(0.014)
1999	0.112***
	(0.012)
2000	0.089***
	(0.013)
2001	0.118***
	(0.011)
2002	0.118***
	(0.011)
2003	0.091***
	(0.012)
2004	0.107***
	(0.012)
2005	0.117***
	(0.012)
2006	0.149***
	(0.012)
2007	0.159***
	(0.013)
2008	0.155***
	(0.012)
2009	0.147***
	(0.013)
2010	0.164***
	(0.013)
2011	0.141***
	(0.013)
2012	0.160***
	(0.017)
2013	0.169***
	(0.014)

Note: standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Data are from the Census Bureau.

Table 3.7: Coefficients of inverse Mills ratio, Year-by-Year, Each Sector

Year	Federal	Private	Coeff.
1995	0.141	0.245	-0.103
			(0.095)
1996	0.159	0.275	-0.116
			(0.129)
1997	0.180	0.346	-0.166
			(0.112)
1998	-0.405	0.335	-0.740***
			(0.242)
1999	-0.248	0.216	-0.465**
			(0.221)
2000	-0.344	0.317	-0.662***
			(0.111)
2001	0.087	0.430	-0.343***
			(0.075)
2002	0.013	0.248	-0.235***
			(0.082)
2003	0.062	0.326	-0.264***
			(0.097)
2004	0.332	0.320	0.0116
			(0.107)
2005	0.071	0.333	-0.262*
			(0.134)
2006	-0.008	0.274	-0.282***
			(0.085)
2007	0.111	0.301	-0.190*
			(0.099)
2008	-0.142	0.256	-0.398***
			(0.094)
2009	-0.079	0.266	-0.346***
			(0.093)
2010	-0.071	0.386	-0.457***
			(0.129)
2011	0.181	0.241	-0.0607
			(0.102)
2012	-0.057	0.240	-0.297**
			(0.131)
2013	-0.042	0.192	-0.234**
			(0.100)

Note: standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Data are from the Census Bureau.

Table 3.8: Coefficients of inverse Mills ratio, Year-by-Year, Each Sector, 4 Occupations

Year	Federal	Private	Coeff.
1995	0.069	0.053	0.0164
			(0.121)
1996	0.213	0.161	0.0527
			(0.127)
1997	0.194	0.164	0.0296
			(0.116)
1998	-0.226	0.058	-0.284
			(0.174)
1999	-0.396	0.039	-0.435*
			(0.223)
2000	-0.319	0.070	-0.390***
			(0.112)
2001	0.115	0.289	-0.174*
			(0.098)
2002	0.086	0.097	-0.0109
			(0.093)
2003	0.067	0.292	-0.225**
			(0.113)
2004	0.323	0.193	0.13
			(0.106)
2005	0.081	0.208	-0.127
			(0.151)
2006	-0.003	0.112	-0.114
			(0.106)
2007	0.099	0.122	-0.023
			(0.093)
2008	-0.171	0.177	-0.348***
			(0.122)
2009	-0.094	0.158	-0.251***
			(0.084)
2010	-0.009	0.281	-0.290*
			(0.170)
2011	0.176	0.153	0.0226
			(0.095)
2012	-0.104	0.155	-0.258**
			(0.130)
2013	-0.026	0.179	-0.205**
			(0.101)

Note: standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Data are from the Census Bureau.

Table 3.9: Wage Differential using Heckman Selection Model, Year-by-Year, CPS ORG

Year	Wage Differential(Heckman)
1995	0.143***
	(0.015)
1996	0.132***
	(0.021)
1997	0.116***
	(0.018)
1998	0.0644**
	(0.026)
1999	0.0476*
	(0.029)
2000	0.0781***
	(0.016)
2001	0.0892***
	(0.016)
2002	0.0822***
	(0.013)
2003	0.117***
	(0.017)
2004	0.0936***
	(0.015)
2005	0.129***
	(0.013)
2006	0.155***
	(0.016)
2007	0.153***
	(0.012)
2008	0.145***
	(0.014)
2009	0.153***
	(0.015)
2010	0.162***
	(0.018)
2011	0.155***
	(0.017)
2012	0.161***
	(0.019)
2013	0.172***
	(0.015)

Note: standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Data are from the Census Bureau.

Table 3.10: Wage Differential using Heckman Selection Model, Year-by-Year, 4 Occupation, CPS ORG

	Wage Differential(Heckman, 4 Occupation)
1995	0.152***
	(0.015)
1996	0.146***
	(0.015)
1997	0.143***
	(0.013)
1998	0.114***
	(0.018)
1999	0.118***
	(0.014)
2000	0.0943***
	(0.013)
2001	0.115***
	(0.011)
2002	0.116***
	(0.010)
2003	0.0895***
	(0.012)
2004	0.101***
	(0.011)
2005	0.115***
	(0.012)
2006	0.149***
	(0.011)
2007	0.158***
	(0.013)
2008	0.159***
	(0.012)
2009	0.147***
	(0.014)
2010	0.164***
	(0.012)
2011	0.139***
	(0.011)
2012	0.162***
	(0.020)
2013	0.172***
	(0.017)

Note: standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Data are from the Census Bureau.

Table 3.11: Summary of Coefficient Differences for Key Independent Variables

	School	Female	Union	Black	Locality
1995	-0.0024	0.0612	-0.0450	-0.0093	-0.0099
1996	-0.0095	0.0366	-0.0149	0.0032	-0.0056
1997	-0.0029	0.0390	-0.0306	-0.0033	-0.0040
1998	-0.0291	0.1440	-0.4086	-0.1062	-0.0109
1999	-0.0232	0.1339	-0.2634	-0.0917	0.0064
2000	-0.0328	0.1372	-0.3411	-0.0854	-0.0041
2001	-0.0020	0.0695	-0.1046	-0.0099	-0.0074
2002	0.0000	0.0674	-0.1183	0.0187	-0.0193
2003	0.0010	0.0493	-0.0721	-0.0307	-0.0263
2004	0.0263	0.0267	0.0880	0.0051	-0.0164
2005	0.0063	0.0626	-0.0682	0.0138	-0.0268
2006	-0.0035	0.0606	-0.1104	-0.0493	-0.0157
2007	0.0009	0.0402	-0.0996	-0.0046	-0.0148
2008	-0.0234	0.0928	-0.2202	-0.0782	-0.0010
2009	-0.0106	0.0650	-0.2003	-0.1060	-0.0131
2010	-0.0192	0.0939	-0.2020	-0.2001	-0.0043
2011	0.0082	-0.0068	0.0315	0.0154	-0.0176
2012	-0.0129	0.0864	-0.1598	-0.0026	0.0146
2013	-0.0111	0.0661	-0.1407	0.0016	-0.0176

Table 3.12: Summary of Mean Value Differences for Key Independent Variables

	School	Female	Union	Black	Locality
1995	0.9031	0.0183	0.2160	0.0882	0.0211
1996	0.9443	0.0144	0.2133	0.0815	0.0254
1997	1.0292	0.0061	0.2185	0.0693	0.0228
1998	0.9825	0.0092	0.2279	0.0716	0.0223
1999	1.0569	0.0036	0.2260	0.0800	0.0177
2000	0.9892	-0.0080	0.2195	0.0696	0.0195
2001	1.0149	-0.0037	0.2220	0.0750	0.0265
2002	0.9823	0.0113	0.2250	0.0870	0.0250
2003	0.9885	0.0140	0.2143	0.0839	0.0267
2004	1.0161	0.0055	0.2021	0.0776	0.0240
2005	1.1158	0.0009	0.1915	0.0708	0.0309
2006	1.1812	0.0050	0.1961	0.0724	0.0282
2007	1.2377	-0.0008	0.1780	0.0791	0.0317
2008	1.1317	0.0101	0.1916	0.0739	0.0292
2009	1.1152	0.0069	0.1985	0.0696	0.0301
2010	1.1317	-0.0029	0.1901	0.0763	0.0333
2011	1.1777	-0.0015	0.1989	0.0709	0.0283
2012	1.2470	0.0046	0.1866	0.0688	0.0338
2013	1.2926	0.0041	0.1879	0.0738	0.0356

Table 3.13: Correlation between Wage differentials and Coefficients' Value Differences

	School	Female	Union	Black	Locality	Constant	WD Heckman (All Occupations)	WD Heckman (4 Occupations)
School	1							
Female	-0.8441586	1						
Union	0.9053815	-0.9292215	1					
Black	0.6678511	-0.637886	0.6889434	1				
Locality	-0.560481	0.4667753	-0.3750115	-0.3137425	1			
Constant	-0.9436426	0.8732716	-0.9704736	-0.6663603	0.38611	1		
WD Heckman (All Occupations)	0.1876218	-0.4972385	0.342929	0.0780711	-0.0968593	-0.2066005	1	
WD Heckman (4 Occupations)	-0.1398008	-0.1810433	0.0639162	-0.0789617	0.3144217	0.0492087	0.786776289	1

Table 3.14: Correlation between Wage differentials and Mean Value Differences

	School	Female	Union	Black	Locality	WD Heckman (All Occupations)	WD Heckman (4 Occupations)
School	1						
Female	-0.4267979	1					
Union	-0.8335603	0.2536728	1				
Black	-0.4977421	0.5802354	0.3167389	1			
Locality	0.792813	-0.1858776	-0.8540094	-0.2907837	1		
WD Heckman (All Occupations)	0.6438947	0.0320084	-0.8281023	-0.1840888	0.8107978	1	
WD Heckman (4 Occupations)	0.6103313	0.0729287	-0.634614	-0.1420167	0.6166544	0.786776289	1

Table 3.15: Fringe Benefit Differential from Probit model

Year	Pension Plan	Health Insurance
1995	0.221***	0.053**
	(0.029)	(0.022)
1996	0.257***	0.071***
	(0.031)	(0.021)
1997	0.250***	0.041*
	(0.032)	(0.025)
1998	0.211***	0.050**
	(0.033)	(0.024)
1999	0.172***	-0.018
	(0.034)	(0.029)
2000	0.156***	-0.008
	(0.033)	(0.025)
2001	0.153***	0.046***
	(0.024)	(0.014)
2002	0.174***	0.032**
	(0.023)	(0.015)
2003	0.251***	0.007
	(0.023)	(0.018)
2004	0.209***	0.028*
	(0.023)	(0.017)
2005	0.236***	0.033
	(0.030)	(0.023)
2006	0.213***	0.011
	(0.030)	(0.025)
2007	0.206***	0.087***
	(0.031)	(0.021)
2008	0.203***	0.009
	(0.031)	(0.026)
2009	0.265***	0.043*
	(0.029)	(0.024)
2010	0.229***	0.059***
	(0.028)	(0.023)
2011	0.266***	0.084***
	(0.029)	(0.022)
2012	0.225***	0.043*
	(0.031)	(0.026)
2013	0.242***	0.071***
	(0.029)	(0.023)

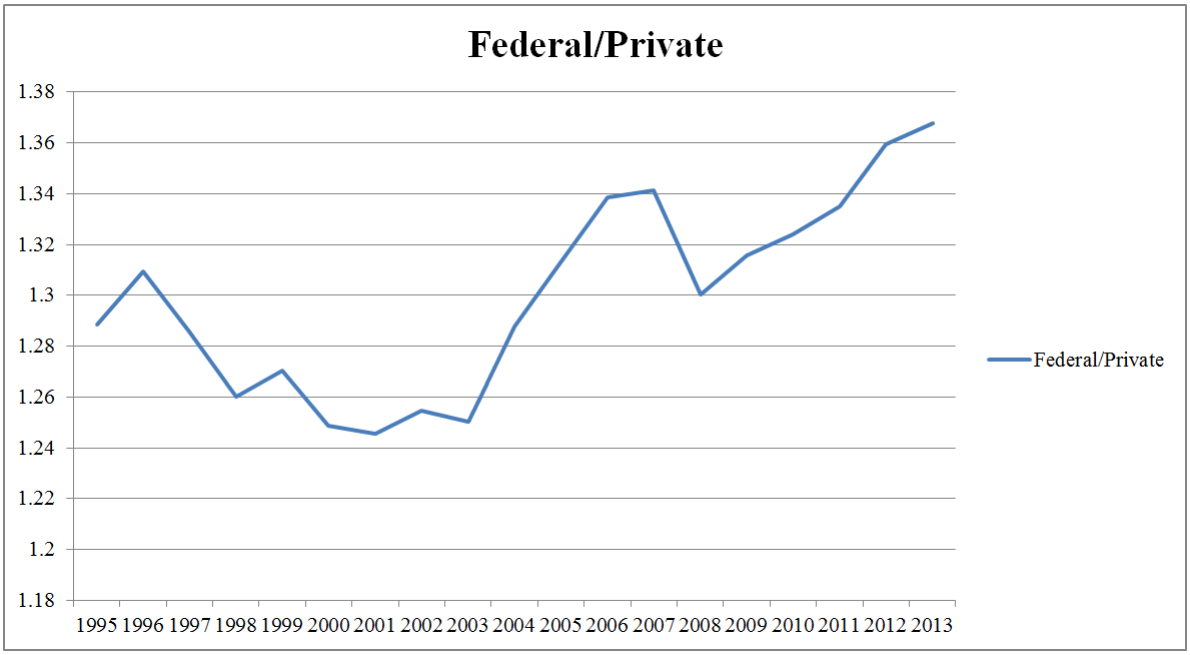
Note: standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Data are from the Census Bureau.

Table 3.16: Time series analysis of Wage Differentials

	Specification 1		Specification 2	
	All	4 Occ.	All	4 Occ.
	Coef.	Coef.	Coef.	Coef.
Unemployment Rate (Age 25~54)	-0.013	-0.014	-0.028*	-0.024*
	(0.012)	(0.009)	(0.014)	(0.012)
Fed. Spending to GDP	0.024***	0.019***	0.03***	0.019**
	(0.010)	(0.008)	(0.010)	(0.008)
Bush			0.033**	0.007
			(0.015)	(0.012)
Obama			0.053	0.043
			(0.038)	(0.032)
Constant	0.041*	-0.170	-0.351**	-0.146
	(0.147)	(0.114)	(0.143)	(0.121)

Figures

Figure 3.1: Trend of Real Wage Ratio between Public and Private Sector.



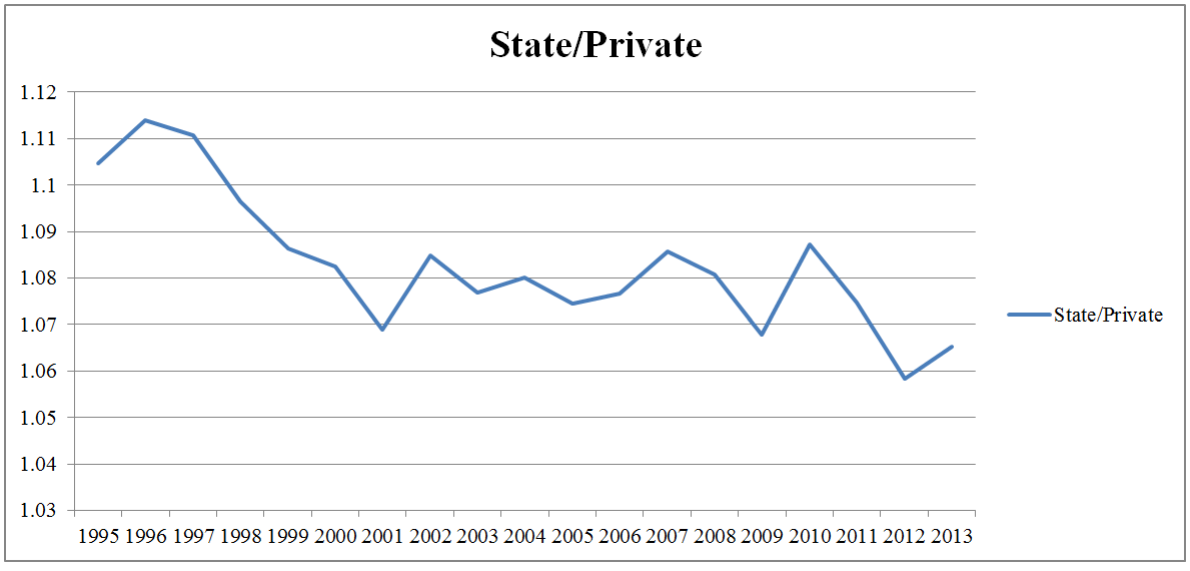


Figure 3.2: Summary of Coefficient Differences Effect on Key Independent Variables

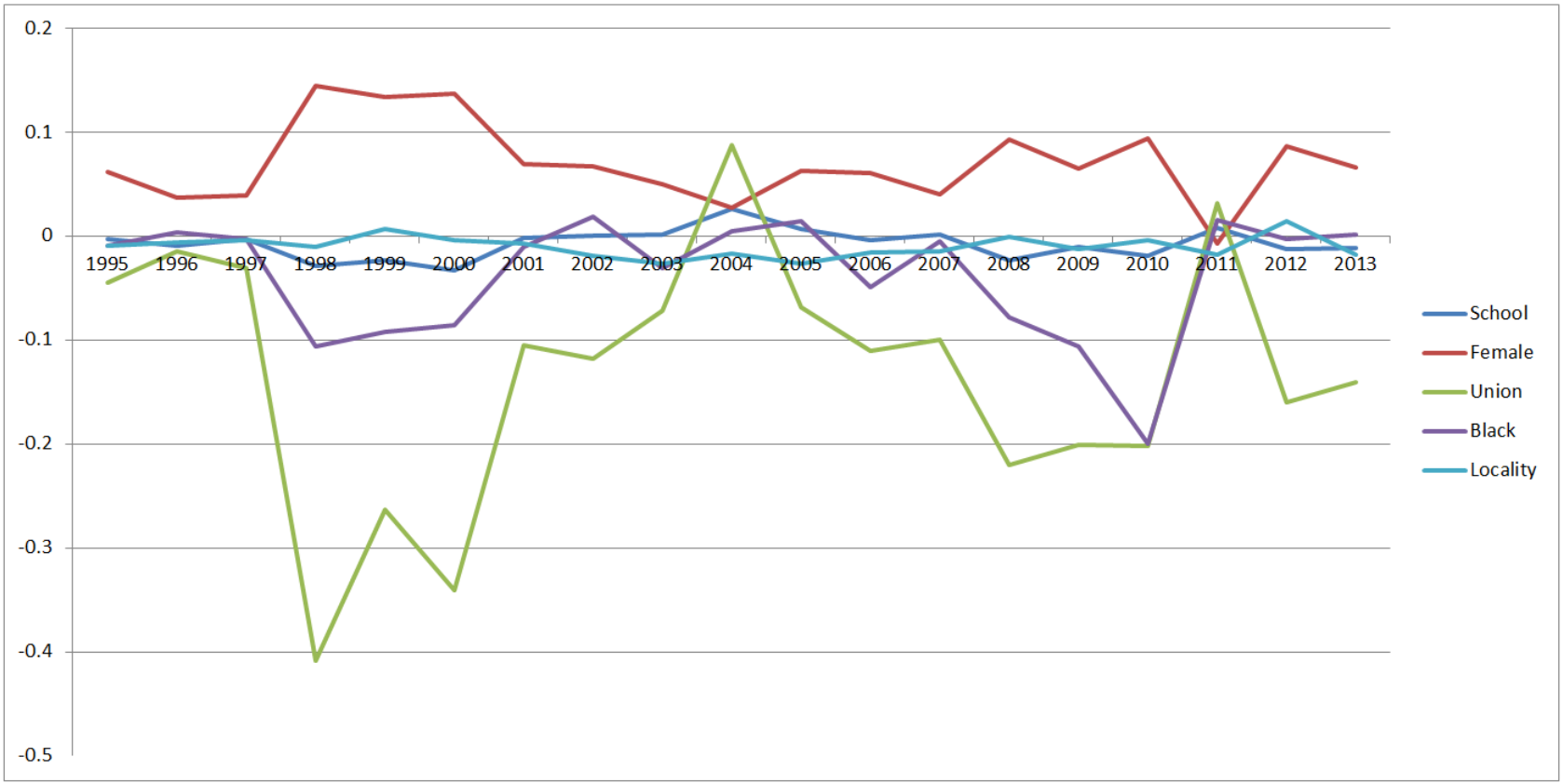
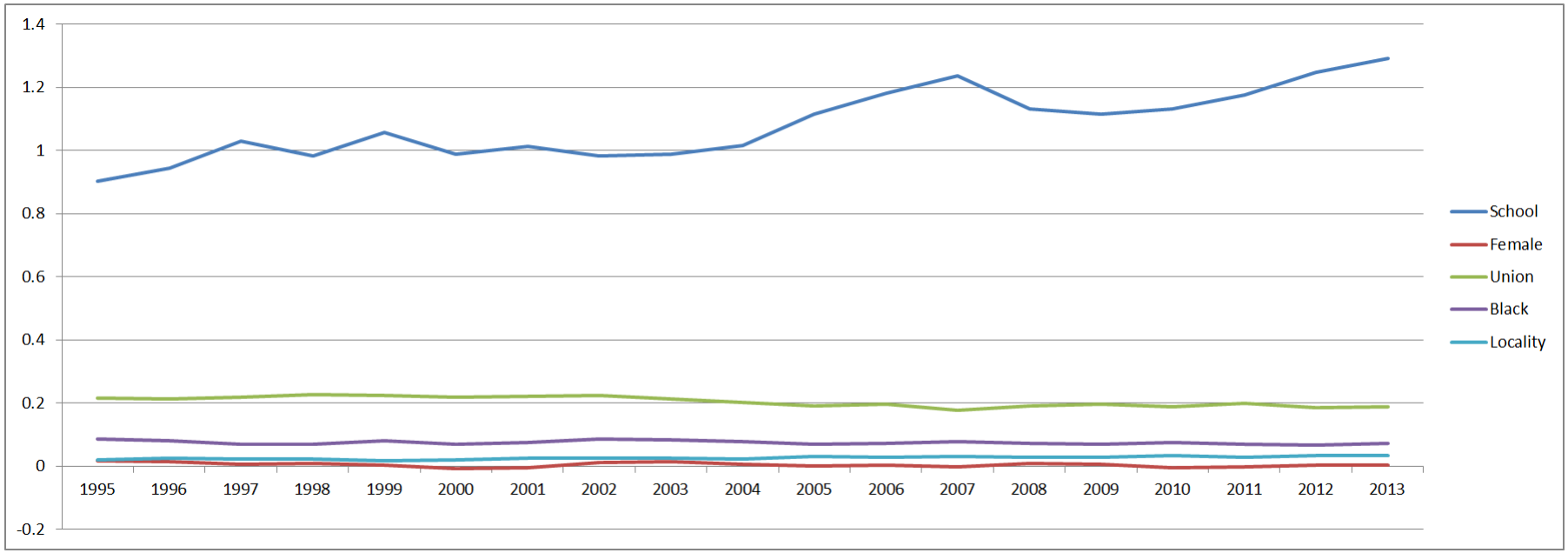


Figure 3.3: Summary of Mean Value Differences Effect on Key Independent Variables



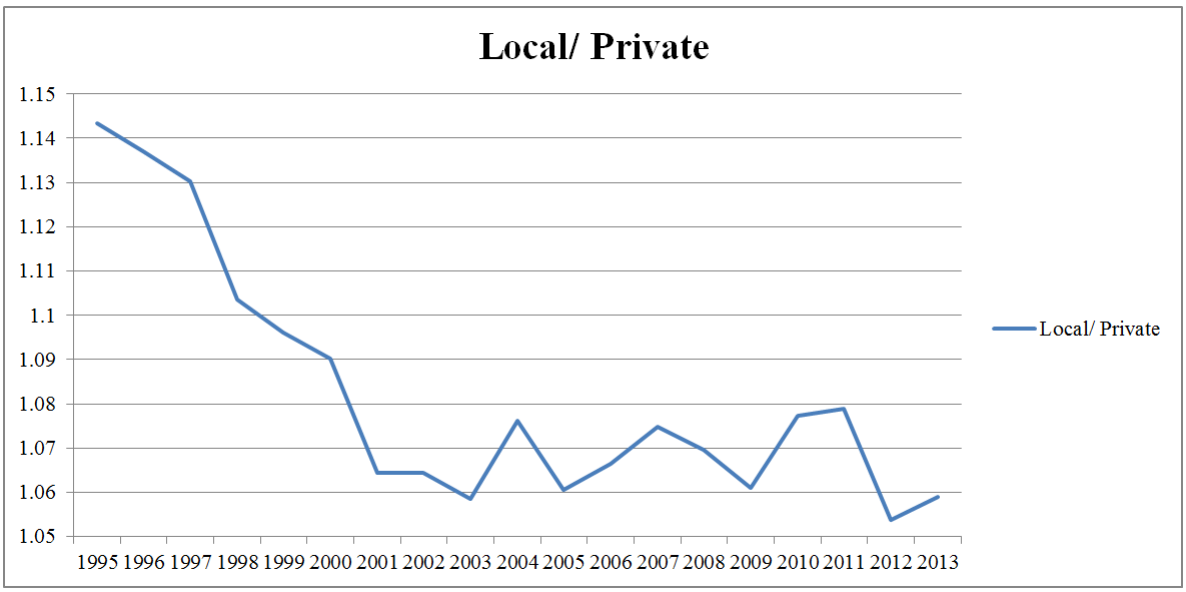
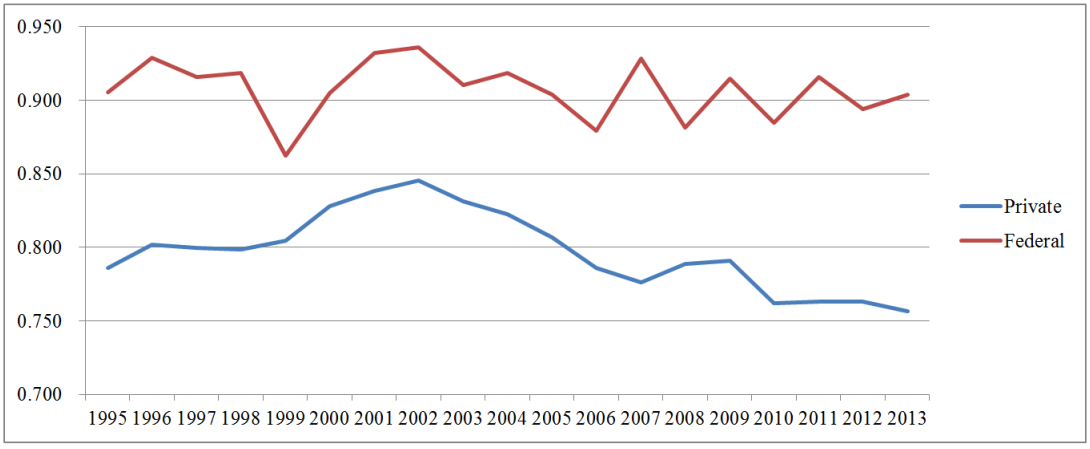

Local/ Private
1.15
1.14
1.13
1.12
1.11
1.1
1.09
1.08
1.07
1.06
1.05
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Local/ Private

Figure 3.4: Percentage of workers receiving fringe benefit

< Health Insurance >



< Pension Plan >

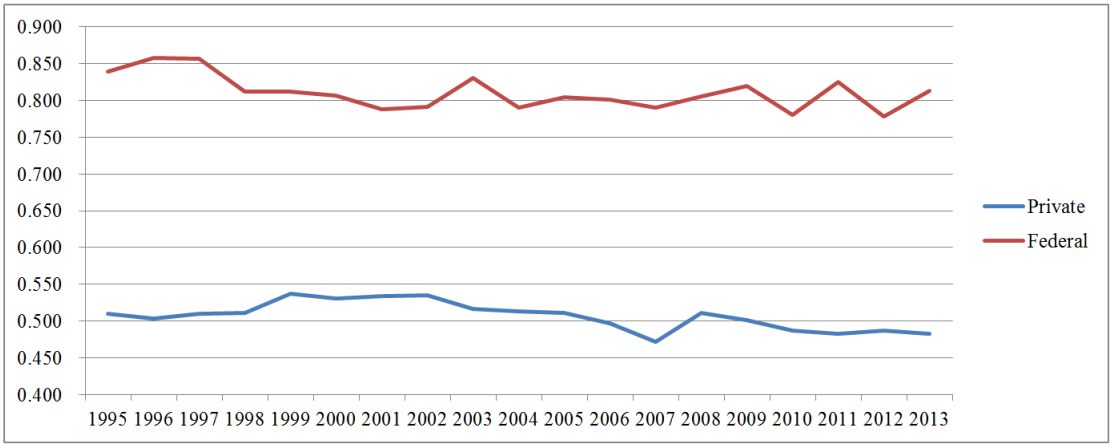


Figure 3.5: Wage Differential, OLS, Year-by-Year, 1995-2013 CPS MORG

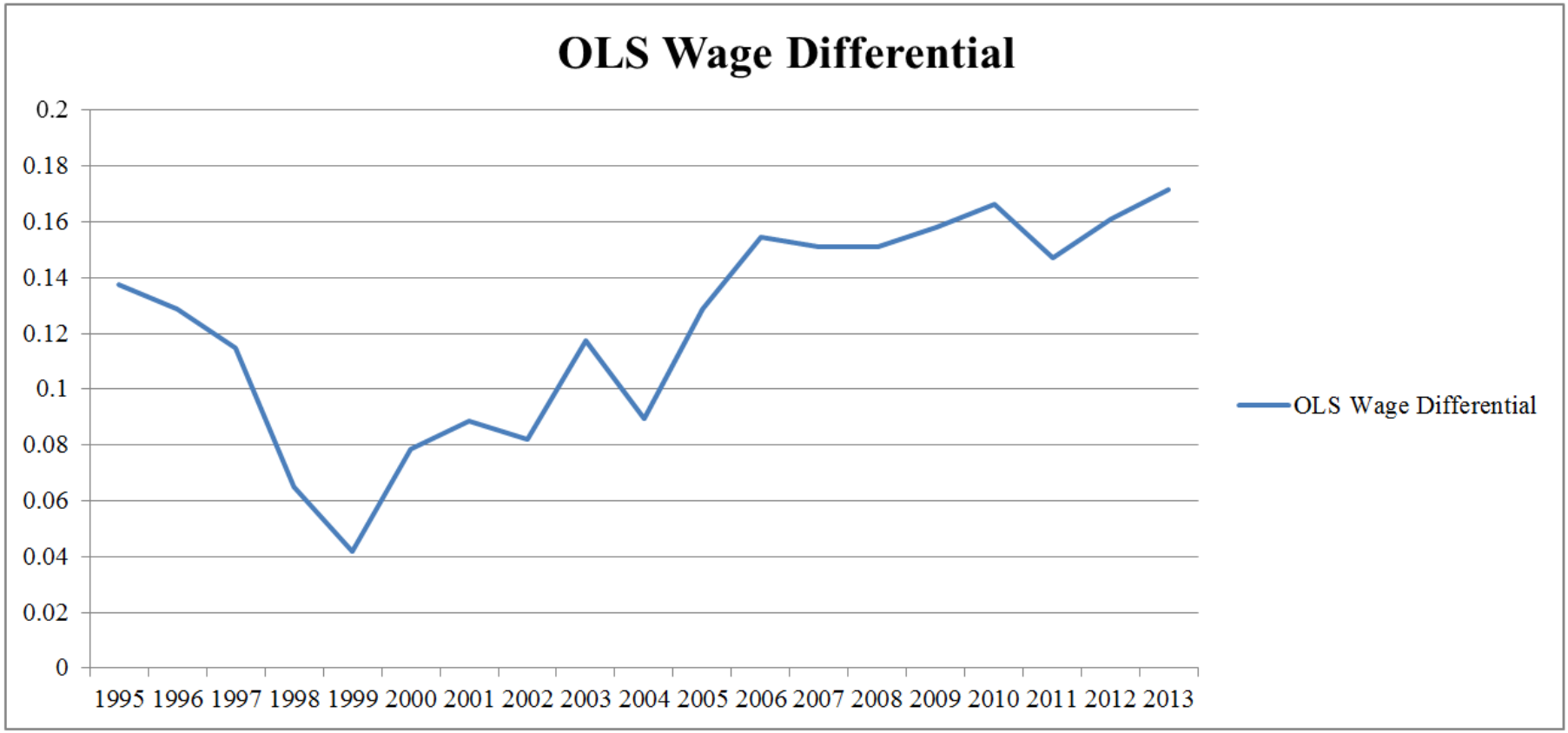


Figure 3.6: Wage Differential, OLS, Year-by-Year, 4 Occupations, 1995-2013 CPS MORG

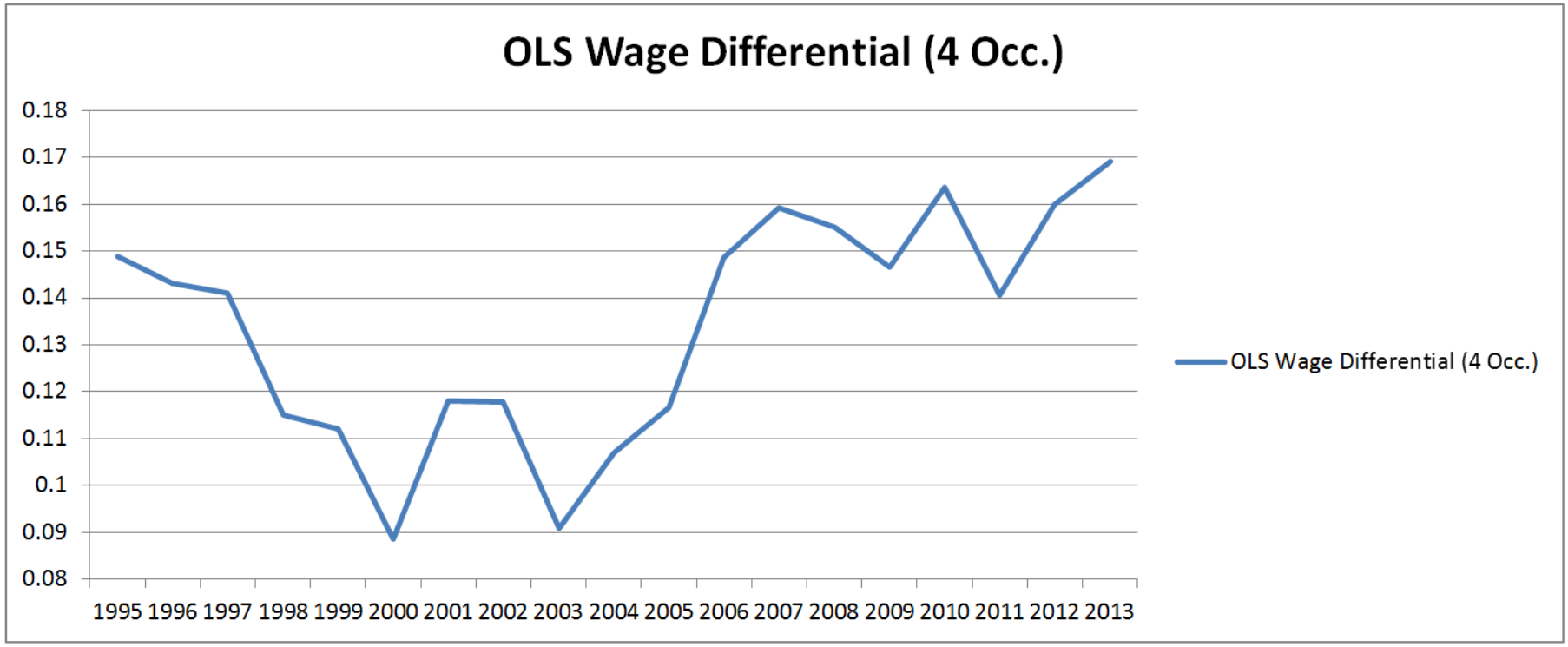


Figure 3.7: Wage Differential using Heckman Selection Model, Year-by-Year, CPS ORG

Figure 3.8: Wage Differential using Heckman Selection Model, Year-by-Year, 4 Occupation, CPS ORG

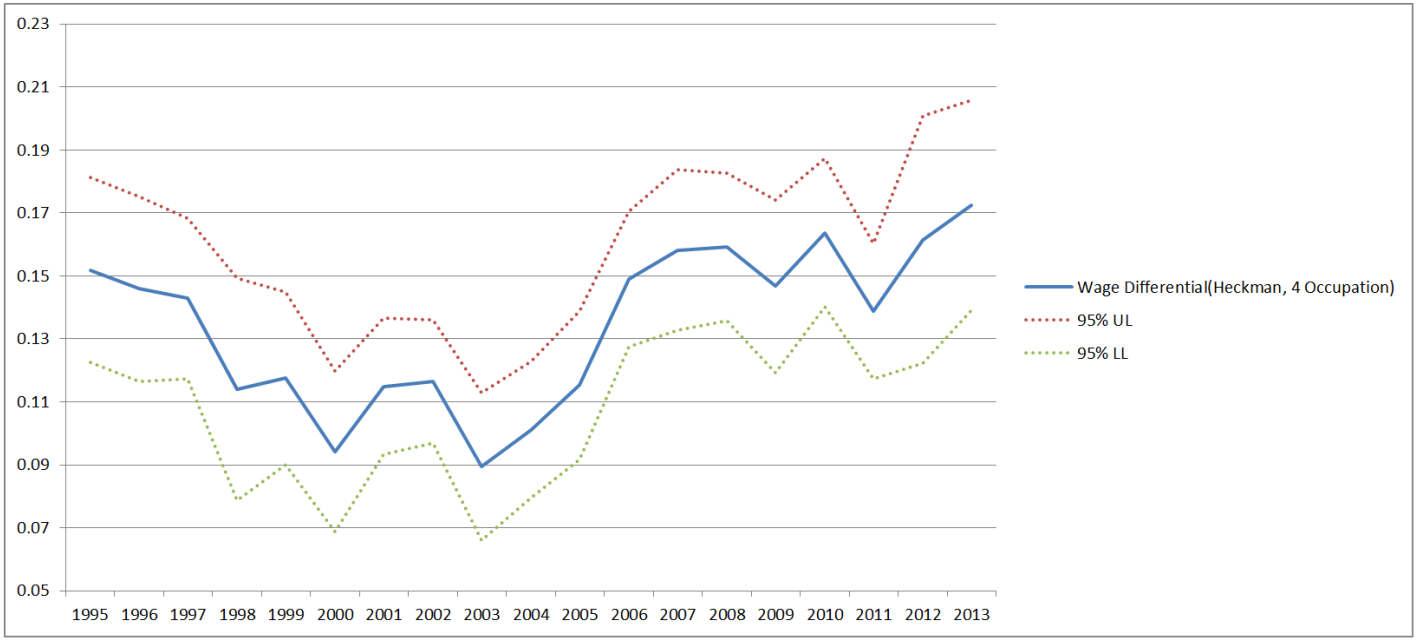


Figure 3.9: Comparing Wage differentials (All vs. 4 Occupation)

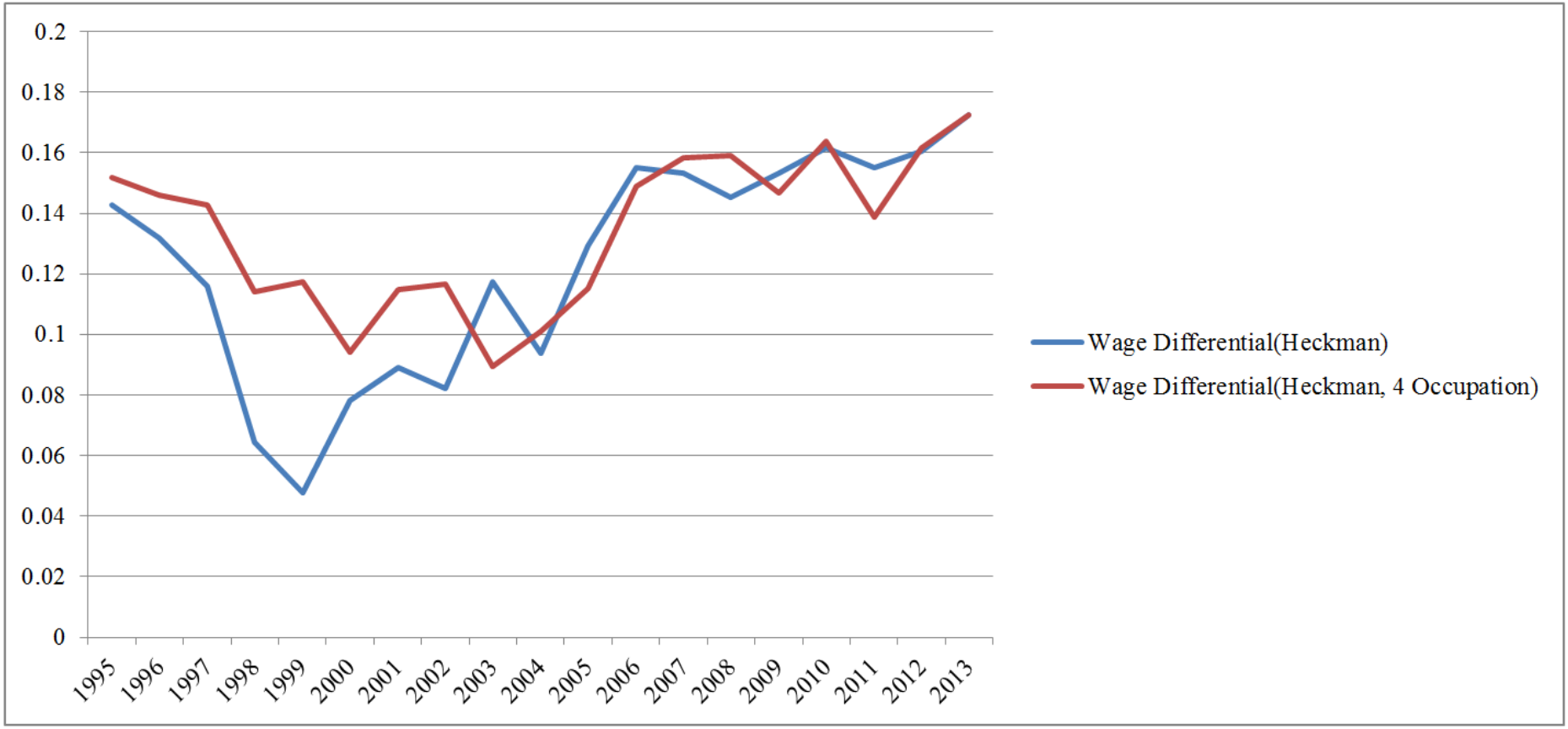


Figure 3.10: Comparing Wage differentials (OLS vs.Heckman)

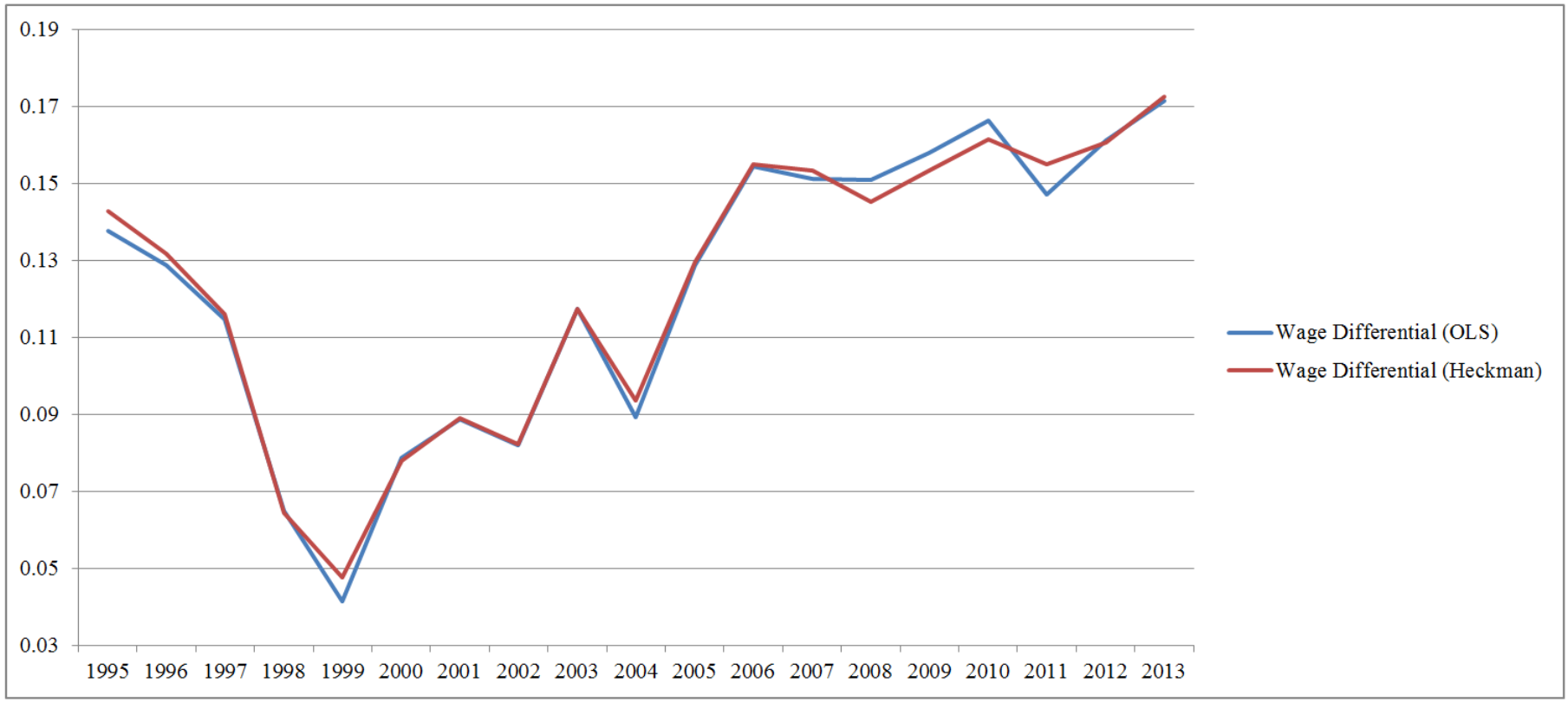


Figure 3.11: Comparing Wage differentials (OLS vs.Heckman, 4 Occupation)

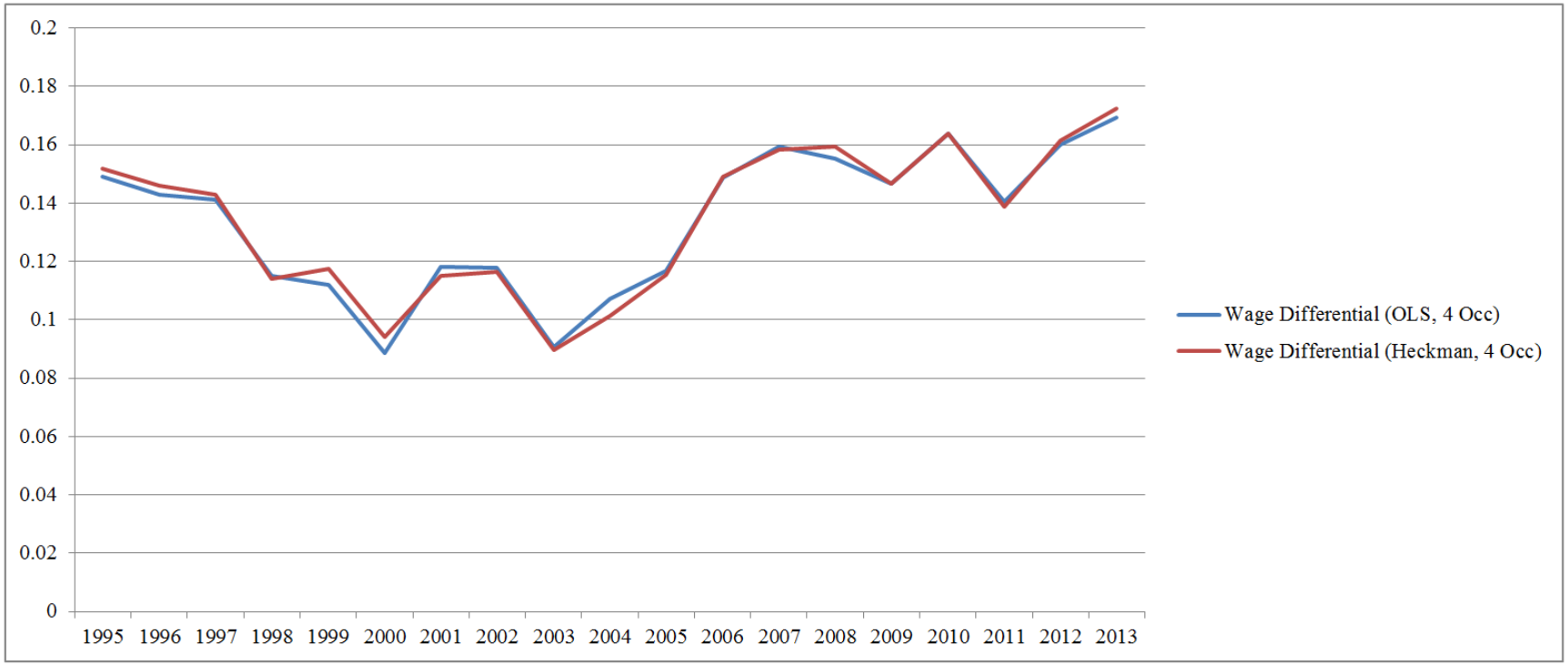


Figure 3.12: Trend of Pension Plan Differentials, Year-by-Year, March CPS

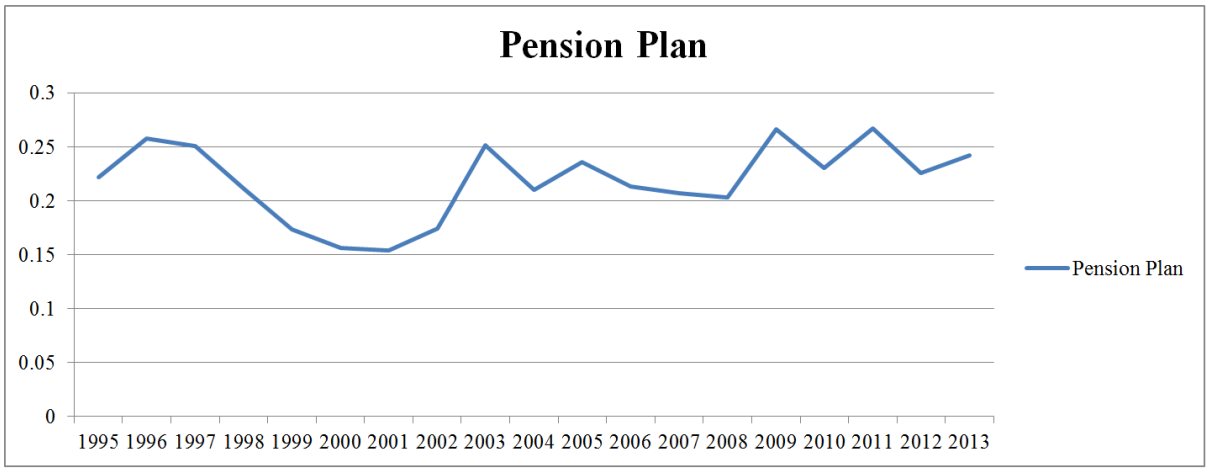
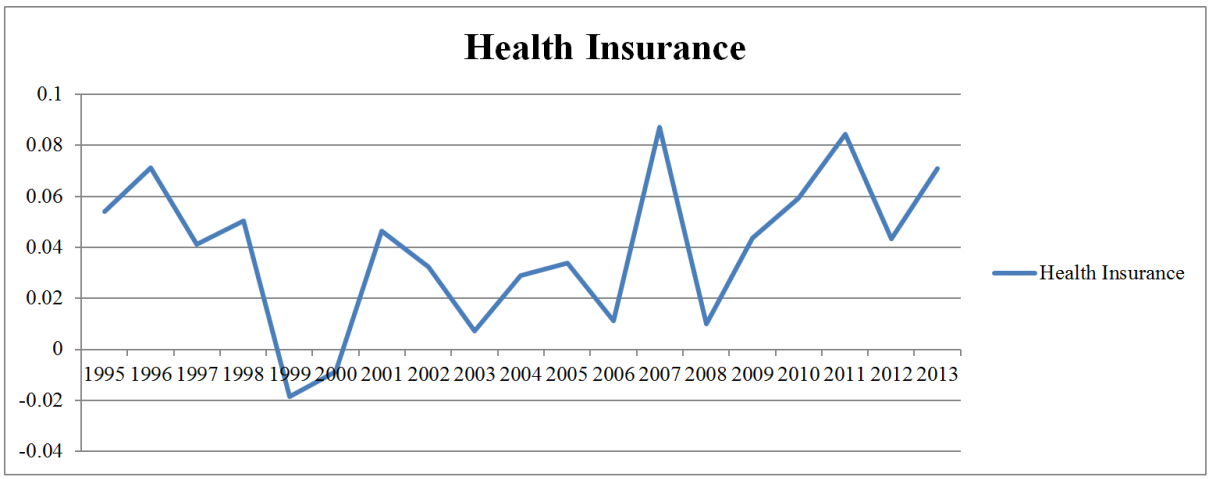


Figure 3.13: Trend of Health Insurance Differentials, Year-by-Year, March CPS



Definitions for Variables

- **Hourly Wage**: The wage rate is used, if reported. Otherwise, this is reported earning divided by reported usual hours over that time span.
- **School**: This variable indicates the number of years of education the workers attained.
- **Experience**: I calculated potential experience (= Age- School -6).
- **Female**: If a worker who interviewed is female, then the value for this variable is 1 and 0.
- **Race**: There are four race dummy variables one each for White, Black, Asian, others.
- **Region**: There are four region dummy variables, one each Northeast, Midwest, South, and West.
- **MSA**: This variable defines the Metropolitan Statistical Area status. Separate dummies are created in the city of an MSA, the balance of the MSA, and non-metropolitan location.
- **Occupation**: Dummies variables are created for ten major occupations.

Chapter 4 State.Local-Private Wage and Fringe Benefit Differential: Effect of the State Policy Environment

4.1 Previous Literature

For the last four decades, there has been much research on wage differentials between public and private employees. Discussion of wage differentials between these two sectors started in the 1970s (Smith, 1976a, 1976b, 1977). Smith (1976a) found that federal employees received higher wages than their private sector counterparts and in early 1970s, they still enjoyed that advantage. This wage premium for public sector workers implied that the reforms made in the public pay system was conceived and implemented in error. She didn't find the wage differential between state/local government employees and private sector employees. Smith's second paper (1976b) discovered a significant difference from private sector employees not only for federal employees, but also local government employees, but still didn't have sufficient evidence to find conclude that the state government employees' wage is significantly different from private sector employees . These findings suggested that different level of public sector should be dealt differently in estimating wage differentials between the public and private sectors. In 1990's, Katz and Krueger (1991) argued that during the 1980s, skill differential, which is highly related to education differential, played an important role in wage inequality between the public and private sector employees. Sharp increasing in the skill differential for both state and local government moderately increase the wage inequality. In addition, their examination of regional pay variation indicates that wages in state and local governments respond substantially to changes in local economic conditions. In the state and local government sector, pay compression occurred but reflected improvements in wages for less edu-

cated workers relative to the private sector, rather than sharp declines in the wages of highly educated workers. Borjas (2002) investigated the changes in wage gap due to the changing wage structure. His evidence suggests that public sector workers in high-skilled groups are more likely to quit the public sector and enter the private sector under the circumstance of the relative compression of wages in the public sector. Thus, over time, the public sector should find it increasingly difficult to attract high-skill workers from private sector positions, and retain high-skill workers.

There is research that estimates a positive total compensation premium for state and/or local government employees. Recent research about public-private sector wage differentials includes Rosen and Bewerunge (2012). They found that there exist no statistically wage differential between state and local government workers and their private sector counterparts. However, pension wealth[1] accumulations for state and local government employees are greater than private sector employees. Taking pension wealth into account, the compensation benefit for state government and for local government employees is 8.3 percent and 8.6 percent higher, respectively. According to the most recent Employer Cost for Employee Compensation survey (BLS, 2015), state and local government employees received total hourly compensation of $44.97, compared to $33.58 for private workers, which is nearly 40 percent higher. This difference includes over 24 percent higher wages and salaries (state and local: $28.63, private: $23.06) and over 55 percent greater total benefits (state and local: $16.35, private: $10.52). However, this does not control for worker characteristics.

In contrast, there also exist papers and reports that estimate a wage penalty for state and/or local government employees. Researchers found that greater fringe benefits for state and local government employees do not totally offset the wage penalty using Bureau of Labor Statistics (BLS) Employer Costs for Employee Compensation (ECEC) survey (Allegretto and Keefe, 2010). Lewis and Galloway (2011) analyzed

[1]Defined contribution plans

and estimated wage differentials using Census and American Community Survey data. They combined state and local government employees and compared to their private sector counterparts. They concluded that most state and local governments pay less than private firms. However, they present a wide range of differentials with minimum of -15.2 percent in Kansas and with maximum 13 percent in Nevada. There were 41 states with a statistically significant wage premium for state and local government employees and 5 states with a statistically significant wage penalty.

Regarding public sector pay, Edwards (2010) found that most of public sector pay advantage comes from fringe benefits using the U.S. Bureau of Economic Analysis data. They concluded that average compensation in the state/local government and private sectors moved at a similar pace between 1950 and about 1980. However after 1980, public sector compensation growth began to outpace private sector growth. In 2008, average compensation from benefits for public sector employees is $15,761 but only $9,881 for the average private sector employees. Biggs and Richwine (Biggs et al., 2014), regarding state worker wages, found that wages in nearly all states[2] fall below those paid in the private sector, but fringe benefits, health insurance and retirement benefit, are significantly greater for public sector employees. In sum, state government employees in most states[3] receive greater total compensation, with an average total compensation premium of 10 percent.

Overall, researchers find no systematic differences between state-local workers and private workers' wages. However, they acquire more fringe benefits[4], which may or may not.

[2] 49 out of 50 states except Connecticut

[3] 42 out of 50 states except Georgia, Indiana, Kansas, Minnesota, Mississippi, South Dakota, Virginia, and West Virginia

[4] Compensations include paid leave, such as vacation, holiday or sick pay; supplemental bonus pay, such as bonuses and overtime; insurance, such as life and health coverage; retirement and savings, such as employer contributions to defined benefit and defined contribution plans; and legally required benefits, such as Social Security and Medicare.

4.2 Data

In this research, the primary data source is the American Community Survey (ACS)[5] from U.S. Census Bureau between 2012 and 2014. The ACS data is the largest household survey in the United States, with a sample size of about 3 million housing unit addresses throughout the country. The ACS collects detailed demographic, socioeconomic, and housing information. Regarding fringe benefits, the ACS contains data for employer health insurance provision. I use this variable for part of the fringe benefit differential analysis, in conjunction with a separate analysis for pension benefits with other data.

Table 4.1 summarizes the mean wages of private workers and public sector workers from 2012 to 2014. Federal, state, and local government workers are presented separately. The primary focus of this paper, however, is the wage differential between private and state/local government employees. The ratio of average state to average private sector employees' wages is consistently below 1, which means state government workers earn less during the sample period. The ratio of local to private employees is very close to one.

Table 4.2 shows probability of receiving employer-sponsored health insurance. Over this period, 90.6 percent of state and 90.2 percent of local government employees received employer-sponsored health insurance. However, only 75.8 percent of workers in the private sector had health insurance through a current employer. One of the main components of fringe benefits is employer pension coverage. However, due to lack of data on retirement pension benefits from the ACS, I examine pensions with different data[6].

Table 4.3 shows descriptive statistics for the pooled ACS data by sector. In the sample, 5.4 percent and 8.8 percent of interviewees work for state and local

[5]Data is collected from Integrated Public Use Microdata Series (IPUMS)
[6]Data are collected from Biggs et al. (2014) and Novy-Marx and Rauh (2009)

government. On average, public sector workers are older and better educated than private sector employees. A higher percentage of the state and local government employees are female and black. With regard to occupation, a higher proportion of public sector employees are working in professional occupations than the private sector.

4.3 Basic OLS Wage Equations

I use OLS wage equations to estimate wage differentials for the state-private and local-private workers. I estimate three separate pooled wage equations, state-by-state: one for state workers, one for local government employees, and one for private sector employees from 2012 to 2014. One specification controls for major occupations and the other does not. Here, the class of worker variable d_{it} equals 1 if the worker is employed in state government, 2 for local government, and 0 for the private sector. The wage equations are given by:

$$ln(Y_{it}^{s}) = \beta_{0t}^{s} + \beta_{it}^{s} X_{it} + \epsilon_{it}^{s} \quad if \quad d_{it} = 1, \ \ where \ \ t = Alabama, \cdots, Wyoming \tag{4.1.1}$$

$$ln(Y_{it}^{l}) = \beta_{0t}^{l} + \beta_{it}^{l} X_{it} + \epsilon_{it}^{l} \quad if \quad d_{it} = 2, \ \ where \ \ t = Alabama, \cdots, Wyoming \tag{4.1.2}$$

$$ln(Y_{it}^{p}) = \beta_{0t}^{p} + \beta_{it}^{p} X_{it} + \epsilon_{it}^{p} \quad if \quad d_{it} = 0, \ \ where \ \ t = Alabama, \cdots, Wyoming \tag{4.1.3}$$

The variable Y_{it} is average earnings. The term X_{it} is a vector of individual characteristics and demographics including gender, educational attainment, experience,

race, metropolitan statistical area, and occupation[7], and ϵ_{it} is the disturbance term. After obtaining estimated coefficients, the predicted wage differential is computed, using sample means. For this research, I narrowed the sample to full time workers[8], excluding military workers and self-employed workers. I use the workers whose age range is between 18 and 70 years. Thus, I estimate a state-private and local-private wage differential for each state.

Table 4.4 summarizes estimates of the wage gap regarding both state-private and local-private. With wage equations that control for occupations, the wage differential between state employees and the private sector ranges from -32.4 percent (Wyoming) to 18.63 percent (North Dakota). Overall, I find that state government employees earn, on average, 7.5 percent less than private sector counterparts. Eighty percent of states pay lower wages for state employees compared to private counterparts. The estimation of wage differentials between local and private employees also has a wide range. It is between -20.64 percent (Mississippi) and 21.43 percent (Idaho). Overall, the local government employees pay 1.1 percent less than private sector employees. Fewer states have a wage penalty for local government employees compared to state employees. Fifty-eight percent of states have wage penalty for local government employees. There are three states where both state and local government employees have statistically significant wage premium compared to private sector employees: Florida (state: 5 percent, local: 7 percent), New Jersey (state: 13.4 percent, local: 7.1 percent), and New York (state: 14 percent, local: 13.1 percent). On the other hand, there are nine states with wage penalty for both state and local employees: examples are Georgia (state: -15.5 percent, local: -9.3 percent), Kentucky (state: -31.3 percent, local: -9.8 percent), and Mississippi (state: -8.7 percent, local: -20.6 percent)[9].

[7]Detailed definition of characteristics/demographics are in the appendix.

[8]Working equal or more than 35 hours per week.

[9]The other states are North Carolina (state: -20.1 percent, local: -8.1 percent), Ohio (state: -4.8 percent, local: -7.1 percent), Texas (state: -12.5 percent, local: -10.5 percent), Utah (state: -15.2

Table 4.5 presents estimated wage differentials from OLS wage equations without controls for occupation. State workers in North Dakota have the greatest wage premium of 19.4 percent and those in Nebraska have the highest wage penalty of 40.75 percent. The estimation of the wage differential between local and private employees also has wide range. It is between -25.6 percent (South Dakota) and 21.9 percent (Idaho). On average, state government employees received 7.8 percent less and local government employees received 2.8 percent less than comparable private sector employees. There are two states where both state and local government employees have statistically significant wage premium compare to private sector employees: New York (state: 14.5 percent, local: 12.3 percent) and Pennsylvania (state: 3.1 percent, local: 2.7 percent). On the contrary, there are thirteen states with wage penalty for both state and local employees: examples are Illinois (state: -5.4 percent, local: -2.2 percent), and Kansas (state: -9 percent, local: -8.4 percent)[10].

Table 4.6 presents the correlation matrix among these four differentials. There are no significant correlations between the state-private and local-private wage differential estimates. However, the state-private wage differential estimates are highly correlated as are the two local-private wage differential estimates.

4.4 Fringe Benefit Analysis

Previous analysis shows that state and local government workers' compensation includes more fringe benefits. Thus, it is an essential step to compare fringe benefits, in addition to wages, between sectors regarding the total compensation comparison since

percent, local: -16.2 percent), Virginia (state: -20.2 percent, local: -4.1 percent), West Virginia (state: -14 percent, local: -8.4 percent).

[10]The others are Georgia (state: -18.7 percent, local: -17.3 percent), Kentucky (state: -36.8 percent, local: -11 percent), Louisiana (state: -18.7 percent, local: -17.3 percent), Missouri (state: -9.6 percent, local: -2.8 percent), New Mexico (state: -18.4 percent, local: -14.6 percent), North Carolina (state: -21.1 percent, local: -11.5 percent), Oklahoma (state: -26.3 percent, local: -22.6 percent), Texas (state: -16.2 percent, local: -14 percent), Utah (state: -16.3 percent, local: -14.8 percent), Virginia (state: -17.8 percent, local: -11.2 percent), West Virginia (state: -10.4 percent, local: -12.3 percent).

they are a critical factor in worker's compensation. For the analysis of the fringe benefit differential, I estimate the probability differential of receiving employer-sponsored health insurance between public and private sector employees. Since ACS does not have information about employer pension coverage, I use different data for the analysis of employees' retirement pension. To estimate the health coverage probability, I use the following probit model,

$$P(Y_{it} = 1) = \Phi(X'_{it}\rho)$$

where t indexes states, and i indexes the individual. In this estimation, Y_{it} is a binary variable to indicate whether persons have health insurance through a current employer and $\Phi(\cdot)$ is the distribution function for the standard normal. The vector of observable characteristics, X_{it}, is the same as in the wage equation. I ran separate probit equations by state to estimate the probability differential.

Table 4.7 shows the marginal effects of the probability of the employer-sponsored health insurance differential between public and private sector workers. Positive values mean that public sector employees have a higher probability of receiving health insurance through a current employer. I find that in all 50 states, state government workers have a significantly higher probability of receiving employer-sponsored health insurance. This higher probability ranges between 4.3 percent (Utah) and 19.6 percent (Idaho), with an average of 11 percent. This fringe benefit differential between local and private sector employees is similar to that between the state and private sectors. Except for Alaska, local government employees have a higher probability of receiving health insurance through a current employer. Idaho also has the greatest differential at 19.8 percent and the smallest differential is found in Hawaii as 3.4 percent. The average local-private differential is about 11 percent as well.

4.5 Determinants of Wage and Fringe Benefit Differentials

In this section, I examine the relationship between the wage and fringe benefits differentials and state-level data for economic and political variables. I find from previous sections that wage and benefit differentials vary by states, with, wage differentials having an especially wide range. Therefore, I investigate the reasons why they are so different across states.

4.5.1 Determinants of the Wage Differential

In section 4, I estimate four wage differentials between public and private sector employees. I have the state-private wage differential with and without controlling for workers' occupations. In addition to that I estimate the local-private wage differential with and without controlling for workers' occupations. These differentials vary widely across states. Thus, I investigate the reasons for this variation. For the analysis, I utilized the following models:

$$WD_t^{SP_j} = \alpha_{0t}^{SP_j} + \alpha_{1t}^{SP_j} X_t + \mu_t^{SP_j}, \quad where \quad j = 0, 1 \tag{4.2}$$

$$WD_t^{LP_j} = \alpha_{0t}^{LP_j} + \alpha_{1t}^{LP_j} X_t + \mu_t^{LP_j}, \quad where \quad j = 0, 1 \tag{4.3}$$

The WD_t is wage differentials from state t. The t indicates 50 states and j has two possible values. If $j = 0$, estimates are from the model which with no occupation controls and if $j = 1$, estimates of the wage differentials are those with occupation in the wage equations. Wage differentials between state government and private sector employees are marked with SP and those between local and private sector workers are marked separately as LP. Variables used to explain the variation in the wage differentials, X_t, are state-level variables for unemployment rate, the mean wage, the percentage of each state's employees who are union members, the state govern-

ment policy environment, and demographic information. To measure the effect of the state policy environment, I use three indices[11]. They are the Freedom in the 50 state's index (Mercatus Center, 2011), Best States for Business (Forbes, 2014), and Economic Performance Ranking (ALEC, 2014). The Mercatus index provides a comprehensive ranking of states on their public policies that affect individual freedoms in the economic, social, and personal spheres. They obtain the overall freedom index by summing personal, social, and economic freedom indices[12]. Forbes annually announces its ranking for the best states for business. The annual ranking measures six vital categories[13] for each state and combines the ranks in these six main categories to obtain the overall rank. Lastly, ALEC Economic Performance Ranking is a backward-looking measure based on the state's GDP, absolute domestic migration and non-farm payroll employment growth rate. These are highly influenced by state policy. Table 4.8 is correlation matrix among these rankings. The Forbes ranking and the ALEC ranking are not well correlated with other rankings. The Mercatus overall ranking is highly correlated with other Mercatus rankings. That is, it makes sense because the other Mercatus rankings are the components of overall ranking.

Table 4.9 shows the summary of results using the state-private wage differential as the dependent variable. The difference among specifications (1) through (4) uses different rankings as measure of the government policy environment in each state. When the dependent variable in a regression is based on estimates, I need to consider sampling error before estimating. Sampling error occurs when there is difference between the true value of dependent variable and its estimated value. Thus I adjusted and find the robust standard error using bootstrap method. In specifications (1) and (2), I use the Mercatus rankings and in (3) and (4), I use Forbes and ALEC rankings,

[11]I use rankings, that is , 1 through 50.

[12]The categories are Fiscal Policy Ranking, Regulatory Policy Ranking, Economic Freedom Ranking, and Personal Freedom Ranking

[13]They are Business Cost, Labor Supply, Regulatory Environment, Current Economic Climate, Growth Prospects and Quality of Life.

respectively. Specifications (1) and (2) show that the Mercatus overall ranking and component rankings are not statistically significant. From specification (4), the ALEC ranks also do not have significant explanatory power regarding the state-local wage gap. However the Forbes ranking is statistically significant. This result implies that as the ranking increases by one, which means a worsening business environment, the state-private wage differential increases 0.35 percent, ceteris paribus. Table 4.10 presents the results of estimating the same regression model but using the wage differential estimates that controls for workers' major occupations. The results are very similar to Table 4.9. I find that the Forbes ranking is statistically significant, but the rankings from Mercatus and ALEC are not. From specification (3) in Table 4.10, I can conclude that, holding all else constant, as the Forbes ranking increases by one, the state-private wage gap widens by 0.32 percent. Table 4.11 and Table 4.12 present a similar analysis for the local-private wage differentials. In the analysis of local-private wage differential, there are no statistically significant effects of the rankings. However, in specification (4), the unemployment rate matters for the local-private wage gap. As a state's unemployment rate increases 1 percent, the wage gap increases by 0.2 percent.

In sum, among rankings that I use to measure the government policy environment, the Forbes ranking has a significant effect. States that are a better place for business have a smaller state-private wage differential. However none of the rankings have a significant effect on the local-private wage differential.

One may wonder, why the different rankings have dissimilar effects. Perhaps, this is not that surprising since the rankings are not highly correlated. It seems that they are measuring different aspects of the state environment. The Forbes ranking, for example, is much more influenced by private business climate components, such as labor supply and business cost, relative to the ALEC and Mercatus rankings. Evidently, this better explains the state-private wage differential.

4.5.2 Determinants of the Fringe Benefit Differential

Health insurance and retirement pensions are two main components of fringe benefits. In this section, I test for the effect of the state policy environment on fringe benefits. For the analysis of health insurance, I use the estimated probability differential of receiving employer-sponsored health insurance between public and private sector employees. In addition to health insurance analysis, I test for the effect of the state policy environment on retirement pension coverage. However, retirement pension related data are not available from ACS. Thus I look for other state-based data on pensions to capture its generosity. I use data about annual benefits for new retirees and total retirement income replacement rates for state employees to investigate the effect of the state policy environment on the pension differential. Also, I estimate the policy environment's effect on how well-funded the state's pension system is.

Table 4.13 and Table 4.14 present OLS regression estimates for the state-private and the local-private probability differential of receiving health insurance through a current employer. From table 4.13, I find no evidences that measures of the policy environment affect the state-private differential. Instead, the aggregate schooling level in the state matters for all three specifications. Increasing the percentage of high school degree holders decreases the fringe benefit differential between state government and private sector employees by about 0.7 percent. Regarding the local-private differential, these results are shown in Table 4.14. The ALEC ranking has a negative effect on this differential. As the ALEC economic performance ranking decreases, indicating a higher rank, the probability differential of receiving health insurance becomes wider. Other than the ALEC index, the percentage of high school degree holders in each state decreases the fringe benefit differential between local and private sector employees through health insurance by about 0.7 percent.

Since I do not have ACS data on pension benefits, I turn to other sources for this. Data on state government employees' pension benefit is available from Biggs (2014).

The variables I use are the annual benefits for new retirees and the replacement rate paid to a full-career state employee. Table 4.15 shows the summary of data that I collect for analyzing retirement pension benefit. These are estimated using salary data and benefit formulas available in pensions' annual actuarial valuations. The average replacement paid to a full career employee is 87 percent of final earnings and the average annual benefits is $ 37,060. Table 4.16 and 4.17 report the results of regressions to explain variations in these variables. Regarding the finding for annual pension benefit in Table 4.16, the Mercatus and Forbes ranking are not significant. Likewise, for the retirement income replacement ratio shown in Table 4.17. In contrast, the ALEC ranking has a statistically significant effect on total annual pension benefit. As the ALEC ranking increases by one, indicating a worse ranking, the annual pension amount decreases by $ 343.56 on average. In addition to the rankings, the unemployment rate and the percent of black population have significant effects on the retirement pension variables. The states with higher unemployment rates or a higher proportion of blacks pay less of an annual pension benefit to their state government employees.

Lastly, I examine the ratio of state's pension underfunding as percent of tax revenues and the effect of the state policy environment on it. Most state governments offer defined benefit pension plans to their employees. These plans contrast with defined contribution plans which are prevalent among private sector employees, such as 401(k) plans. State government employees, under defined benefit plans, are guaranteed future payment when they retire. To fund this, states manage their own pension funds. The security of this guarantee may depend on how well states fund these plans. A poor funded plan may detract from the value of the pension benefit. I collect data on pension funding from Novy-Marx and Rauh (2009). Summary of this data is in Table 4.15. In this data, Ohio has the largest burden as a percent of total annual tax revenues (874 % underfunded) and Vermont has the smallest (171 %). The average

rate of overall states is 435 %.

Using a market-based discount rate, the present value of the already-promised pension liabilities amount is $ 5.17 trillion, with a net of $ 1.94 trillion is in state assets. Thus, these pensions are underfunded by $ 3.23 trillion. If state governments do not have sufficient funds when a worker retires, then the states will have to increase taxes or cut spending which can affect all workers in states. Table 4.19 presents the OLS regression estimates for the ratio of state's pension underfunding as percent of tax revenues. From specification (3), I find that the ALEC ranking matters in predicting this ratio. The coefficient for the ALEC ranking, 0.04736 indicates that as a state has worse ranking by one, the additional liability to the state-sponsored pension plan is 4.73 percent of annual tax revenue higher. That is, states with better standing in the ALEC ranking are in a better condition regarding funding their state employees.

In addition to checking the effect of the state policy environment on wage and fringe benefit differentials, I examine how they are different between states with 'Right-to work law' and ones without it. According to the national right to work committee, the right to work law secures the right of employees to decide for themselves whether or not to join or financially support a union. However, employees who work in the railway or airplane industries are not protected by the law, and employees who work a federal enclave may not be. The OLS test results show that there are no statistically significant differences between states that pass the law and ones does not on wage and health insurance differentials. However, 'Right to Work law' has significant effect on the ratio of state's pension underfunding as percent of tax revenues among retirement pension related variables. Table **??** presents the OLS regression estimates for the ratio of state's pension underfunding as percent of tax revenues. The coefficient for 'Right to Work law' indicates that the states with this law have 184.6 % lower annual tax revenue amount of liability to state-sponsored pension plan.

This implies that states with 'Right to Work law' have better condition in funding for their state retirees.

4.6 Conclusion

Though previous work on state and local government worker pay does not show as large differential as with federal workers, examining state-private and local-private wage differentials is still worthwhile. Overall, there is general agreement that state-local workers as a group are not paid more than their private sector counterparts in salary. The argument arises on the fringe benefit side. Therefore, it is important to examine wage and fringe benefit differentials as well. Also, the wage and benefit vary across states, I estimate these differentials, state-by-state, comparing worker's hourly wage and probability of receiving employer-sponsored health insurance. In addition to health insurance, I collect the data related to retirement pensions to investigate more details about the fringe benefit side.

The OLS estimations for state-private and local-private wage differentials show that they range widely. Estimated wage differentials between state government and private sector employees are between -32.4 percent (Wyoming) and 18.63 percent (North Dakota) in one of my specifications. In another, the state-private wage gap ranges from -40.75 percent (Nebraska) to 19.4 percent (North Dakota). I also investigate wage differentials between local government employees and their private sector counterparts. State workers in Idaho enjoy the highest wage premium of 21.43 percent by one specification and 21.9 percent by another. In contrast, Mississippi is the state that has the highest wage penalty for local government employees of -20.64 percent by the first specification, and South Dakota has the biggest wage penalty at -25.6 percent with the second specification. Overall, local government employees received 2.8 percent and state government employees received 7.8 percent less than comparable private sector employees.

To investigate the fringe benefit differential, I estimate the probability of receiving employer-provided health insurance in each sector and calculate the differences. I find that, both state and local government employees have a significantly higher probability of receiving health insurance through a current employer in all states. On average, state governments are 10.9 percent more likely and local governments 11.2 percent more likely to provide health insurance than the private sector.

Using the wage and fringe benefit differentials estimates, I investigate the determinants of the differential with state-level data for the economic policy environment by state. As indices for this, I obtain rankings from Forbes, ALEC, and the Mercatus Center. These indices rank states on their state policy. The Forbes ranking is the only index that explains variation in state-private wage differentials. As the Forbes ranking increases the state-private wage gap widens by 0.32 percent. None of the policy environment indices, however, are statistically significant in predicting the local-private wage differential.

Regarding the determinants of fringe benefit differentials, I use the estimates of the probability differential of receiving employer-sponsored health insurance and data on retirement pensions. The ALEC ranking has a negative and significant effect on fringe benefit differential between local and private employees. As the ALEC economic performance ranking decreases, implying a worse ranking, the probability differential of receiving health insurance through a current employer becomes smaller.

Finally, I examine the factors that affect state government retirement pension generosity and the degree of soundness in funding state employees' retirement pensions. Among the policy environment indices, the ALEC ranking is related to the total amount of annual pension benefit and the ratio of state's pension underfunding as a percent of tax revenues. As the ALEC ranking increases by one, implying a worse rankings, annual pension amount decreases by $ 343.56 and 4.73 percent of annual tax revenue amount is added as an additional liability to state-sponsored pension

plan. Additionally, there exists difference in underfunding ratio between states with and without 'Right to Work law'. The states with the law has better standing in funding for their state government retirees.

Tables

Table 4.1: Real Average Hourly Earnings, by Worker Category, 2012-2014 ACS.

	Private	Federal	State	Local	Federal/Private	State/Private	Local/Private
2012	23.09	31.31	23.11	23.40	1.36	0.74	1.01
2013	23.51	30.18	23.11	23.27	1.28	0.77	1.01
2014	23.75	30.48	23.46	23.28	1.28	0.77	0.99

Data are from the Census Bureau.

Table 4.2: Percentage of workers receiving Health Insurance.

	Health Insurance		
	Private	State	Local
2012	0.757	0.910	0.907
2013	0.756	0.901	0.902
2014	0.760	0.906	0.899

Data are from the Census Bureau.

Table 4.3: Summary Statistics, 2012-2014 American Community Survey

Variable	Entire Sample		State		Local		Private	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Wage	23.712	22.494	23.223	15.710	23.316	14.696	23.455	23.631
Health Insurance	0.780	0.414	0.906	0.292	0.902	0.297	0.758	0.429
State Employee	0.054	0.226						
Local Employee	0.088	0.284						
School	13.946	3.010	15.284	2.954	14.883	2.759	13.716	3.002
Age	43.218	12.718	46.013	12.018	45.823	11.985	42.668	12.782
Female	0.453	0.498	0.578	0.494	0.561	0.496	0.435	0.496
Msa								
Balance	0.561	0.496	0.505	0.500	0.550	0.497	0.565	0.496
Non-Metropolitan	0.216	0.412	0.318	0.466	0.236	0.425	0.209	0.407
Experience	23.271	13.049	24.729	12.481	24.940	12.416	22.953	13.145
Region								
Midwest	0.220	0.414	0.179	0.383	0.205	0.404	0.229	0.420
South	0.292	0.455	0.333	0.471	0.284	0.451	0.281	0.450
West	0.177	0.382	0.191	0.393	0.183	0.387	0.175	0.380
Race								
Black	0.108	0.310	0.137	0.344	0.131	0.338	0.099	0.299
Asian	0.064	0.245	0.052	0.221	0.037	0.189	0.067	0.251
Others	0.145	0.352	0.097	0.296	0.132	0.338	0.151	0.358
Occupation								
Professional	0.242	0.428	0.474	0.499	0.434	0.496	0.204	0.403
Service	0.135	0.341	0.176	0.381	0.215	0.411	0.124	0.330
Sales	0.085	0.279	0.008	0.087	0.007	0.083	0.102	0.303
Administrative support	0.141	0.348	0.134	0.340	0.128	0.334	0.137	0.344
Farming, fishing, and forestry	0.007	0.083	0.002	0.048	0.001	0.033	0.008	0.089
Construction	0.049	0.216	0.027	0.162	0.035	0.184	0.054	0.225
Installation, maintenance, and repair	0.037	0.189	0.016	0.125	0.021	0.142	0.040	0.196
Production	0.071	0.257	0.011	0.104	0.017	0.129	0.084	0.277
Transportation	0.063	0.243	0.021	0.144	0.037	0.188	0.070	0.255

Data are from the Census Bureau.

Table 4.4: Wage Differential (with occupation), OLS, State-by-State, ACS

States	Wage Differential (with Occupation)	
	State vs. Private	Local vs. Private
Alabama	0.024	0.011
	(0.051)	(0.072)
Alaska	0.002	-0.063
	(0.072)	(0.077)
Arizona	-0.046	-0.008
	(0.035)	(0.024)
Arkansas	0.025	-0.034
	(0.043)	(0.053)
California	-0.023	0.122***
	(0.022)	(0.012)
Colorado	-0.060	-0.014
	(0.044)	(0.032)
Connecticut	0.053	-0.026
	(0.040)	(0.044)
Delaware	-0.085***	-0.020
	(0.046)	(0.069)
Florida	0.050**	0.07***
	(0.024)	(0.020)
Georgia	-0.155***	-0.093***
	(0.031)	(0.019)
Hawaii	-0.060	-0.063
	(0.065)	(0.081)
Idaho	0.019	0.214***
	(0.063)	(0.062)
Illinois	-0.029	-0.003
	(0.023)	(0.017)
Indiana	-0.162***	0.009
	(0.055)	(0.023)
Iowa	-0.245	0.094**
	(0.151)	(0.040)
Kansas	-0.053	-0.059
	(0.064)	(0.048)
Kentucky	-0.313***	-0.098***
	(0.070)	(0.034)
Louisiana	-0.149***	-0.032
	(0.048)	(0.026)

Maine	-0.109**	-0.018
	(0.045)	(0.099)
Maryland	-0.043	0.057***
	(0.027)	(0.019)
Massachusetts	0.094***	0.031
	(0.022)	(0.020)
Michigan	-0.007	0.029
	(0.034)	(0.023)
Minnesota	-0.053	0.056***
	(0.040)	(0.020)
Mississippi	-0.087**	-0.206***
	(0.039)	(0.048)
Missouri	-0.081**	-0.013
	(0.035)	(0.021)
Montana	-0.077	0.089
	(0.097)	(0.095)
Nebraska	-0.322***	-0.075
	(0.073)	(0.095)
Nevada	-0.023	0.105**
	(0.058)	(0.050)
New Hampshire	-0.065	0.018
	(0.057)	(0.040)
New Jersey	0.134***	0.071***
	(0.023)	(0.022)
New Mexico	-0.100	-0.111**
	(0.063)	(0.059)
New York	0.140***	0.131***
	(0.014)	(0.010)
North Carolina	-0.201***	-0.081**
	(0.035)	(0.037)
North Dakota	0.186**	-0.055
	(0.081)	(0.076)
Ohio	-0.048	0.071***
	(0.040)	(0.019)
Oklahoma	-0.308***	-0.152**
	(0.086)	(0.074)
Oregon	-0.042	0.061
	(0.059)	(0.062)
Pennsylvania	0.032*	0.022
	(0.017)	(0.017)

Rhode Island	-0.011	-0.086
	(0.057)	(0.063)
South Carolina	-0.045	-0.063
	(0.044)	(0.039)
South Dakota	-0.048	-0.173**
	(0.083)	(0.074)
Tennessee	-0.155***	0.035
	(0.057)	(0.025)
Texas	-0.125***	-0.105***
	(0.023)	(0.017)
Utah	-0.152**	-0.162***
	(0.061)	(0.053)
Vermont	-0.021	-0.125**
	(0.055)	(0.056)
Virginia	-0.202***	-0.041**
	(0.035)	(0.017)
Washington	-0.240***	0.105***
	(0.053)	(0.039)
West Virginia	-0.14**	-0.084**
	(0.071)	(0.042)
Wisconsin	-0.137**	0.023
	(0.067)	(0.036)
Wyoming	-0.324***	0.045
	(0.108)	(0.058)

Note: *** p<0.01, ** p<0.05, * p<0.1

Note: Data are from Census Bureau

Table 4.5: Wage Differential (pooled occupation), OLS, State-by-State, ACS

States	Wage Differential (no Occupation)	
	State vs. Private	Local vs. Private
Alabama	0.060	0.012
	(0.050)	(0.043)
Alaska	0.047	-0.085
	(0.064)	(0.074)
Arizona	-0.058**	-0.021
	(0.026)	(0.021)
Arkansas	-0.008	-0.052
	(0.039)	(0.055)
California	-0.074***	0.076***
	(0.018)	(0.010)
Colorado	-0.07*	-0.038*
	(0.041)	(0.023)
Connecticut	0.052	-0.013
	(0.032)	(0.027)
Delaware	-0.082**	-0.016
	(0.034)	(0.060)
Florida	-0.013	0.047**
	(0.020)	(0.018)
Georgia	-0.187***	-0.173***
	(0.023)	(0.016)
Hawaii	-0.075	0.013
	(0.065)	(0.081)
Idaho	0.103	0.219***
	(0.068)	(0.054)
Illinois	-0.054***	-0.022*
	(0.020)	(0.012)
Indiana	-0.175***	-0.021
	(0.051)	(0.024)
Iowa	-0.311**	0.082**
	(0.158)	(0.035)
Kansas	-0.090*	-0.084***
	(0.047)	(0.036)
Kentucky	-0.368***	-0.11***
	(0.047)	(0.035)
Louisiana	-0.185***	-0.088***
	(0.038)	(0.024)

Maine	-0.069	-0.041
	(0.045)	(0.098)
Maryland	-0.031	0.009
	(0.024)	(0.018)
Massachusetts	0.055***	-0.022
	(0.019)	(0.018)
Michigan	-0.002	0.016
	(0.030)	(0.019)
Minnesota	-0.044	0.019
	(0.029)	(0.020)
Mississippi	-0.061*	-0.171***
	(0.034)	(0.036)
Missouri	-0.096***	-0.028*
	(0.026)	(0.017)
Montana	-0.002	0.087
	(0.102)	(0.116)
Nebraska	-0.408***	-0.032
	(0.067)	(0.054)
Nevada	-0.056	0.129***
	(0.073)	(0.035)
New Hampshire	-0.109*	-0.016
	(0.065)	(0.034)
New Jersey	0.096***	0.024
	(0.020)	(0.018)
New Mexico	-0.184***	-0.146**
	(0.062)	(0.058)
New York	0.145***	0.123***
	(0.010)	(0.008)
North Carolina	-0.211***	-0.115***
	(0.031)	(0.032)
North Dakota	0.195***	-0.028
	(0.072)	(0.077)
Ohio	-0.039	0.055***
	(0.036)	(0.015)
Oklahoma	-0.263***	-0.226***
	(0.082)	(0.072)
Oregon	-0.052	0.095*
	(0.058)	(0.053)
Pennsylvania	0.031*	0.027**
	(0.016)	(0.012)

Rhode Island	0.026	-0.064
	(0.049)	(0.060)
South Carolina	-0.029	-0.046*
	(0.029)	(0.026)
South Dakota	-0.043	-0.256***
	(0.086)	(0.037)
Tennessee	-0.129***	-0.032
	(0.037)	(0.021)
Texas	-0.162***	-0.140***
	(0.015)	(0.013)
Utah	-0.163***	-0.148***
	(0.058)	(0.053)
Vermont	-0.045	-0.088*
	(0.051)	(0.047)
Virginia	-0.178***	-0.112***
	(0.023)	(0.015)
Washington	-0.249***	0.102***
	(0.042)	(0.027)
West Virginia	-0.104**	-0.123***
	(0.046)	(0.039)
Wisconsin	-0.074	0.020
	(0.057)	(0.031)
Wyoming	-0.151**	-0.006
	(0.065)	(0.052)

Note: *** p<0.01, ** p<0.05, * p<0.1

Note: Data are from Census Bureau

Table 4.6: Correlation between Wage Differentials

	State-private WD (no Occupation)	Local-private WD (no Occupation)	State-private WD (with Occupation)	Local-private WD (with Occupation)
State-private WD (no Occupation)	1			
Local-private WD (no Occupation)	0.353	1		
State-private WD (with Occupation)	0.927	0.331	1	
Local-private WD (with Occupation)	0.309	0.931	0.275	1

Table 4.7: Health Insurance Probability Differential

States	Health Insurance Probability Differential	
	State vs. Private	Local vs. Private
Alabama	0.108***	0.130***
	(0.017)	(0.013)
Alaska	0.157***	0.019
	(0.026)	(0.022)
Arizona	0.141***	0.147***
	(0.010)	(0.008)
Arkansas	0.133***	0.098***
	(0.018)	(0.021)
California	0.132***	0.154***
	(0.005)	(0.003)
Colorado	0.121***	0.150***
	(0.013)	(0.008)
Connecticut	0.089***	0.094***
	(0.008)	(0.007)
Delaware	0.061***	0.072***
	(0.013)	(0.017)
Florida	0.154***	0.194***
	(0.008)	(0.004)
Georgia	0.114***	0.112***
	(0.007)	(0.006)
Hawaii	0.045***	0.034**
	(0.010)	(0.015)
Idaho	0.197***	0.198***
	(0.031)	(0.027)
Illinois	0.098***	0.110***
	(0.006)	(0.004)
Indiana	0.052***	0.095***
	(0.013)	(0.008)
Iowa	0.089***	0.093***
	(0.018)	(0.015)
Kansas	0.101***	0.103***
	(0.012)	(0.009)
Kentucky	0.103***	0.109***
	(0.009)	(0.009)
Louisiana	0.076***	0.146***
	(0.013)	(0.009)

Maine	0.149***	0.115***
	(0.012)	(0.013)
Maryland	0.100***	0.105***
	(0.006)	(0.005)
Massachusetts	0.063***	0.070***
	(0.005)	(0.004)
Michigan	0.099***	0.102***
	(0.007)	(0.006)
Minnesota	0.091***	0.075***
	(0.008)	(0.007)
Mississippi	0.138***	0.125***
	(0.009)	(0.010)
Missouri	0.112***	0.107***
	(0.007)	(0.006)
Montana	0.117***	0.144***
	(0.025)	(0.028)
Nebraska	0.089***	0.116***
	(0.022)	(0.015)
Nevada	0.095***	0.149***
	(0.026)	(0.016)
New Hampshire	0.096***	0.083***
	(0.011)	(0.010)
New Jersey	0.095***	0.092***
	(0.003)	(0.003)
New Mexico	0.191***	0.127***
	(0.018)	(0.017)
New York	0.114***	0.130***
	(0.003)	(0.002)
North Carolina	0.172***	0.176***
	(0.007)	(0.007)
North Dakota	0.128***	0.050*
	(0.031)	(0.030)
Ohio	0.069***	0.092***
	(0.007)	(0.004)
Oklahoma	0.071***	0.132***
	(0.017)	(0.016)
Oregon	0.156***	0.150***
	(0.012)	(0.011)
Pennsylvania	0.067***	0.076***
	(0.004)	(0.004)

Rhode Island	0.126***	0.094***
	(0.011)	(0.012)
South Carolina	0.116***	0.128***
	(0.011)	(0.010)
South Dakota	0.109***	0.058**
	(0.025)	(0.020)
Tennessee	0.109***	0.138***
	(0.012)	(0.009)
Texas	0.166***	0.162***
	(0.006)	(0.005)
Utah	0.044***	0.099***
	(0.014)	(0.011)
Vermont	0.109***	0.123***
	(0.020)	(0.018)
Virginia	0.063***	0.087***
	(0.007)	(0.005)
Washington	0.070***	0.093***
	(0.009)	(0.007)
West Virginia	0.145***	0.112***
	(0.014)	(0.016)
Wisconsin	0.111***	0.106***
	(0.012)	(0.009)
Wyoming	0.142***	0.114***
	(0.022)	(0.018)

Note: *** p<0.01, ** p<0.05, * p<0.1

Note: Data are from Census Bureau

Table 4.8: Correlation between State Policy Environment Rankings

	Forbes	ALEC	Overall ranking	Fiscal Policy Ranking	Regulatory Policy Ranking	Economic Freedom Ranking	Personal Freedom Ranking
Forbes[1]	1						
ALEC[2]	0.449	1					
Overall ranking[3]	0.490	0.420	1				
Fiscal Policy Ranking[4]	0.419	0.443	0.788	1			
Regulatory Policy Ranking[5]	0.526	0.266	0.724	0.427	1		
Economic Freedom Ranking[6]	0.538	0.393	0.908	0.880	0.778	1	
Personal Freedom Ranking[7]	0.068	0.301	0.569	0.164	0.235	0.223	1

[1] Forbes Ranking for best state for business.

[2] ALEC Ranking for Economic Performance Ranking, based on state's GDP, domestic migration, and non-farm payroll employment growth rate.

[3] Mercatus Overall Ranking for freedom: weighted combination of fiscal policy, regulatory policy, economic freedom, and personal freedom scores.

[4] Mercatus Fiscal Policy Ranking: Determined by Tax Burden, Government Employment/Spending/Debt, and Fiscal Decentralization.

[5] Mercatus Regulatory Policy Ranking: Determined by Tort Abuse, Property Right Protection, Health Insurance/Labor Market/Occupational Licensing/Cable and Telecom Freedom.

[6] Mercatus Economic Freedom Ranking: Determined by sum of Fiscal/Regulatory scores.

[7] Mercatus Personal Freedom Ranking: Determined by Victimless Crime/Gun Control/Tabacco/Alcohol/Marriage/Marijuana and Salvia/Gambling and so on.

Table 4.9: OLS regression for the State-Private WD (Pooled Occ.) on Policy Environment Rankings

	State-Private Wage Diff. (pooled occupation)			
	(1)	(2)	(3)	(4)
Overall Freedom Ranking	0.0004573			
	(0.00151)			
Fisical Policy Ranking		-0.002029		
		(0.00790)		
Regulatory Policy Ranking		0.000062		
		(0.00706)		
Economic Freedom Ranking		0.00205		
		(0.01200)		
Personal Freedom Ranking		0.0014959		
		(0.00152)		
Forbes Ranking			**0.00351****	
			(0.00180)	
ALEC_Ranking				0.00133
				(0.00178)
State Unemployment Rate	0.0101514	0.0167703	0.008681	0.00846
	(0.02710)	(0.02890)	(0.02370)	(0.02630)
Mean Wage	0.00000518	0.00000406	0.000008	0.00001
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Union Menbership (%)	0.0064452	0.0051926	0.001713	0.00612
	(0.00840)	(0.00929)	(0.00883)	(0.00818)
Mean Age	**0.0203266***	0.0177177	0.009389	0.0194*
	(0.01050)	(0.01400)	(0.01220)	(0.01080)
% of White	-0.0006107	-0.0005368	0.000586	-0.00124
	(0.00350)	(0.00391)	(0.00324)	(0.00397)
% of Black	0.0009678	0.000286	0.001658	0.00010
	(0.00370)	(0.00418)	(0.00356)	(0.00447)
% of High School Degree	-0.0024831	0.000923	0.002382	-0.00357
	(0.01360)	(0.01720)	(0.01340)	(0.01350)
% of Bachelor Degree	0.0114656	0.0082607	0.017041	0.01100
	(0.01290)	(0.01590)	(0.01320)	(0.01360)
% of Advanced Degree	-0.0163182	-0.0111484	-0.031869	-0.01550
	(0.02910)	(0.03310)	(0.03110)	(0.03050)
% of Democrat population	-0.0075705	-0.0075863	-0.004294	-0.00862
	(0.00585)	(0.00695)	(0.00608)	(0.00606)
Democrat Governor	-0.0196784	-0.0150524	-0.018878	-0.01440
	(0.04020)	(0.04270)	(0.04060)	(0.03960)
Constant	-0.8150181	-0.9817349	-1.200478	-0.59900
	(1.16)	(1.37)	(1.16)	(1.20)

Table 4.10: OLS regression for the State-Private WD (with Occ.) on Policy Environment Rankings

	State-Private Wage Diff. (With occupation)			
	(1)	(2)	(3)	(4)
Overall Freedom Ranking	-0.00029			
	(0.0015)			
Fisical Policy Ranking		-0.00190		
		(0.0076)		
Regulatory Policy Ranking		-0.00058		
		(0.0066)		
Economic Freedom Ranking		0.00211		
		(0.0115)		
Personal Freedom Ranking		0.00043		
		(0.0015)		
Forbes Ranking			**0.00324***	
			(0.0017)	
ALEC_Ranking				0.00140
				(0.0017)
State Unemployment Rate	0.00409	0.00714	0.00429	0.00395
	(0.0243)	(0.0264)	(0.0212)	(0.0234)
Mean Wage	0.00001	0.00000	0.00001	0.00001
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Union Menbership (%)	0.00521	0.00413	-0.00036	0.00348
	(0.0080)	(0.0088)	(0.0078)	(0.0075)
Mean Age	0.01343	0.01264	0.00356	0.01263
	(0.0101)	(0.0136)	(0.0117)	(0.0101)
% of White	-0.00014	-0.00012	0.00101	-0.00081
	(0.0034)	(0.0040)	(0.0031)	(0.0039)
% of Black	0.00055	0.00019	0.00110	-0.00054
	(0.0035)	(0.0040)	(0.0033)	(0.0043)
% of High School Degree	-0.00622	-0.00463	-0.00117	-0.00682
	(0.0126)	(0.0158)	(0.0125)	(0.0123)
% of Bachelor Degree	0.01585	0.01517	0.02172	0.01616
	(0.0131)	(0.0162)	(0.0133)	(0.0135)
% of Advanced Degree	-0.02502	-0.02491	-0.04123	-0.02614
	(0.0284)	(0.0330)	(0.0294)	(0.0294)
% of Democrat population	-0.00091	-0.00073	0.00183	-0.00243
	(0.0060)	(0.0073)	(0.0062)	(0.0060)
Democrat Governor	-0.03866	-0.03516	-0.03540	-0.02983
	(0.0385)	(0.0448)	(0.0372)	(0.0368)
Constant	-0.48975	-0.59043	-0.90953	-0.31693
	(1.0980)	(1.2920)	(1.0880)	(1.1230)

Table 4.11: OLS regression for the Local-Private WD (Pooled Occ.) on Policy Environment Rankings

	Local-Private Wage Diff. (pooled occupation)			
	(1)	(2)	(3)	(4)
Overall Freedom Ranking	-0.00092			
	(0.00122)			
Fisical Policy Ranking		0.00342		
		(0.00628)		
Regulatory Policy Ranking		0.00381		
		(0.00574)		
Economic Freedom Ranking		-0.00689		
		(0.00953)		
Personal Freedom Ranking		0.00046		
		(0.00138)		
Forbes Ranking			-0.00133	
			(0.00105)	
ALEC_Ranking				-0.00160
				(0.00132)
State Unemployment Rate	0.02147	0.02469	0.02368	0.02439
	(0.01720)	(0.01920)	(0.01670)	(0.01610)
Mean Wage	0.00000	0.00000	0.00000	0.00000
	(0.000004)	(0.000005)	(0.000004)	(0.000004)
Union Menbership (%)	0.00681	0.00647	0.00735	0.00668
	(0.00569)	(0.00666)	(0.00554)	(0.00567)
Mean Age	0.00579	0.00127	0.01018	0.00713
	(0.00840)	(0.01100)	(0.00925)	(0.00808)
% of White	0.00093	0.00124	0.00052	0.00177
	(0.00335)	(0.00382)	(0.00333)	(0.00438)
% of Black	0.00082	0.00097	0.00046	0.00191
	(0.00330)	(0.00403)	(0.00325)	(0.00457)
% of High School Degree	0.00806	0.01217	0.00681	0.00973
	(0.00847)	(0.01140)	(0.00869)	(0.00898)
% of Bachelor Degree	0.00633	0.00136	0.00498	0.00725
	(0.00959)	(0.01210)	(0.00934)	(0.01000)
% of Advanced Degree	-0.02140	-0.01329	-0.01745	-0.02337
	(0.01810)	(0.02230)	(0.01730)	(0.01850)
% of Democrat population	0.00016	0.00009	-0.00138	0.00139
	(0.00472)	(0.00492)	(0.00431)	(0.00447)
Democrat Governor	0.00474	0.00099	0.00709	-0.00091
	(0.02570)	(0.03490)	(0.02350)	(0.02670)
Constant	-1.32656	-1.50037	-1.24760	-1.63612
	(0.687)	(0.868)	(0.686)	(0.818)

Table 4.12: OLS regression for the Local-Private WD (with Occ.) on Policy Environment Rankings

	Local-Private Wage Diff. (With occupation)			
	(1)	(2)	(3)	(4)
Overall Freedom Ranking	-0.00103			
	(0.00108)			
Fisical Policy Ranking		0.00366		
		(0.00542)		
Regulatory Policy Ranking		0.00485		
		(0.00490)		
Economic Freedom Ranking		-0.00797		
		(0.00819)		
Personal Freedom Ranking		0.00056		
		(0.00129)		
Forbes Ranking			-0.00154	
			(0.00106)	
ALEC_Ranking				-0.00125
				(0.00132)
State Unemployment Rate	0.01946	0.02339	0.02193	0.02242
	(0.01560)	(0.01800)	(0.01520)	(0.01480)
Mean Wage	0.00001	0.00001	0.00000	0.00001
	(0.000004)	(0.000005)	(0.000004)	(0.000004)
Union Menbership (%)	0.00470	0.00411	0.00538	0.00408
	(0.00527)	(0.00616)	(0.00519)	(0.00539)
Mean Age	0.00846	0.00220	0.01352	0.00961
	(0.00822)	(0.01010)	(0.00947)	(0.00824)
% of White	0.00096	0.00137	0.00048	0.00163
	(0.00260)	(0.00313)	(0.00260)	(0.00334)
% of Black	0.00077	0.00105	0.00036	0.00158
	(0.00283)	(0.00359)	(0.00281)	(0.00384)
% of High School Degree	0.00636	0.01231	0.00488	0.00790
	(0.00817)	(0.01100)	(0.00849)	(0.00891)
% of Bachelor Degree	0.00507	-0.00162	0.00348	0.00611
	(0.00951)	(0.01130)	(0.00908)	(0.00998)
% of Advanced Degree	-0.02014	-0.00997	-0.01548	-0.02248
	(0.01930)	(0.02170)	(0.01830)	(0.01980)
% of Democrat population	-0.00098	-0.00083	-0.00275	-0.00015
	(0.00435)	(0.00439)	(0.00406)	(0.00432)
Democrat Governor	-0.00502	-0.01113	-0.00242	-0.00833
	(0.02620)	(0.03330)	(0.02420)	(0.02760)
Constant	-1.301*	-1.568*	-1.207*	-1.571**
	(0.667)	(0.855)	(0.666)	(0.799)

Table 4.13: OLS regression for the State Health Insurance Differential on Policy Environment Rankings

	State Health Insurance Differential		
	(1)	(2)	(3)
Overall Freedom Ranking	0.00025		
	(0.00060)		
Forbes Ranking		0.00067	
		(0.00057)	
ALEC_Ranking			-0.00061
			(0.00054)
State Unemployment Rate	0.00701	0.00636	0.00679
	(0.00664)	(0.00680)	(0.00631)
Mean Wage	-0.0000001	0.00000	0.00000
	(0.00000)	(0.00000)	(0.00000)
Union Menbership (%)	-0.00023	-0.00085	0.00074
	(0.00256)	(0.00247)	(0.00241)
Mean Age	0.00608	0.00394	0.00639*
	(0.00401)	(0.00458)	(0.00382)
% of White	-0.00015	0.00006	0.00013
	(0.00143)	(0.00137)	(0.00147)
% of Black	-0.00148	-0.00132	-0.00098
	(0.00144)	(0.00135)	(0.00159)
% of High School Degree	-0.0074**	-0.00661*	-0.00724**
	(0.00369)	(0.00381)	(0.00339)
% of Bachelor Degree	0.00582	0.00671*	0.00555
	(0.00419)	(0.00410)	(0.00416)
% of Advanced Degree	-0.00507	-0.00760	-0.00425
	(0.00813)	(0.00792)	(0.00821)
% of Democrat population	-0.00311*	-0.00241	-0.00239
	(0.00184)	(0.00164)	(0.00175)
Democrat Governor	-0.01132	-0.01176	-0.01564
	(0.01150)	(0.01130)	(0.01170)
Constant	0.57015*	0.51164*	0.50606*
	(0.30800)	(0.31100)	(0.30000)

Table 4.14: OLS regression for the Local Health Insurance Differential on Policy Environment Rankings

	Local Health Insurance Differential		
	(1)	(2)	(3)
Overall Freedom Ranking	-0.00043		
	(0.00045)		
Forbes Ranking		-0.00055	
		(0.00047)	
ALEC_Ranking			-0.0001**
			(0.00044)
State Unemployment Rate	0.00741	0.00844	0.00891*
	(0.00592)	(0.00554)	(0.00519)
Mean Wage	-0.000002	-0.000002	-0.000002
	(0.000002)	(0.000002)	(0.000001)
Union Menbership (%)	-0.00020	-0.00006	-0.00006
	(0.00228)	(0.00219)	(0.00205)
Mean Age	0.00262	0.00446	0.00340
	(0.00316)	(0.00366)	(0.00274)
% of White	0.00057	0.00040	0.00107*
	(0.00091)	(0.00095)	(0.00100)
% of Black	-0.00001	-0.00016	0.00067
	(0.00094)	(0.00097)	(0.00114)
% of High School Degree	-0.00798**	-0.00847***	-0.00707**
	(0.00328)	(0.00329)	(0.00320)
% of Bachelor Degree	0.00739**	0.00687*	0.00781**
	(0.00365)	(0.00359)	(0.00355)
% of Advanced Degree	-0.00626	-0.00475	-0.00712
	(0.00664)	(0.00686)	(0.00634)
% of Democrat population	-0.00119	-0.00185	-0.00038
	(0.00149)	(0.00148)	(0.00136)
Democrat Governor	0.00115	0.00230	-0.00278
	(0.01080)	(0.01090)	(0.01110)
Constant	0.62386**	0.65233**	0.44634*
	(0.268)	(0.267)	(0.286)

Table 4.15: Summary of Retirement Pension variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Annual Pension Benefit	50	37060.16	11296.88	14844	64008
Replacement Rate	50	86.54	11.28338	54	115
Underfunding Ratio	50	4.3556	1.57175	1.71	8.74

Table 4.16: OLS regression for the Annual Pension Benefit on Policy Environment Rankings

	Annual Pension Benefit		
	(1)	(2)	(3)
Overall Freedom Ranking	-54.4125		
	(171.7)		
Forbes Ranking		-36.6672	
		(142.8)	
ALEC_Ranking			-343.5558***
			(162.2)
State Unemployment Rate	3391.19**	3515.844**	3701.318***
	(1660.0)	(1760.0)	(1505.0)
Mean Wage	0.6627*	0.6319	0.5818*
	(0.4)	(0.4)	(0.3)
Union Menbership (%)	375.8274	341.8401	588.2523
	(639.4)	(572.5)	(599.6)
Mean Age	-608.8635	-478.0595	-369.2411
	(949.2)	(890.7)	(803.0)
% of White	-52.3815	-61.9927	118.3225
	(305.5)	(309.3)	(252.1)
% of Black	-526.8471	-540.6844	-275.8880
	(326.4)	(329.8)	(300.9)
% of High School Degree	-801.1775	-813.2447	-556.9385
	(933.9)	(905.4)	(923.7)
% of Bachelor Degree	587.4124	579.7355	638.3768
	(1202.0)	(1211.0)	(1098.0)
% of Advanced Degree	-875.9420	-842.2285	-926.2203
	(2113.0)	(2137.0)	(1807.0)
% of Democrat population	-413.7191	-468.1853	-92.3406
	(411.2)	(390.4)	(394.6)
Democrat Governor	3908.1110	4075.7630	2189.5860
	(3489.0)	(3502.0)	(3015.0)
Constant	92661.28	92239.69	39149.13
	(71816.0)	(70603.0)	(76688.0)

Table 4.17: OLS regression for the Replacement Ratio on Policy Environment Rankings

	Retirement Income Replacement Ratio		
	(1)	(2)	(3)
Overall Freedom Ranking	-0.09438		
	(0.179)		
Forbes Ranking		-0.00450	
		(0.197)	
ALEC_Ranking			-0.18140
			(0.178)
State Unemployment Rate	-0.51420	-0.30579	-0.20590
	(1.675)	(1.817)	(1.833)
Mean Wage	0.0008*	0.0008*	0.0007*
	(0.0005)	(0.0005)	(0.0005)
Union Menbership (%)	-0.73659	-0.88815	-0.73475
	(0.673)	(0.680)	(0.641)
Mean Age	-0.68765	-0.64233	-0.53922
	(1.071)	(1.301)	(1.021)
% of White	-0.16570	-0.16178	-0.07175
	(0.277)	(0.277)	(0.326)
% of Black	-0.95646***	-0.96987**	-0.83271**
	(0.370)	(0.389)	(0.399)
% of High School Degree	-1.12349	-1.05652	-0.94329
	(1.013)	(1.086)	(1.049)
% of Bachelor Degree	-1.18815	-1.09977	-1.09438
	(1.226)	(1.228)	(1.163)
% of Advanced Degree	0.52407	0.30079	0.32730
	(1.993)	(2.171)	(1.889)
% of Democrat population	0.44740	0.40494	0.59031
	(0.464)	(0.511)	(0.490)
Democrat Governor	3.46088	3.79243	2.78626
	(4.046)	(4.380)	(3.956)
Constant	218.2144***	210.3043**	184.0773*
	(84.21)	(86.09)	(93.98)

Table 4.18: OLS regression for the Underfunding Ratio on Policy Environment Rankings

	Underfund to Tax Revenue Ratio		
	(1)	(2)	(3)
Overall Freedom Ranking	-0.00288		
	(0.0273)		
Forbes Ranking		0.02565	
		(0.0268)	
ALEC_Ranking			0.04736*
			(0.0281)
State Unemployment Rate	0.45910	0.46204*	0.4392*
	(0.3300)	(0.3210)	(0.3120)
Mean Wage	-0.00011	-0.00009	-0.00010
	(0.0001)	(0.0001)	(0.0001)
Union Menbership (%)	0.05069	0.00565	0.00396
	(0.1080)	(0.1080)	(0.0933)
Mean Age	-0.07718	-0.15503	-0.10675
	(0.1580)	(0.1650)	(0.1370)
% of White	0.02043	0.02953	-0.00250
	(0.0497)	(0.0494)	(0.0569)
% of Black	0.00758	0.01179	-0.02841
	(0.0504)	(0.0496)	(0.0652)
% of High School Degree	-0.09284	-0.05244	-0.11841
	(0.1840)	(0.1680)	(0.1880)
% of Bachelor Degree	0.27235	0.31942	0.27589
	(0.2140)	(0.2170)	(0.2140)
% of Advanced Degree	-0.27760	-0.40737	-0.29759
	(0.3390)	(0.3440)	(0.3490)
% of Democrat population	0.01144	0.03284	-0.03710
	(0.0735)	(0.0685)	(0.0711)
Democrat Governor	-0.19633	-0.16843	0.07738
	(0.5990)	(0.6080)	(0.5770)
Constant	10.20671	6.83253	16.65340
	(15.51)	(14.09)	(16.68)

Table 4.19: OLS regression for the Underfunding Ratio on 'Right to Work States'

	Underfund to Tax Revenue Ratio
Right to Work States	-1.84605**
	(0.8918)
State Unemployment Rate	0.43381
	(0.2872)
Mean Wage	-0.00009
	(0.0001)
Union Menbership (%)	-0.02313
	(0.1130)
Mean Age	-0.09129
	(0.1413)
% of White	0.01851
	(0.0521)
% of Black	0.02004
	(0.0506)
% of High School Degree	-0.07573
	(0.1787)
% of Bachelor Degree	0.24344
	(0.1993)
% of Advanced Degree	-0.41054
	(0.3231)
% of Democrat population	-0.00275
	(0.0767)
Democrat Governor	-0.52710
	(0.6040)
Constant	12.74744
	(14.3786)

Note: *** p<0.01, ** p<0.05, * p<0.1

Figures

Figure 4.1: Wage Differential (with occupation), OLS, State-by-State, ACS.

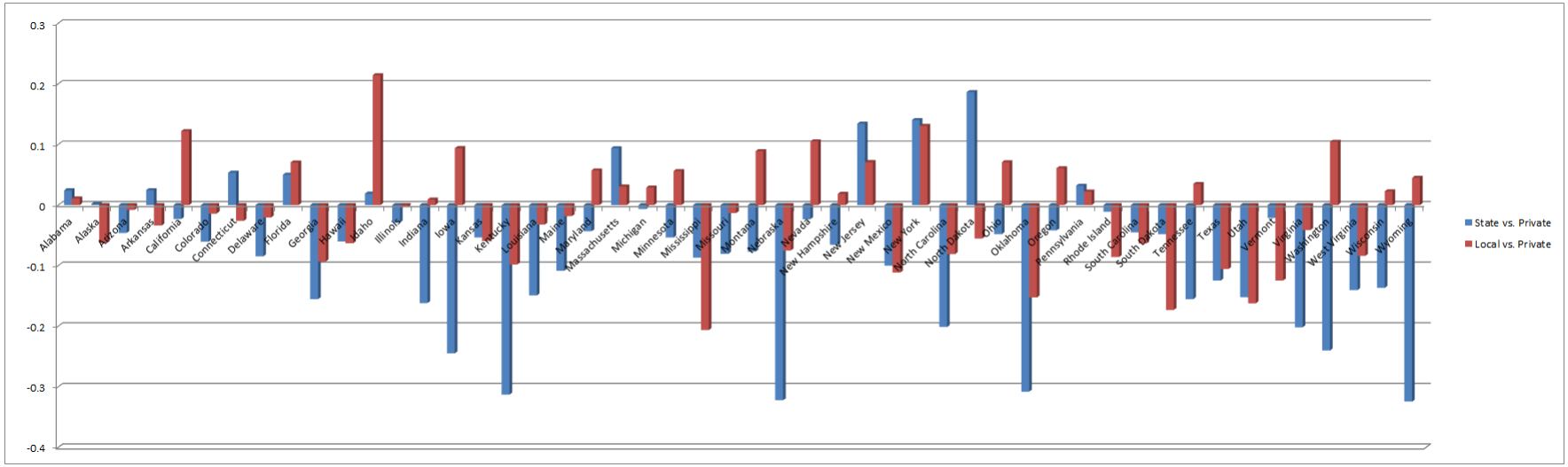
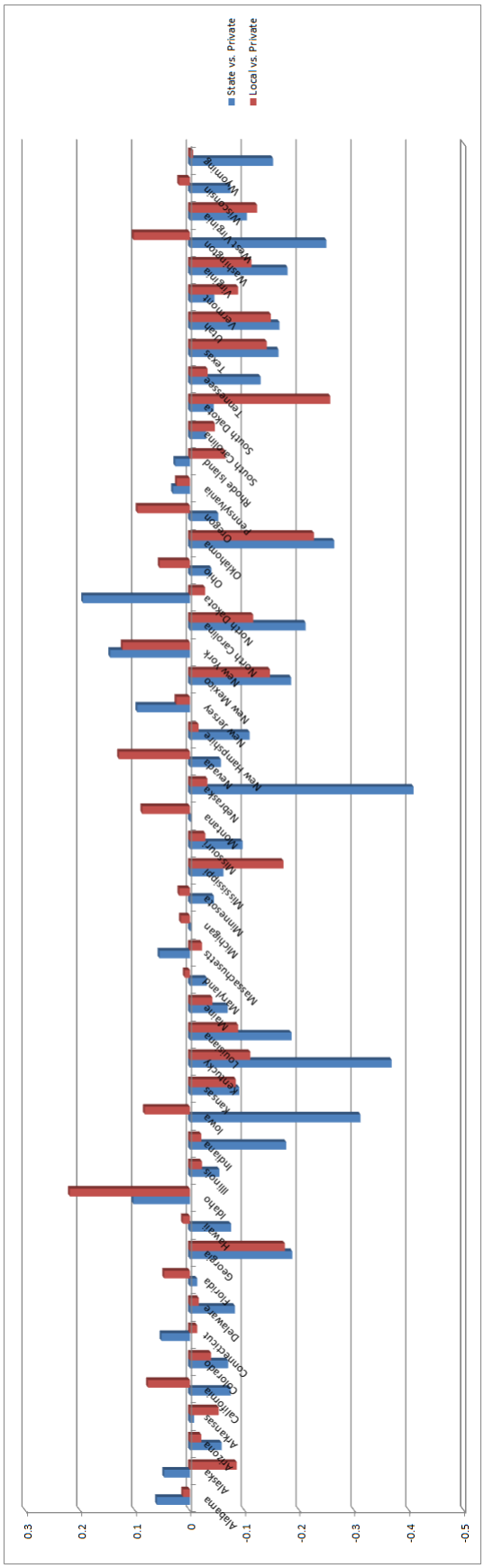


Figure 4.2: Wage Differential (pooled occupation), OLS, State-by-State, ACS.



Chapter 5 Summary

The recent serious economic conditions in the U.S. stimulated debates about public sector employee compensations. The main issue about these arguments is whether public sector employees are paid about the same wage or not compare to the private sector workers. There is much research about wage differential between the public and private sectors, however, most of them have examined only the wage, and none have examined the time trend. Therefore I examine wage differential between public sector employees and private sector employees. Before summarize the finding, it is worth to mentioning that public sector employees are categorized in three different levels such as the federal government, state government, and local government according to where they work for. Each level of public sector workers has different pay and different fringe benefit systems that are also distinguished from private sector employees. Thus I estimate wage differential between federal/state/local government employees and the private sector counterparts, respectively. In addition to wage differential, I estimate fringe benefit differentials between public and private sector workers. Since fringe benefits are essential factors when comparing total compensations for workers. For the analysis of fringe benefit differential, I utilize the probability of receiving employer-sponsored health insurance and retirement pension plan data which are the two main components of fringe benefits.

The CPS Outgoing Rotation Group data is used when estimating the wage differentials between federal and private sector employees. For the analysis of health insurance and pension plan benefit differential between federal and private sector employee, I use March CPS data. Both CPS data include detailed workers' information such as wage, demographics, and so on. I use about two decades sample period, from 1995 to 2013, to find the trend of wage differentials. The wage and fringe benefit

differential estimations between state/local and private sector workers are calculated based on ACS data from 2012 to 2014. However, retirement pension related data are not available from ACS. Thus I look for other state-based data on pensions to capture its generosity. I use data about annual benefits for new retirees and total retirement income replacement rates for state employees from Biggs et al. (2014). Also, I collect data on how well-funded the state's pension system is from Novy-Marx and Rauh (2009). I use data for all workers whose age is between 18 and 70 year. I estimate these differentials among full-time[1] workers and excluding military workers and self-employed workers.

The wage differential between federal and private sector employees is estimated by two different method (OLS and Heckman model) and two different sample (all occupation workers and only four selected occupation workers). I use OLS regression method to find basic wage differential. The OLS estimation for federal wage premium with all workers is between 4.16 percent and 17.14 percent. For the four selected occupations that I examine, the estimates range between 8.8 percent and 16.91 percent. However OLS estimation is unbiased and consistent under the assumption that choice of being federal government employees is not correlated with disturbance term. However if they are correlated, due to some unobservable characteristic such as ability, then the estimation from the OLS can be biased. Thus, I pay careful attention to the potential bias from unobservables. I explore three general methods, fixed effects (FE) model, IV approach and the Heckit model, to control for unobservable characteristics that might cause biased OLS estimations. Since FE model and IV approach only control for one dimensional unobservable, such as ability, Heckman selection correction model is used in this research due to its ability to control two dimensional unobservables as in a Roy model. The estimation of wage differential from Heckman model has minimum of 4.76 percent in 1999 and maximum of 17.25 percent

[1]They work more than 35 hours per week.

in 2013 for all employees and between 8.95 percent and 17.23 percent for the only four selected occupations. These findings suggest that the federal pay differential is invariably positive, but fell during the 1990s, began to rise in the early 2000s, and has continued to rise to the end of the sample period.

The estimations for state-private and local-private wage differentials show that they range widely by state. With wage equations that control for occupations, the wage differential estimation between the state and the private sector employees are between -32.4 percent and 18.63 percent. Wyoming state has the largest wage penalty for state government workers and North Dakota's state government employees have the greatest wage premium. The estimation of wage gap of local-private employees is between -20.64 percent (Mississippi) and 21.43 percent (Idaho). The estimated wage differential from OLS wage equations without controls for occupation is similar to previous results. State workers in Nebraska have the highest wage penalty of 40.75 percent and those in North Dakota also have the greatest wage premium of 19.4 percent. The local-private wage differential, without controls for occupation, is between -25.6 percent (South Dakota) and 21.9 percent (Idaho). Both state and local government employees' wage differentials relative to private sector workers vary widely by state. However, Overall, I find that state government employees earn 7.5 percent and local government employees earn 1.1 percent, on average, less than private sector counterparts, receptively.

To investigate the fringe benefit differential between federal and private sector employees, I estimate the probability differential of receiving health employer-sponsored health insurance and retirement pension plans. Federal workers enjoy a higher probability of receiving retirement pension plan than private sector counterparts during entire sample period. It has minimum difference in 2001 as 15.3 percent and maximum difference in 2011 as 26.6 percent. Probit estimates of the probability of receiving employer-sponsored health insurance shows a smaller magnitude than pensions and

not all sample periods show statistically significant differentials. However, since late 2000s, the effect is marginally significant and positive with average 2 percent.

The probabilities of receiving employer-sponsored health insurance in each state and sectors are estimated and calculate the differences between state/local and private sector employees. In contrast to wage differentials, I find that both state and local government employees have a significantly higher probability of receiving health insurance through a current employer in all states. The estimations from Idaho for both state and local probability differential, regarding employer-sponsored health insurance provision status, indicate the largest difference with 19.7 percent higher for state employees and 19.8 percent higher for local employees. Overall, the state government employees received 10.9 percent and the local government employees received 11.2 percent higher probability of receiving health insurance than the private sector, on average.

Using estimated wage and probability of receiving employer-sponsored health insurance differential between state/local government employees as dependent variables, I investigate the determinants of the differential with state-level data for the economic policy environment by state. As indices for this, I obtain rankings from Forbes, ALEC, and the Mercatus Center. These indices rank states on their state policy. The Forbes ranking is the only index that explains variation in state-private wage differentials. As the Forbes ranking increases the state private wage gap widens by 0.32 percent. None of the policy environment indices, however, are statistically significant in predicting the local-private wage differential. Regarding the determinants of fringe benefit differentials, I use the estimates of the probability differential of receiving employer-sponsored health insurance and data on retirement pensions. For the analysis of determinants of probability differential of receiving health insurance through a current employer, the ALEC ranking is the only ranking which is significant with negative effect. As one ranking increase in the ALEC economic per-

formance ranking, implying a worse ranking, the probability gap of receiving health insurance through a current employer is getting narrower. Additionally, I examine the relationship between these indices and retirement pension related variables such as state government retirement pension generosity and the degree of soundness in funding state employees retirement pensions. Among the policy environment indices, the ALEC ranking is significantly related with the total amount of annual pension benefit and the ratio of state's pension underfunding as a percent of tax revenues. As the ALEC ranking increases by one, implying a worse rankings, annual pension amount decreases by $ 343.56 and 4.73 percent of annual tax revenue amount is added as an additional liability to state-sponsored pension plan.

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