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8 Are Public Sector Workers Paid More Than Their Alternative Wage? Evidence from Longitudinal Data and Job Queues

Alan B. Krueger

Several academic researchers have addressed the issue of whether federal government workers are paid more than comparable private sector workers. In general, these studies use cross-sectional data to estimate the differential in wages between federal and private sector workers, controlling for observed worker characteristics such as age and education. (Examples are Smith 1976, 1977 and Quinn 1979.) This literature typically finds that wages are 10–20 percent greater for federal workers than private sector workers, all else constant. In conflict with the findings of academic studies, the Bureau of Labor Statistics's official wage comparability survey consistently finds that federal workers are paid less than private sector workers who perform similar jobs.[1] Moreover, the government's findings have been confirmed by an independent study by Hay Associates (1984). Additional research is needed to resolve this conflict.

When the focus turns to state and local governments, insignificant differences in pay are generally found between state and local government employees and private sector employees. One important difference, however, is the varying effect of unions on compensation in the two sectors. An overwhelming amount of evidence suggests that the union-nonunion wage gap is substantially smaller in the state and local government sector than in the private sector.[2]

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This chapter extends the literature on public sector/private sector wage differentials by examining two new types of evidence, namely longitudinal data and job queues.[3] With longitudinal data I examine the change in a worker's pay as he or she moves from the private to the public sector, or vice versa. This analysis has the advantage of reflecting the government's relevant external labor market because it is based on the actual transitions of workers, and of controlling for worker characteristics that remain fixed as workers change jobs. The data on job queues are used to compare the number of individuals who apply for jobs in the federal government to the number who apply for jobs in the private sector. If prospective employees consider government employment (e.g., wage and nonwage benefits) more attractive than private sector employment, we would expect to find a longer queue of applicants for government jobs than private sector jobs, all else constant.

The major result of this chapter is that longitudinal and cross-sectional analyses yield broadly similar estimates of the differential in pay between public and private sector workers, and similar estimates of the union-nonunion wage gap in the public sector. Furthermore, the comparison of job application rates suggests that for the average job opening the federal government receives more applications than the average private sector firm. For certain occupations such as engineers, however, it appears that the government has a shortage of job applicants. The findings are generally consistent with the previous academic literature.

Finally, this chapter explores several possible rationales that might explain why the federal government appears to consistently pay higher wages than the private sector for comparable employees. The specific focus is on issues relating to turnover, morale, motivation, supervision, employee transfers, employer size, and unions.

8.1 Pay Determination in the Federal Government

Federal employees are covered by a number of different wage schedules.[4] However, the General Schedule (GS) for white-collar workers and the Federal Wage System (FWS) for blue-collar workers are the two major wage schedules for civilian federal employees. Since federal employees are overwhelmingly white-collar workers, the GS is the predominant wage schedule used by the U.S. government—nearly 1.5 million full-time federal employees were covered by the GS as of March 1985.

The GS consists of eighteen grades, GS-1 through GS-15, with GS-1 the lowest grade.[5] A grade corresponds to a salary range. Each work level of each occupation is assigned to one of the grades. For example, nearly all nurses are classified between GS-4 and GS-9. Within a grade,

employees may advance through ten salary steps, depending on length of service and completion of sufficiently competent work. Some additional flexibility is introduced into the system because agencies may apply to the Office of Personnel Management's Special Rates and Analysis Division for higher step classifications (up to the tenth step of the grade) if they encounter difficulty in recruiting or retaining employees in certain occupations (e.g., engineering) or regions (e.g., Los Angeles).

The Federal Pay Comparability Act of 1970 is the statutory basis of the GS. The Act requires that federal workers receive wages equivalent to private sector workers performing the same level of work. To this end, each year in March the U.S. Bureau of Labor Statistics (BLS) conducts a survey of private sector wages of professional, administrative, technical, and clerical jobs (the PATC survey). Based on this survey, the BLS recommends to Congress and the president salary increases for each grade to take effect the following October. The president, in turn, has the option to submit an alternative proposal for white-collar pay increases to Congress. Each year since 1976 the president has elected this option and proposed wage increases that were less than the amount called for by the PATC survey.

In the early 1970s the PATC comparability survey found that wages were virtually equal between GS and private sector workers in similar occupations, but by 1980 the GS fell behind the private sector by 14 percent, and by 1986 the GS trailed the private sector by 23.8 percent.

The PATC survey has been criticized on several grounds. First, many jobs in the public sector are not directly comparable to private sector jobs, and jobs that are equivalent may have inaccurate job descriptions. Second, the PATC survey neglects nonwage compensation. Finally, the survey has been unduly criticized because it oversamples large establishments. In 1985, the minimum establishment size requirement for the PATC survey ranged from 50 to 250 employees depending on the industry. Although larger establishments appear to pay higher wages for workers of equal quality (e.g., Brown and Medoff 1985), the following calculation suggests that it is unlikely that the sampling design of the PATC survey produces a sizeable bias on the estimated pay differential. A wage regression with 1979 CPS data shows that white-collar employees in establishments with fewer than 100 employees earn about 7 percent lower wages than employees in larger establishments. Since less than half of private sector employees work in establishments with fewer than 100 employees, neglecting employees in small establishments will upwardly bias the estimated wage of private sector workers by less than 3.5 percent.

It should be noted, however, that an independent study by Hay Associates (1984) for the House Committee on Post Office and Civil Service reached conclusions similar to the PATC survey. The Hay

Associates applied the same compensation analyses it uses to evaluate the pay scales of major private sector employers: jobs in both sectors were assigned points by managers according to their degree of difficulty, and comparisons were made between the GS and the wages of a sample of private sector employers who had previously used Hay Associates' services. The study found that GS pay was 10.3 percent less than the pay of private sector employees performing similar jobs in 1984. Although the Hay Associates' study can be easily criticized for its nonrandom sample of private employers, the results are qualitatively similar to the PATC survey.

8.2. Methodology

Studies of public sector wages that estimate human capital earnings functions with cross-sectional data cannot control for unobserved differences in worker productivity, such as innate ability and motivation. This can be seen in equation (1), where w_{it} is the hourly wage rate, X_{it} is a vector of observed productivity and demographic characteristics, β is a vector of returns to those characteristics, P_{it} is a dummy variable that takes on the value of one if the worker is employed in the public sector and zero if employed in the private sector, δ is the public sector wage differential, μ_i represents unobserved, time invariant worker characteristics, and ϵ_{it} is a white noise error term.[6] The subscript i refers to individuals and t to time.

$$\ln(w_{it}) = X_{it}\beta + P_{it}\delta + \mu_i + \epsilon_{it}. \tag{1}$$

If public sector workers are more productive than their private sector counterparts in terms of unobserved characteristics and if workers are positively rewarded for these unobserved characteristics, the unobserved factors will "load on" the public sector dummy variable and thus upwardly bias the estimated public sector wage differential.

Longitudinal data provide a means to control for time-invariant, unobserved variables. The approach taken here is to estimate first differenced regressions to control for unobserved variables.[7] As can be seen in equation (2), first differencing the data (denoted by Δ) nets out the constant unobserved factors that bias cross-sectional analyses. Since the panel data set only includes two years of data on each individual, the first differenced regression is equivalent to a fixed-effects estimator. However, controlling for fixed effects is not without costs, since first differencing typically exacerbates measurement error bias and raises issues about the selectivity of job switchers. These potential biases are considered in the empirical analysis.

$$\Delta\ln(w_{it}) = \Delta X_{it}\beta + \Delta P_{it}\delta + \Delta\epsilon_{it}. \tag{2}$$

Finally, it should be noted that equation (2) can be generalized to allow different changes in employment to have different effects on wages. Because of the voluntary mobility of many job changers, the wage growth, W, of workers who join the government relative to those who remain in the private sector, $(Wpg - Wpp)$, may not equal the relative wage change of workers who leave the government, $(Wgp - Wgg)$, in absolute value. The consequences of voluntary job changes for the longitudinal analysis is discussed further in the empirical section below.

8.2.1 Data Sets

A longitudinal data set that follows individuals over time is necessary to estimate equation (2). Two longitudinal data sets are used. The first is a series of matched May Current Population Surveys (CPS). The rotation group design of the CPS allows for the creation of a large longitudinal data set because half of the households surveyed in a given month are reinterviewed the following year, and thus may be matched from one year to the next.

This study uses matched May CPS data from 1979–80, 1977–78, and 1974–75. Each individual is observed in two consecutive years. The data from all three matched data sets are pooled together to create a large sample of public sector/private sector switchers, and year dummy variables are included in the regressions to control for wage inflation. CPS reports that about 70 percent of eligible observations are typically matched from one year to the next. Even with this large data set, there is only a relatively small sample of workers who move between the public and private sectors, and it is necessary to pool together observations on men and women to estimate the public sector wage differential more precisely.

Since CPS cannot match individuals who change their address during the course of the year, the sample is not completely representative of all workers. However, this sample selection rule is not likely to produce an important bias in the estimated wage differentials because both joiners and leavers who move to a new location are eliminated from the sample.[8] On the other hand, this feature of the data has the virtue of assuring that wage changes do not represent cost-of-living adjustments for workers who move to relatively high-wage areas (e.g., Washington, D.C.), because all workers remain in the same area both time periods.

Following most previous studies, government employees are identified from their reported industry status. (In recent years CPS identifies the level of government in the class of worker variable.) Unfortunately, this procedure only identifies government employees involved in public administration, which consists of employees engaged in legislative,

judicial, administrative, and regulatory activities. At the federal level, this includes workers employed by most agencies and bureaus, the courts, and the secret service. The Army Corp of Engineers and Government Printing Office are examples of exclusions from public administration. At the state and local government level, policemen, fire fighters and tax collectors are examples of workers classified in public administration, while other employees such as public school teachers and librarians are classified in private sector industries. In total, 51 percent of federal workers, 35 percent of state government workers, and 20 percent of local government workers are classified in public administration.[9]

The sample contains full-time and part-time civilian nonagricultural employees sixteen years old or older. The earnings variable is usual weekly earnings divided by usual weekly hours. All individuals whose derived wage rate is less than $1 per hour or more than $200 per hour are eliminated from the sample.[10] Furthermore, workers who are categorized as government employees according to the class of worker variable but who are not categorized in a public administration industry are eliminated from the sample. Finally, workers who move from one branch of government service to another (e.g., state government to local government) are eliminated from the sample in order to compare public sector workers to private sector workers.

8.2.2 Displaced Workers Survey

The second longitudinal data set is drawn from the CPS supplemental surveys of displaced workers. In January of 1984 and 1986 the U.S. Census Bureau asked a sequence of retrospective questions of workers who lost a job in the preceding five years because of a plant closing, permanent layoff, or unforeseen job abolishment. Responses from both surveys are pooled together to create a sample of more than 4,000 workers who were displaced from private sector jobs. Almost 10 percent of these workers joined the public sector.

This data set (hereafter referred to as the Displaced Workers Survey) helps solve the problem of selective job changers because only workers who were involuntarily displaced from their jobs are in the sample. Since the notion of a job displacement from the public sector is questionable, workers who are initially in the public sector are eliminated from the sample. Furthermore, construction workers are eliminated from the sample because of the temporary, discontinuous nature of their work.

One disadvantage of the Displaced Workers Survey is that hourly wage rates and weekly hours are not available. Instead, the usual weekly wage is used as the dependent variable and the sample is restricted to full-time (at least thirty-five hours per week) workers. On the other

hand, the data set has the advantages of following workers who moved to a new location, contains tenure on the initial job, and identifies government workers on the basis of the class of worker variable rather than the industry variable.[11] Furthermore, the sample covers a recent time period.

8.3 Empirical Results

Longitudinal and cross-sectional estimates of the public sector wage differential are considered below. The results for federal, postal, state and local government employees are considered in turn, with most attention devoted to the federal sector.

8.3.1 The Federal Wage Differential

Before proceeding to the multivariate analysis, it is useful to consider some summary statistics. Table 8.1 focuses on differences between federal and private sector workers who move between sectors or remain in the same sector using the matched CPS data set, which includes voluntary and involuntary movers. The table contains means of several variables for four subgroups: 1) joiners to the federal government (from the private sector, 2) stayers in the private sector, 3) stayers in the federal government, and 4) leavers from the federal government (to the private sector).

Several conclusions can be drawn from table 8.1. One striking difference between switchers and stayers is that labor mobility is disproportionately large between the federal sector and the service industry. Of workers who joined the public sector, 55 percent left jobs in the service industry, while 38 percent of the workers who left federal employment for private employment joined the service industry. In comparison, only about 20 percent of private sector workers are employed in the service sector at a point in time.

It is also apparent from table 8.1 that workers who join the federal government are more likely to be in white-collar jobs and to be female, white, unmarried, nonunion, and younger than workers who remain in the private sector, while workers who leave the federal government are more likely to be male, nonwhite, unmarried, nonunion, and slightly younger than those who remain in the federal sector.

Table 8.2 presents regression estimates of the public sector wage differential for each level of government, holding constant the occupation, human capital, and demographic controls listed at the bottom of the table.[12] Column (1) of the table reports results of regressions on first differences (eq. 2) and, for comparison, column (2) reports cross-sectional results (eq. 1). Each coefficient reported in the table is estimated from a separate regression. A puzzling result is that the longi-

Table 8.1 Characteristics of Sector Changers and Stayers

Variable	(1) Joiners (to federal)	(2) Stayers (private)	(3) Stayers (federal)	(4) Leavers (from federal)
Change Log Wage				
Males	0.192	0.093	0.080	0.083
Females	0.262	0.106	0.076	0.226
Initial Occupation				
Professional	0.161	0.103	0.327	0.143
Management	0.065	0.097	0.148	0.238
Clerical	0.484	0.185	0.337	0.286
Sales	0.032	0.067	0.000	0.000
Crafts	0.097	0.170	0.097	0.143
Operatives	0.032	0.212	0.092	0.095
Laborers	0.000	0.049	0.026	0.048
Service Workers	0.129	0.117	0.047	0.048
Industry				
Construction	0.000	0.058	NA	0.048
Manufacturing	0.129	0.346	NA	0.048
Transportation	0.032	0.082	NA	0.095
Wholesale & Retail Trade	0.226	0.240	NA	0.143
Finance, Insurance, and Real Estate	0.065	0.064	NA	0.238
Service	0.548	0.193	NA	0.381
Mining	0.000	0.016	NA	0.048
Demographic				
Age	32.7	38.5	41.9	37.7
Education	12.5	11.9	13.6	12.9
Nonwhite	0.065	0.091	0.162	0.190
Female	0.677	0.397	0.339	0.286
Married	0.774	0.836	0.899	0.714
Union Status				
Period One	0.032	0.257	0.176	0.143
Period Two	0.097	0.259	0.203	0.191

Note: Sample sizes for columns (1)–(4) are 31, 18, 348, 493, and 21, respectively. Data set is matched May CPS, 1974–75, 1977–78, and 1979–80. NA means not applicable.

tudinal analysis finds a statistically insignificant 6 percent wage differential for federal workers relative to private sector workers, while the cross-sectional estimate with the same data set is nearly 25 percent and highly statistically significant. Furthermore, the cross-sectional finding is similar in magnitude to the results of studies surveyed earlier.

Estimation of a more flexible specification that allows the wage differential to vary for joiners and leavers helps resolve this puzzle. The estimated wage change (standard error) of workers who join the federal sector from the private sector as opposed to remaining in the private sector ($Wpg - Wpp$) is 0.12 (0.05), while workers who move from the

Table 8.2 **Public Sector/Private Sector Wage Differentials, Fixed-Effects and Cross-Sectional Estimates[a]**

Sample	Estimation Technique	
	(1) Fixed-Effects[b]	(2) Cross-Section[c]
Federal and Private [18,893]	0.058	0.247
	(0.042)	(0.017)
Postal and Private [18,603]	0.312	0.113
	(0.088)	(0.024)
State and Private [18,600]	0.051	0.062
	(0.054)	(0.025)
Local and Private [18,920]	−0.038	0.042
	(0.037)	(0.017)

[a]Data set for fixed-effects models is CPS matched May 1979–80, 1978–79, and 1974–75. Sample size is in brackets. Cross-section is 1974, 1977, and 1979 CPS samples pooled together. Results were qualitatively similar with the second-period data sample. Standard errors are in parentheses.

[b]Controls column (1): change in occupation dummies (8), change in education, change in union status, change in marital status, age, and year dummies (2).

[c]Controls column (2): occupation dummies (8), education, union status, marital status, nonwhite, age group dummies (6), sex, region dummies (3), and year dummies (2).

federal government to the private sector ($Wgp - Wgg$) experience a 0.05 (0.07) wage gain over those who remain federal employees.[13] Unfortunately, these wage differentials are not estimated very precisely because of the limited number of transitions between the private sector and the federal government in this data set.

Consideration of the selection forces that affect job changers suggests that the relative wage gains for workers who join the federal government are more representative of the "true" average difference in wages between the federal government and private sector.[14] If employees face a distribution of jobs with different wages (i.e., due to job matches or imperfect information), optimal search behavior would lead employees to voluntarily change jobs only if the new job offered better wage and nonwage benefits than the current job. In addition, the large pension losses imposed on workers who leave the federal government discourage federal workers from moving to the private sector unless they receive large wage gains (Ippolito 1987).

On the other hand, focusing on workers who join the federal government obviates many of the selectivity problems. First, if wages in the federal sector truly exceed private sector wages in comparable jobs, private sector workers would have an incentive to queue for federal jobs. The "lucky" private sector workers who were selected for federal jobs would reap large wage gains. Furthermore, private sector workers are less constrained by pension rules.

Results of Displaced Workers Survey

The issue of selectivity of job changers is dealt with in perhaps a more satisfactory manner in our analysis of displaced workers. In the ideal longitudinal experiment, workers would be randomly assigned to move between the government and the private sector. The Displaced Workers Survey is a better approximation to the ideal experimental design because only workers who were involuntarily displaced from their original private sector jobs are included in the sample.[15]

Table 8.3 compares the wage growth of workers who joined the government after being displaced from their initial jobs in the private sector to the wage growth of workers who accepted private sector jobs after being displaced from their initial private sector jobs. The regressions control for the year the worker was displaced and the survey year, as well as tenure on the initial job, geographic mobility, and changes in eight major occupations. For comparison, the second column of the table presents cross-sectional regression estimates of the various public sector wage differentials using the May 1984 CPS.

The results indicate that earnings growth of displaced private sector workers who join the federal government exceeds the earnings growth

Table 8.3 Longitudinal Analysis of Displaced Workers Survey

	Estimation Technique	
Sample	(1) Fixed-Effects[a]	(2) Cross-Section[b]
Federal and Private	0.107	0.126
	(0.055)	(0.020)
Postal and Private	0.126	0.065
	(0.097)	(0.038)
State and Private	−0.037	−0.100
	(0.045)	(0.018)
Local and Private	−0.044	−0.096
	(0.033)	(0.013)

[a]Data set for fixed-effects models is the January 1984 and January 1986 CPS supplemental displaced worker surveys. The sample consists of 3,844 workers who remained in the private sector, 59 who joined the federal government, 19 who joined the postal service, 91 who joined state governments, and 174 who joined local governments. Controls are change in major occupation dummies (8), tenure on previous job, age, a dummy variable indicating whether the worker moved to a new location, year of displacement dummies (4), and a dummy variable indicating whether the observation is taken from the 1984 or 1986 survey. Standard errors are in parentheses.

[b]Cross-section estimates are based on the May 1984 CPS survey. Dependent variable is log usual weekly wage and sample is restricted to full-time workers. Sample sizes for rows 1 through 3 are 9,740, 9,896, and 10,521, respectively. Controls are occupation dummies (8), education, union status, marital status, nonwhite, age group dummies (6), sex, central city dummy, and region dummies (3). Standard errors are in parentheses.

of displaced workers who remain in the private sector by a statistically significant 10.7 percent. This estimate is similar in magnitude to the 12.6 percent federal earnings differential obtained from the cross-sectional regression with the May 1984 CPS. Because of changes in relative federal-private compensation over time, these results vary from table 8.2.

The initial industry that workers are employed in does not appear to have an important effect on these findings. When the sample is divided into subsamples of manufacturing and nonmanufacturing workers, the first difference estimate of the federal wage premium (standard error) is 0.11 (0.08) for nonmanufacturing workers and 0.10 (0.07) for manufacturing workers.

Measurement Error

Estimation using both longitudinal data sets finds that the federal wage differential is smaller in the longitudinal analysis than in the corresponding cross-sectional analysis. It is well known that measurement error biases regression coefficients downward in absolute value, and Freeman (1984) proves that under plausible assumptions measurement error produces a greater bias in longitudinal analyses than cross-sectional analyses. Since Mellow and Sider (1983) report evidence that misclassification in the reporting of industry status at a point in time is a pervasive problem in CPS data, measurement error bias may be responsible for the smaller estimate of the federal wage differential in the longitudinal analysis.

What effect does measurement error have on the longitudinal estimation? If half of the observed transitions between the federal government and private sector in the matched CPS data set are the result of random misclassification errors, the first difference estimate would be biased downward by about 50 percent. This would be large enough to account for the entire difference between the longitudinal and cross-sectional results in the matched CPS data set.

There is likely to be a smaller bias from measurement error in the Displaced Workers Surveys than in the matched CPS data set for two reasons. First, there are relatively more true sectoral transitions in this data set because all of the workers changed jobs. As a result, the signal in the data increases relative to the noise. Second, government workers are identified by the class of worker variable instead of the industry variable, which is likely to reduce measurement error.

Unfortunately, given the small sample of switchers in the data sets and the potentially large effect of measurement error bias, it is difficult to precisely estimate the federal wage differential from the longitudinal analyses. Nonetheless, it appears that longitudinal estimates of the federal wage differential in both data sets are less than the corresponding

cross-sectional estimates. The difference between the longitudinal and cross-sectional estimates may stem from measurement errors and/or unobserved worker-specific characteristics. Since Freeman (1984) has shown that cross-sectional and longitudinal estimates of wage differentials probably bound the true wage differential, it would appear that the federal wage premium was between 12 percent and 25 percent in the 1970s and between 11 percent and 13 percent in the mid-1980s.

Who Gains from Federal Employment?

Lastly, I examine how the federal wage premium varies across different types of workers, different regions of the United States, and over time. Table 8.4 examines these issues for separate samples of men and women. The federal wage premium is estimated for various groups of workers by interacting several independent variables with a dummy variable that equals one if the worker is employed by the federal government. Cross-sectional data are analyzed because there are too few job changers in the longitudinal data set to make accurate comparisons, and because the previous results suggest that unobserved heterogeneity may not be a serious problem in cross-sectional studies of the federal wage premium.

Consistent with the findings of previous researchers, the results indicate that the federal wage premium is greater for female workers (especially nonwhite female workers) than for male workers. This may reflect less discrimination in the federal government than in the private sector (Asher and Popkin 1984; Freeman 1987) or, alternatively, that the compressed government wage structure benefits female-dominated occupations relative to male-dominated occupations.

Along occupational lines, white-collar workers appear to receive a larger wage premium from federal employment than blue-collar workers. In addition, older workers and workers in the South appear to benefit more from federal employment than younger workers and workers in other regions of the country. The regional differences may result from inherent rigidities caused by a national nominal wage scale.

Finally, an analysis of the federal wage premium over time shows that the wage gap between male federal workers and private sector workers fell quite dramatically in the latter part of the 1970s, although a trend for women is much less pronounced. Freeman (1987) notes a similar decline in the relative pay of federal workers in several data sets.

8.3.2 Postal Workers

Turning next to postal workers, the longitudinal and cross-sectional analyses in tables 8.2 and 8.3 both find that the wage of postal workers exceeds the wage of private sector workers, although the magnitude

Table 8.4 **The Federal Wage Premium for Different Types of Workers and Over Time**

	Sample	
	Male	Female
Race		
White	0.210	0.299
	(0.023)	(0.030)
Nonwhite	0.181	0.369
	(0.056)	(0.059)
Age		
25	0.140	0.246
	(0.037)	(0.033)
50	0.232	0.363
	(0.026)	(0.127)
Occupation		
White Collar	0.215	0.317
	(0.024)	(0.026)
Blue Collar	0.184	0.178
	(0.039)	(0.154)
Region		
North East	0.051	0.285
	(0.062)	(0.070)
South	0.279	0.373
	(0.030)	(0.036)
West	0.176	0.252
	(0.042)	(0.060)
North Central	0.140	0.199
	(0.053)	(0.072)
Year		
1974	0.240	0.348
	(0.033)	(0.043)
1977	0.202	0.267
	(0.030)	(0.036)
1979	0.115	0.385
	(0.059)	(0.074)
Sample Size	11,410	7,483

Notes: Coefficients are estimated from cross-section regressions interacting each variable with a dummy variable for federal employment. Controls are year dummies, occupation dummies (8), union status, marital status, age group dummies (6), education, and race. Data set is pooled CPS data from 1974, 1977, and 1979.

of the differential appears to have diminished over time. Given the small sample of postal workers, however, the estimated wage differentials are extremely imprecise. Nonetheless, these results support Perloff and Wachter's (1984) claim that postal workers are paid more than comparable private sector workers.

8.3.3 State and Local Government Workers

The estimated wage differential between state and local government employees and private sector employees is similar in the longitudinal and cross-sectional analyses using both data sets. Furthermore, a decline in the wages of state and local workers relative to private sector workers is evident in the Displaced Workers Survey, which covers the years 1980 through 1986, and in the matched CPS data set, which covers the years 1974 through 1980.

The first difference regression using the matched CPS data reported in table 8.2 indicates that state government employees earn 5.1 percent higher wages than private sector workers, while the cross-sectional regression finds a 6.2 percent wage advantage for state government employees over private sector employees. The longitudinal estimate, however, is statistically insignificant. Analysis of the second data set reported in table 8.3 finds that displaced private workers who take employment in state governments experience 3.7 percent less earnings growth than displaced workers who remain in the private sector. And a cross-sectional regression using the May 1984 CPS finds that earnings are 10 percent less among state government employees than private sector employees.

Lastly, on the local government level, the first difference regression using the matched CPS data finds a statistically insignificant −3.8 percent public sector wage differential, while the cross-sectional regression shows a statistically significant positive 4.2 percent public sector wage differential. The Displaced Workers Survey, on the other hand, shows a −4.4 percent earnings differential for workers who join local governments, and the cross-sectional regression with the May 1984 CPS shows a statistically significant −9.6 percent earnings differential for local government employees.

As noted earlier in the case of federal workers, reporting errors in the state and local government variable would bias the public sector wage differentials toward zero.

8.4 Queues for Federal Jobs

Long (1982), Utgoff (1983), and others turn to evidence on the quit rate in the federal government and the private sector to infer conclusions about pay comparability. Since the quit rate is substantially lower among federal workers, this is often cited as support of the view that federal workers receive economic rents. Ippolito (1987), however, challenges this interpretation. He argues that the abnormally low quit rate in the federal sector is due to the substantial pension losses imposed on workers who quit the government early because federal pension

benefits are based on nominal wages at the time of departure, and because pension benefits make up a larger share of compensation in the public sector than in the private sector.

An alternative form of evidence—the application rate for federal government and private sector jobs—is examined here.[16] In a textbook competitive labor market, firms pay a wage that is just high enough to attract, motivate, and retain a sufficient number of qualified workers. Consequently, the number of workers who queue for a job opening at a particular firm reflects the relative attractiveness of working for that firm. A longer job queue signals that workers perceive the firm to offer relatively high pecuniary and nonpecuniary benefits. It should be noted that a comparison of job application rates overcomes a major limitation of the quit rate studies because workers who are applying for a job consider the expected discounted value of future earnings and are not seriously influenced by the "lock-in" effects of pensions.

In addition to the overall attractiveness of the job, the direct and indirect costs of the application process will affect the number of applicants for a given job opening. More costly and difficult application procedures will discourage applicants. Included in the application cost are the psychic and time costs of obtaining information about job openings, filling out an application, being interviewed, and possibly taking an exam. If the cost of applying for a job does not differ substantially between two employers that draw from the same labor market, it is reasonable to expect that the employer with the longer job queue offers relatively more desirable employment.

There are three major limitations to judging federal pay comparability by comparing the length of queues for federal and private sector jobs. First, the cost of applying for federal jobs and private sector jobs is not equal. For instance, the federal government requires a competitive entrance exam of many job applicants, while this procedure may be less common in private sector firms. In addition, the cost and process of obtaining information about federal jobs differ from private sector jobs. To the extent that it is more (less) costly to apply for federal jobs than private sector jobs, there will be relatively fewer (more) applicants for available jobs in the federal sector at a given level of wages and working conditions.

The second limitation is that analyzing raw data on the number of applicants per selection does not control for the quality of the applicant pool.[17] Krueger (1988) finds evidence that an increase in the wage of federal workers relative to private sector workers increases both the number and average quality of applicants for federal jobs. The third limitation is that the number of actual applicants is an imperfect measure of the number of workers who would be willing to work for a given firm.

Controlling for the different application costs and the quality of applicants in the federal and private sectors is beyond the scope of available data, but a comparison between the number of applicants for federal and private jobs provides a crude indication of wage comparability. Table 8.5 presents data on the length of the queue for federal jobs, measured by the number of outside job applicants per new worker hired. Column (1) contains the number of applicants from outside the government (excluding the postal service), and column (2) contains the number of workers hired from these applicants during fiscal year 1982.[18] Column (3) contains the ratio of applicants to new hires. The data are broken down for several occupations.

The length of the queue for federal jobs varies considerably across occupations, ranging from a high of 38.4 applicants per new hire in the field of life science to a low of 4.5 applicants per new hire for engineers. The varying length of occupational job queues probably reflects the relative scarcity of certain skills (e.g., engineers) as well as the varying federal wage premium among occupations. On average, 10.5 candidates applied per new hire in the federal government in 1982.

How does this compare with the typical job application rate in the private sector? Unfortunately, only scant data on applications for private sector jobs are available. The most suitable data set for our purposes is the Employment Opportunities Pilot Project (EOPP) survey conducted by Gallup in 1982. The EOPP survey contains establishment-level information on three relevant items: 1) the number of applicants who applied for the last position filled; 2) the number of applications

Table 8.5 **Queues for Jobs in the Federal Government in Fiscal Year 1982**

Occupation/Field	(1) Applications Processed	(2) New Hires	(1)/(2) Applications per New Hire
Blue Collar	127,783	12,673	10.1
Steno/Typist	162,164	20,720	7.8
Life Science	5,370	140	38.4
Engineers	19,025	4,273	4.5
Mathematician	4,803	634	7.6
Physical Science	13,356	1,057	12.6
Computer Specialist	8,958	864	10.4
Nurse	4,257	826	5.2
Accountant/Auditor	10,930	340	32.1
All Jobs	1,132,260	107,967	10.5

Source: Unpublished data provided by the Office of Personnel Management. Total for all jobs does not equal the sum of occupations because of unclassified occupations and because delegations to agencies are not recorded by occupation.

received and job offers made in the preceding ten days; and 3) the average number of job offers made per worker hired. Although these questions are not identical to the application data collected for federal government jobs, they provide a rough indication of the number of applicants for private sector jobs.

According to tabulations using the EOPP data set, on average private sector establishments receive 8.37 applications for the most recently filled position, and 7.60 applications for each accepted job offer.[19] Unfortunately, these data are not available by occupation.

Although there are severe data limitations, a comparison of the length of private sector and federal sector job queues is suggestive. On average, openings for federal government jobs appear to attract more applicants than openings for private sector jobs. Depending on the survey question used, the results indicate that on average there is a 25 percent to 38 percent higher application rate in the federal government than in the private sector. These findings suggest that the positive federal wage differential is not a compensating differential for undesirable work in the federal government.

However, extreme caution should be taken in interpreting these findings given the differences in the occupational composition of the work forces in the federal government and private sector and the paucity of private sector data.

8.5 Why Does the Federal Government Pay High Wages?

A variety of evidence suggests that the federal government pays at least some workers more than their alternative wage in the private sector. Why does such a policy exist? Are there any possible benefits of this policy that might offset the cost of higher wages? Can the government wage structure be reorganized in a more efficient way?

Undoubtedly, political constraints and motivations have an important influence on public sector wages. (See Fogel and Lewin 1974 and Borjas 1980 for evidence on the political aspects of wage setting in the public sector.) My purpose here is not to examine the political forces that affect the determination of public sector wages, but instead to consider the possible benefits to the government of pursuing a "high wage" policy and to suggest alternative, less costly, means to achieve some of these benefits.

The so-called efficiency wage theories of the labor market surveyed in Stiglitz (1986) emphasize the potential benefits to employers of paying workers a greater wage than their alternative wage. According to these theories, possible benefits to the firm that result from paying relatively high wages can at least partially offset the cost of paying above market-clearing wages. These benefits include reduced turnover, reduced

absenteeism, improved morale, less worker malfeasance, lower supervision costs, and improved employee selection.[20]

Evidence suggests that the federal government does reap at least some return from its compensation policy. For instance, Long (1982), Utgoff (1983), and others find that the turnover rate of federal workers is unusually low. And Krueger (1988) demonstrates that an increase in the wages of federal workers relative to private sector workers increases both the number and average quality of applicants for federal jobs. The quantitative economic importance of these benefits, however, is uncertain.

Another element of the government wage structure that is relevant to this discussion is that white-collar federal workers have a uniform nationwide wage schedule. A secretary in New York City earns the same wage as a secretary in Omaha, Nebraska, even though the cost of living and labor market conditions differ considerably between the two regions. Proponents of this system justify nominal regional wage rigidity on the basis of efficiency; they allege that employee morale would be damaged if workers are forced to take a cut in *nominal* pay when they are transferred from one area of the country to another.

It is instructive that many large private sector firms, such as IBM, resolve this problem by maintaining a uniform *real* wage schedule across different regions of the country. Regional cost-of-living adjustments are provided to workers who transfer from one region of the country to another. Introducing regional wage flexibility to the government wage structure (at least for jobs with low transfer rates) would improve the efficiency of providing government compensation. Additionally, this policy would improve equity in the sense that all federal workers regardless of their region of employment would receive the same real wage compensation.

Finally, it should be noted that some large private sector firms pay wages that are at least as high as the federal government and that wages appear to rise with employer size (see Brown and Medoff 1985). The federal government, it should be remembered, is the single largest employer in the United States. Although the reasons for the employer-size wage effect are far from clear, the federal wage premium may be closely related to the size of the government.

8.6 The Union Wage Gap in the Public and Private Sectors

Since unions in the federal sector are usually prohibited from bargaining over wages, the analysis of the effect of public sector unions focuses on state and local government employees. Nonetheless, it is reassuring to note that we do not find evidence of a differential in pay between union and nonunion federal workers.

Most studies of union wage differences at the state and local government level analyze cross-sectional data, and the unit of observation is typically the bargaining unit or municipality.[21] By analyzing a longitudinal sample of individual workers it is possible to control for unchanging, unobserved worker characteristics. Furthermore, first difference estimation controls for the possible endogeneity of unionization, since the effect of time-invariant, unobserved variables that might be correlated with public sector union membership and wages net out.

Table 8.6 presents longitudinal and cross-sectional estimates of the public sector union wage differential. The samples are limited to workers who remain in the same sector each year and are drawn from the matched CPS data set, since initial union status is not available in the Displaced Workers Survey.

The major finding is that union membership does not have a statistically or economically significant effect on the wages of state and local government employees in either the longitudinal or the cross-sectional estimation. Although the union variable is likely to be fraught with reporting errors because workers remained in the public sector (and probably the same job) each period, the magnitude of the union wage gaps in the longitudinal estimation are so small that it is unlikely that measurement error is responsible for these results. Furthermore, the growth in public sector union membership during this period creates true transitions between union and nonunion status even for workers who remain on the same job.

It should be stressed that our inability to find a statistically significant difference in pay between union members and nonmembers in the public sector does not necessarily imply that unions have no effect on

Table 8.6 **Union/Nonunion Wage Differentials by Sector, Fixed-Effects and Cross-Sectional Estimates**

	Estimation Technique	
Sample	(1) Fixed Effects	(2) Cross Section
Private Sector [22,042]	0.087	0.204
	(0.009)	(0.007)
State Government [220]	0.002	−0.010
	(0.044)	(0.058)
Local Government [502]	0.002	0.055
	(0.038)	(0.039)

Notes: Reported wage differentials are coefficients of the union membership dummy variable in a log-wage regression. Each sample contains workers who remained in the same sector both periods. Controls are the same as in table 8.2, except industry dummies were included in the regressions for private sector employees. See table 8.2 for other notes. Standard errors are in parentheses.

public sector compensation. It is possible that unions raise wages for all public sector workers (i.e., through lobbying) and not just union members. Furthermore, unions may have a substantial effect on fringe benefits and working conditions (Mitchell 1979).

In contrast to the insignificant union wage effect in the public sector, the union wage effect in the private sector is substantial during the same time period. The longitudinal estimate of the union wage differential is about 9 percent and the cross-sectional estimate is about 20 percent. When separate wage changes are estimated for workers who join unions and leave unions, the change in wages from going nonunion to union as opposed to remaining union is 8.4 percent, while the change in wages from going union to nonunion as opposed to remaining a union member is −7.9 percent. These results are typical of this type of research. (See Freeman and Medoff 1983 and Lewis 1986b for surveys.)

It is interesting to compare the estimates of the private sector union wage differential to the federal wage differential. The estimated federal wage differential and the private sector union wage gap are about equal in magnitude. In addition, evidence suggests that a greater share of total compensation is composed of fringe benefits in both the federal government and the union private sector than in the nonunion private sector (see Mitchell 1979). A high proportion of federal workers are unionized (Burton 1979). Although federal unions are generally precluded from bargaining over compensation, the wage gap between federal workers and private sector workers and the composition of compensation in the federal sector closely parallel the unionized private sector. These findings are consistent with Levitan and Noden's (1983) view that unions legislatively influence the determination of compensation in the federal sector.

8.6 Conclusion

This chapter asks whether public sector workers are paid more than their alternative wage. Although the longitudinal analysis and evidence from job queues are by no means definitive, the results suggest that the average federal worker received a higher wage than his or her alternative private sector wage in the late 1970s and mid-1980s. The major results are summarized below.

The average worker who joins the federal government appears to experience greater wage gains than the average worker who remains in the private sector, while at the same time workers who leave the federal government do not have a statistically significant change in their wages. These results appear to hold for men and women and for a sample of displaced private sector workers who join the federal government. However, in two data sets the cross-sectional estimate of the

federal wage differential exceeds the longitudinal estimate. A large share of the difference between the longitudinal and cross-sectional estimates is probably due to measurement errors, although it is possible that unobserved worker-specific quality differentials account for much of the difference.

In addition, evidence on the length of job queues as measured by the number of outside job applicants per new hire was considered. The analysis suggests that for the average job opening the federal government receives more outside applicants than the average private sector firm, which supports a conclusion that the positive federal wage differential is not a compensating differential for disagreeable work.

Why does the federal government pay higher wages on average than the private sector? The chapter conjectures that the answer to this question lies in the political nature of public sector wage determination, the size of the government, possible efficiency benefits of high wages, and the rigid federal wage schedule.

At the state and local government level, both the longitudinal and cross-sectional analyses suggest that the differential in earnings between public and private sector workers was small and positive in the 1970s, but became negative by the mid-1980s. Furthermore, the empirical analysis finds no evidence of a difference in pay between union and nonunion members in the public sector.

Notes

1. Results of the government survey are reported annually in U.S. Bureau of Labor Statistics, *National Survey of Professional, Administrative, Technical, and Clerical Pay.*

2. See Lewis (1986a) for a thorough review of studies of the effects of unions in the public sector.

3. Moore and Raisian (1986) and Venti (1987) have carried out longitudinal studies of public sector pay that are similar in many respects to this one. The analysis presented here differs from theirs primarily in that I separately examine wage comparability for each level of government (i.e., federal, postal, state, and local) and analyze a sample of involuntarily "displaced" private sector workers.

4. See Smith (1976), Hartman (1983), and Ehrenberg and Schwarz (1986) for an overview of wage determination in the public sector.

5. The GS actually extends through GS-18, but almost all of the positions above GS-15 have been reclassified into the Senior Executive Service.

6. For simplicity, we abstract from differences in wages across industries in the private sector and treat the entire private sector as a homogeneous group. This procedure gives a weighted average of the difference in wages between the government and private industries.

7. This approach has been used to examine the union wage effect (Mellow 1981), compensating wage differentials (Brown 1980), the employer-size wage effect (Brown and Medoff 1985) and interindustry wage differences (Krueger and Summers 1988).

8. This will not produce a bias in the estimated wage effects when the wage change for joiners is constrained to equal the negative of the wage change for leavers (i.e., when the change dummy variable is 1 for joiners, 0 for stayers, and -1 for leavers) because the "move premium" will have an equal effect on leavers and joiners. However, when we estimate wage differentials for joiners and leavers separately, the coefficients will probably be somewhat biased toward zero due to the sample selection rule of not following workers who move to a new location.

9. These tabulations are from the May 1984 CPS, which identifies public administration and nonpublic administration government workers for each level of government by the class of worker variable. In addition, wage regressions with the same data set find that wages of public and nonpublic administration workers are not statistically or economically different.

10. Results were qualitatively the same when the sample was restricted to workers whose annual log wage growth was between -0.75 and 0.75.

11. Postal workers, however, are identified from their three-digit industry.

12. Addition of a dummy variable measuring whether private sector workers changed three-digit industries to control for the possibility that private sector workers may have changed jobs did not qualitatively alter the results.

13. It should be noted that these results do not appear to be due to the pooling of men and women in the sample. Table 8.1 shows that both men and women experience substantial wage gains when they join the federal government; both also experience wage gains when they leave the government, although the latter finding occurs to a greater extent for women.

14. See Freeman (1984) and Solon (1985) for a formal treatment of selectivity bias in longitudinal analyses.

15. One possible source of nonrandomness in the sample is the selectivity of private sector firms that displace workers (e.g., because their wages exceed the competitive level). However, this selection bias affects all workers in the data set.

16. Perloff and Wachter (1984) examine accounts of excessive application rates in their analysis of pay comparability between the postal service and private sector.

17. It should be noted that analyses of the quit rate may also be biased by omitted worker quality controls.

18. An applicant remains on the register for one year. At the end of the year if the applicant is not selected for a job but wishes to remain eligible for selection in the following year, he or she must formally notify the Office of Personnel Management. In addition, an applicant may apply for multiple jobs. See Krueger (1987) for a further description of the application process and an analysis of the determinants of applications for government jobs.

19. These averages are weighted by sample weights to reflect the general population of employers. I thank Harry Holzer for generously carrying out these tabulations.

20. The notion that a firm's compensation policy influences organizational performance has long been stressed in the personnel and economics literature. See Katz (1986) and Ehrenberg and Milkovich (1987) for a survey.

21. One exception is Ichniowski (1980), who performs before-union and after-union comparison of fire fighters' wages in different municipalities and con-

cludes that the longitudinal and cross-sectional analyses both show a small union wage differential.

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Comment Lisa M. Lynch

Alan Krueger's paper tries to provide the answer to the provocative question, "Are public sector workers really overpaid?" Krueger is concerned with understanding why cross-sectional studies of federal workers indicate that their wages are significantly greater than those of private sector workers with similar observed characteristics, while the government's pay comparability studies claim that federal workers

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earn less than their private sector counterparts. One of the criticisms of previous studies using cross-sectional data has been that if public sector workers are more productive than their private sector counterparts in some unobserved characteristic that is rewarded by employers, there will be an upward bias in the estimated public sector wage differential. Krueger attempts to control for this problem by using two longitudinal data sets of public sector/private sector job switchers and stayers. The first data set was created by matching Current Population Surveys from 1974–75, 1977–78, and 1979–80. At first glance this appears to be a wealth of data, but unfortunately this is not the case. In this data set not that many workers actually switch sectors—only thirty-one workers from the private to federal sector and only twenty-one workers from the federal to private sector. In an attempt to obtain a larger sample size, Krueger also examines data from the two CPS supplemental surveys of displaced workers in January 1984 and 1986. The total sample is over 4,000 workers; however, the number of workers who actually switch into the federal sector is only 59. Consequently, Krueger is forced to pool the data for the male and female respondents when estimating the public sector wage differential. Given that one of the findings from cross-sectional studies has been the higher earnings of women employed in government, this pooling of observations potentially masks one of the most interesting findings on public sector wage differentials. In fact, an interesting question to have examined might have been, "Why are private sector women paid less than comparable public sector women?" Nevertheless, using longitudinal data rather than cross-sectional data, Krueger claims that workers in the federal government seem to receive a wage premium on the order of 6–12 percent (aggregating across males and females). But this conclusion is drawn from a longitudinal estimate of 6 percent that is not statistically significant and a cross-sectional estimate of 25 percent, with its associated problem of unobserved heterogeneity.

A second issue that Krueger addresses is that if there are errors in the data due to mistakes in the measurement of actual transitions between sectors, the public sector wage differential estimated from the longitudinal data will be biased downward. This measurement problem, as shown in Freeman (1984),[1] may be a serious problem when using longitudinal data. Krueger suggests that the bias of his longitudinal estimates may be as large as 50 percent, which might reconcile the difference between the cross-sectional and longitudinal estimates. However, given the extremely small sample size of switchers, it is very

1. Richard Freeman, "Longitudinal analyses of the effects of trade unions", *Journal of Labor Economics* 2(1984):1–26.

difficult to pin down the actual size of this bias. All of the above problems are present again in Krueger's analysis of wages of postal workers and state and local government workers.

Given these problems, Krueger examines the length of queues for federal jobs assuming that evidence of longer queues indicates that an employer is paying relatively higher wages. Krueger does this by using data for the private sector from the Employment Opportunities Pilot Project (EOPP) of 1982 and data for the public sector from the number of applicants listed in the federal applicant registers. He suggests that each federal job appears to attract many more applicants than each private sector job. However, if one examines the largest government job (in terms of number employed) listed in table 8.5, the queue for steno/typists in the federal government is shorter than the average number of applicants in private sector establishments reported in the EOPP data. Ideally one would want to have data on similar occupations across the public and private sectors to have a better understanding of the lengths of queues for public and private sector jobs, but this is not the case here.

Finally, Krueger examines the impact of public sector unions on the pay of public sector workers. He finds with both longitudinal data and cross-sectional data that union membership does not have a statistically significant effect on the wages of state and local government employees. However, as he notes, this result may mean that public sector unions are successful not only for their own members but for all state and local employees in their area regardless of their union status.

Krueger concludes his paper by stating that there is strong evidence that federal workers are paid more than comparable private sector workers. However, while I think that Krueger has done a fine job of addressing the issue of wage determination in the public sector from a variety of perspectives, the quality and the quantity of the data currently available should make him much more cautious in his interpretation of his results. I hope that as better data become available he will examine this fascinating issue further.