CHANGES IN THE STRUCTURE OF WAGES
IN THE PUBLIC AND PRIVATE SECTORS

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ABSTRACT

The wage structure in the U.S. public sector responded
sluggishly to substantial changes in private sector wages during
the 1970s and 1980s. Despite a large expansion in the
college/high school wage differential during the 1980s in the
private sector, the public sector college wage premium remained
fairly stable. Although wage differentials by skill in the
public sector were fairly unresponsive to changes in the private
sector, overall pay <u>levels</u> for state and local government workers
were quite sensitive to local labor market conditions. But
federal government regional pay levels appear unaffected by local
economic conditions. Several possible explanations are
considered to account for the rigidity of the government internal
wage structure, including employer size, unionization, and
nonprofit status. None of these factors adequately explains the
pay rigidity we observe in the government.

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I. Introduction

Recent research has documented sharp changes in the structure of wages and substantial increases in wage dispersion in the United States over the last twenty years.[1] The college wage premium, after narrowing in the 1970s, increased markedly in the 1980s. Wage differentials by experience expanded from the early 1970s to the late 1980s, and residual wage inequality (earnings dispersion within detailed education-experience groups) increased for both men and women in the 1970s and 1980s. Typically, however, this literature has not determined whether these wide-ranging changes have been confined to the private sector or whether they are shared by public and private employees alike. We document in this paper that overall wage structure changes in the 1970s and 1980s have been driven by events in the private sector. These private sector changes provide a natural benchmark for examining how public sector wages respond to movements in labor market conditions.

We examine three questions concerning public sector pay flexibility in the federal government and in state and local governments. The first is the extent to which public sector wage policies respond to market changes in skill differentials. The second is the extent to which government pay levels respond to differences in local labor market conditions. In particular, we explore how wages in different branches of government are affected by changes in private sector skill premia and by local private sector wage levels and unemployment rates. Finally, we examine the implications of government pay polices for the ability of government agencies to meet their personnel

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[1]Studies examining recent changes in the U.S. wage structure include Blackburn, Bloom, and Freeman (1990), Bluestone (1990), Bound and Johnson (1989), Davis and Haltiwanger (1991), Juhn, Murphy, and Pierce (1989), Karoly (1990), Katz and Murphy (1990), Katz and Revenga (1989), and Murphy and Welch (1988, 1989).

requirements.

Answers to these questions are necessary to understand and evaluate the public sector personnel management systems, which directly affect the nearly one-fifth of employees in the United States who are employed by some branch of government.[2] Furthermore, government pay practices can have a substantial impact on the operation of private sector labor markets in which the government is a major employer, such as the markets for health service workers, scientists, teachers, and engineers. Smith (1977) has argued that there are many reasons to suspect that ordinary market forces will not lead the government to optimally alter its personnel and compensation practices. Many observers have already voiced concern that the government (especially the federal government) will be increasingly unable to recruit highly skilled employees -- such as scientists, engineers, and judges -- unless its wage structure responds to changes in the private sector wages (e.g. Campbell and Dix, 1990; National Commission on the Public Service, 1989).

In section II, we analyze a variety of micro-data sets from the Current Population Survey (CPS) and other sources to examine whether the government wage structure has, in fact, been rigid in the face of changes in the private sector wage structure. We compare and contrast changes in wages by education, experience, and gender in the public and private sectors during the 1970s and 1980s. Despite the large expansion in private sector wage differentials by skill level in the 1980s, we find that skill differentials remained fairly stable in the public sector in the 1980s. In particular, the pay of workers at the upper part of the federal pay scale has fallen

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[2] See Ehrenberg and Schwarz (1986) for a discussion of U.S. public sector labor market institutions and a critical survey of research on public sector labor markets.

substantially relative to "comparable" private sector workers, and the wages of less-educated employees of state and local governments have increased greatly relative less-educated private sector workers. The sharp increase during the 1980s in the college/high school wage differential of the 1980s is almost entirely a private sector phenomenon.

In section III, we examine variation in pay across states in the private and public sectors. Geographic variation in pay at a moment in time is quite similar for workers employed in the private sector and for those employed by state and local governments. Changes in local labor market conditions (as proxied by state unemployment rates) seem to have a similar effect on private and on state and local government wage levels. We find that state and local governments alter overall wage <u>levels</u> in response to economic conditions that are likely to affect government budgets and the tax base. Their response is similar to how private sector employers, operating in industries with localized product markets, respond to changes in local economies. In contrast to the responsiveness of their overall wage levels, state and local governments sluggishly adjust relative wages by skill category to shifts in the private sector wage structure. Regional pay variation appears quite different in the federal government. Here pay does not closely mimic local wage structures and does not seem to respond to changes in local labor market conditions. We present some evidence that this rigidity owes to a single national wage schedule for most federal government employees.

In section IV, we explore several possible explanations for the stability of public sector skill differentials in the 1980s. We first examine the roles played by employer size, nonprofit status, and unionization. None of these factors appears to be able to adequately account

for wage structure rigidity in the government. Educational wage
differentials expanded sharply in the 1980s in large, private-sector firms
and in private sector industries dominated by nonprofit firms. Furthermore,
we find that public sector skill differentials increased much less than those
in the private sector even in the ten states with the lowest public sector
unionization rates. Finally, we briefly discuss other institutional
explanations for the relative rigidity of government pay structure.

In section V, we empirically examine how increases in wage compression
in the public sector relative to the private sector in the 1980s has affected
public sector personnel outcomes. We analyze how wage rigidity in the
federal government has affected its ability to recruit and retain employees
of different skill levels. Job queues have indeed expanded for blue-collar
jobs and contracted for white-collar jobs in the federal government in the
1980s. Furthermore, the federal government also seems to be having
difficulty in retaining college graduates whose skills are valued highly in
the private sector.

II. Changes in Public and Private Wage Structures Over Time

We use several individual-level data sets to compare wage structure
changes in the U.S. public and private sectors over the last twenty years.
Before turning to this micro analysis, we first examine longer-term trends in
the relative pay of public sector workers using aggregate data from the
National Income and Product Accounts (NIPA) for the entire postwar period.

Figure 1 presents NIPA data on the ratio of total compensation, and of
wages and salaries, of public sector workers relative to private sector
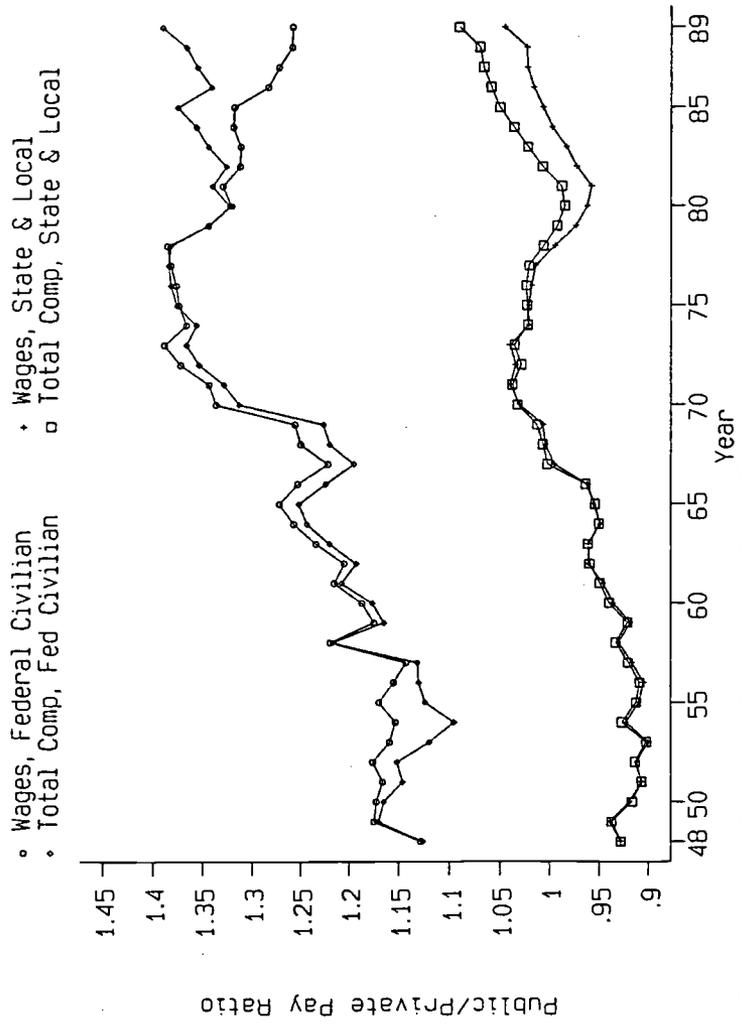
Figure 1: Public/Private Pay Ratios, 1948-89, NIPA Data

Legend (axis labels from chart):
- Public/Private Pay Ratio (y-axis)
- Year (x-axis)

- ○ Wages, Federal Civilian
- + Wages, State & Local
- ● Total Comp, Fed Civilian
- □ Total Comp, State & Local

STATA™

workers for 1948 to 1989.[3] Average pay has remained much higher in the

federal government than in the private sector or in state and local

governments, and trends in relative public sector pay by branch of government

were fairly similar over much of the period. From the mid 1950s to the early

1970s, public sector pay rose relative to the private sector. The period

corresponds to a growth spurt in employment demand in the public sector as

public sector employment steadily expanded from 13.1 percent of civilian

employment (measured in full-time equivalents) in 1955 to 17.9 percent in

1975. Relative public sector pay declined in the late 1970s as public sector

employment growth stagnated and the share of employment in the public sector

started a steady decline that lasted through the 1980s. Despite declining

relative employment, the relative pay of employees in state and local

governments increased in the 1980s. The picture is less clear for the pay of

federal civilian employees relative to private sector workers. If one

examines wages and salaries alone, federal relative pay sharply declined in

the 1980s. If, instead, one includes nonwage compensation, federal relative

total compensation increased because nonwage compensation (particularly

pension contributions) rose sharply relative to the private sector. As we

show below, the aggregate trends in the 1980s hide substantial differences in

movements in relative public sector pay by education and skill group.

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[3]The figure plots public/private sector ratios of pay per full-time
equivalent employee. Total compensation includes wages and salaries,
employer contributions to social insurance, and employer contributions to
private pension and welfare funds. The Federal Civilian sector includes
civilian employees of the Federal government and of government enterprises.
The data used in Figure 1 are from the U.S. Department of Commerce, Bureau of
Economic Analysis, National Income and Products Accounts.

A. Basic Relative Wage Changes, 1967-87

Our comparative analysis of wage structure changes begins with an
examination of movements in the college/high school wage differential by
sector. Many occupations in the government have few close private sector
analogues, if any. Thus movements in education differentials by sector
provide the most meaningful measure of movements in skill differentials in
the public and private sectors.

Panel A of Figure 2 presents a plot of the log weekly earnings
differential between college and high school educated workers in the
government and private sectors from 1967 to 1987. The earnings differentials
have been adjusted for changes in the age and gender composition of the
government and private sector labor forces. The plot is based on data from
the March CPS Annual Demographic Files from 1968 to 1988.[4] Relative earnings
of college graduates declined in both the public and private sectors in the
1970s. In contrast, a sharp increase in the average earnings of college
educated workers relative to high school educated workers occurred in the

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[4]We define high school graduates as individuals with exactly 12 years of
schooling and college graduates as those with 16 or more years of schooling.
To generate Figure 1, we sorted the individual-level data on high school and
college graduates from the March CPS Surveys into 64 cells based on sex, two
education categories (12 and 16 or more years of schooling), eight potential
experience brackets (five-year intervals), and two sectors (private and
government). The mean log weekly wages for full-time workers in each of
these cells was computed. College/high school log wage differentials for
each of our 32 sex-experience-sector categories are then given by the
difference in these cell means for the college and high school workers in the
category. The numbers plotted in Figure 1 are fixed-weighted averages of the
college/high school log wage differentials for the relevant categories in
each graph. The fixed-weights are the average share of the sex-experience
group in total employment in all sectors over the entire 1967-87 period. The
March CPS samples provide information on the earnings and weeks worked in the
calendar year preceding the March survey. The sample selection rules used in
the creation of the March CPS extract are described in detail in Juhn,
Murphy, and Pierce (1989) and Katz and Murphy (1990).

Figure 2: College/HS Log Wage Diffs, Private vs. Govt, 1967-87
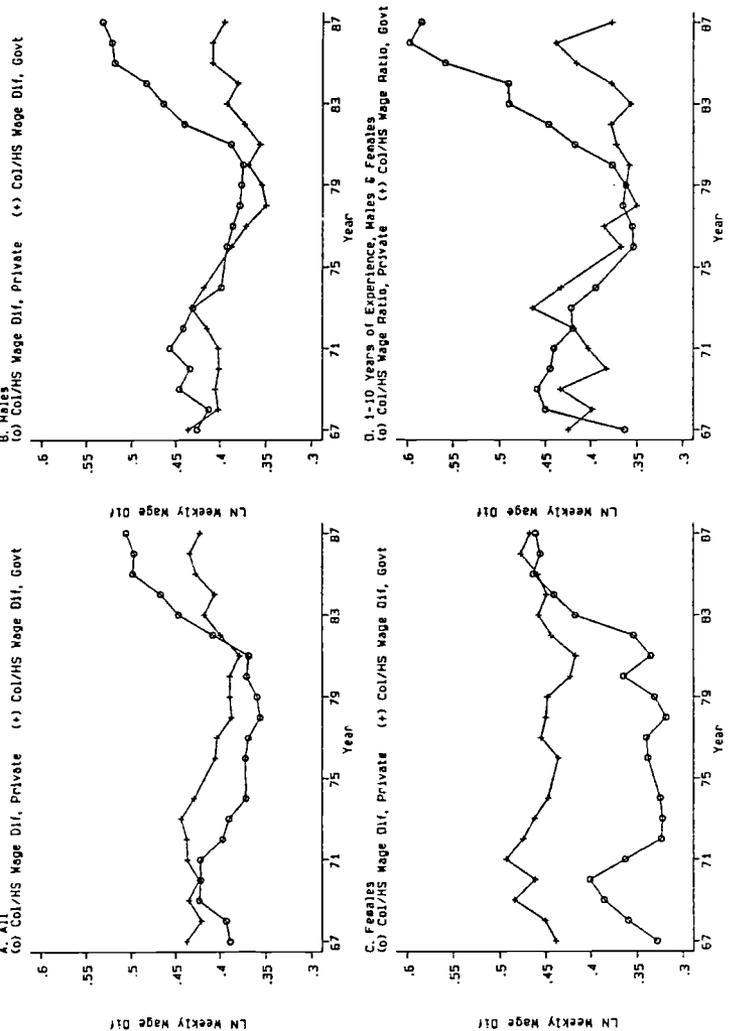
private sector in the 1980s, with the college/high school wage differential
for males and females combined rising from by 15 log points from 0.36 in 1979
to 0.51 in 1987. But the gap in earnings between college educated and high
school educated workers in the government sector increased by only 3 log
points from 0.39 in 1979 to 0.42 in 1987. This rather moderate increase
reflected a combination of a constant differential in the federal government
and an increase of about 4 log points in the state and local government
sector. Panels B and C of the figure illustrate that from 1979 to 1987 the
college wage premium expanded by much less in the public sector than in the
private sector for both men and women. Finally, Panel D shows that this
divergence in relative wage patterns in the private and public sectors in the
1980s was most extreme for young workers.

The divergence in educational differentials between the public and
private sectors in the 1980s could have occurred because of a relative
decline in public sector pay for highly educated workers, a relative increase
in the public sector earnings of high school graduates, or a combination of
the two. Figure 3 plots trends in public/private wage differentials by level
of education. More precisely, the figure presents the difference between the
actual average public sector wage and the predicted average wage of public
sector workers if they were employed in the private sector (based on a
private sector wage regression) for each group of public sector workers. We
estimated a log weekly wage regression for private sector workers in each
year by gender and education group (high school and college) using the March
CPS samples for calendar years 1967-87. The regressions were of the form:

$$\ln W_{it} = X_{it} \beta^p_{jt} + \epsilon_{it}$$

Figure 3: Public/Private Wage Diffs by Sex and Educ, 1967-87
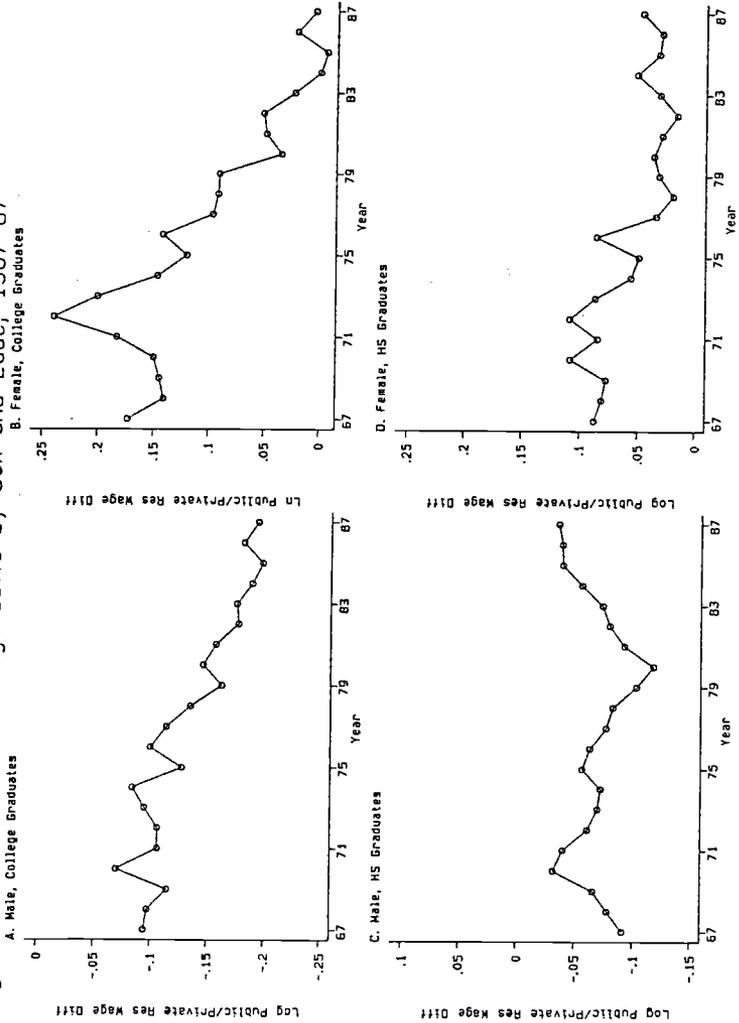
where W is the weekly wage rate, X is a vector of explanatory variables including a quartic in experience (and dummies for individual years of schooling beyond 16 years for college graduates), β^P_{jt} is the vector of private sector coefficients for group j in year t. The public/private wage differential for group j in year t is given by the average value for public sector workers in group j of $lnW_{it} - X_{it}\hat{\beta}^P_{jt}$.

During the period of increase in the overall public/private sector pay ratio from the late 1960s to the early 1970s, Figure 3 indicates that public/private differentials increased moderately for all groups. Furthermore, all groups shared in the decline of public sector relative pay of the late 1970s. Previous work has documented the decline in the public sector wage premium from the mid-1970s to the early 1980s (Freeman, 1987; Moulton, 1990), but it has not adequately examined how different educational groups shared in this decline. In the 1980s, the public/private wage differential continued to drop for college graduates, while the relative position of male high school graduates in the public sector improved substantially. The decline of relative public sector wages for college graduates generated a large negative differential for males and eliminated the historically large positive differential for females. At the federal level, the wage premium for male college graduates also withers away, underscoring recent concerns that the federal government is increasingly unable to attract skilled professionals.

B. Detailed Analysis of Changes in Relative Wages, 1973-88

To adjust for compositional changes in the workforce, we used various

years of the Full Year Outgoing Rotation Group (ORG) files of the CPS and the

May CPS 1973-1975 to estimate a series of wage regressions.[5] These data sets

indicate in which branch of government a worker is currently employed, and

contain usual weekly earnings and usual weekly hours on the current job.[6]

We divided the sample into eight subsamples by sex, experience (0-19

and 20+ years), and education (12 and 16 or more years of schooling) for both

the private and public sectors. Wage equations of the form

$$\ln W_{ijt} = a_{jt} + b_{jt}X_{ijt} + e_{ijt}$$

were estimated for each of the subsamples, where W is the hourly wage rate, X

is a vector of personal characteristics (education, two race dummies, an

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[5]Each May CPS from 1973 to 1978 contains about one-third as many
observations as the Full Year Outgoing Rotation Group Files, available since
1979. We pooled the May 1973 and 1975 CPS's together to provide a larger
sample of data. The May 1974 tape that we were able to access lacked
information on level of government and was not used.

[6]Wages each year were converted to 1988 dollars using the personal
consumption expenditures implicit price deflator (PCE). Workers who failed
to report usual weekly earnings (those with allocated wages) were dropped
from the sample. One limitation of the CPS is that edited usual weekly
earnings variable is topcoded at $999 in current dollars. The unedited usual
weekly earnings variable, however, is top coded at $1,999, but this field is
only available for the ORG sample after 1985. The following crude procedure
was used to overcome the censoring problem. First, we calculated the mean
log hourly wage rate of those in 1988 who had top-coded edited usual weekly
earnings using the 1988 unedited weekly earnings variable. This figure was
then assigned to each individual in the 1988 CPS whose edited weekly wage was
top coded. If few people are censored by the $1,999 earnings limit on the
unedited field, this procedure will lead the expected value of the error in
the regressions to be approximately zero. We used a similar procedure to
deal with top coding in the 1979 and 1983 ORG samples. We converted the top
coded amount in 1979 (1983) into 1988 dollars and used the distribution of
the unedited weekly earnings variable from 1988 to calculate the mean log
hourly wage rate in 1988 dollars of those topcoded in 1979 (1983) and
assigned this figure to each individual topcoded in 1979 (1983). Since less
than 0.2 percent of workers are topcoded prior to the late 1970s, we ignored
topcoding in our May 1973 and May 1975 CPS samples.

experience spline, SMSA, and part-time status), i is a subscript for

individuals, j indicates the individual's sector of employment (public or

private), and t is the year.[7] The results are also given separately for

federal government workers and for state and local government workers.

The predicted wage rate each year for the four sectors (private,

public, federal, state and local) was calculated by the gender-experience-

education groups for a hypothetical worker with constant characteristics --

white, full-time, selected experience levels, and residence in a metropolitan

area. That is, we formed the predicted wage

$$E \{ \ln W_{jt} \mid X^o \} = a_{jt} + b_{jt} X^o,$$

where X^o is the characteristics of the hypothetical worker. This approach

standardizes the wages comparisons for differences in these characteristics

between sectors at a point in time, and for compositional changes within

sectors over time.

Table 1 reports these "regression-adjusted" means for men and women at

two levels of experience in the 1970s and 1980s. Because changes in the wage

structure are likely to occur more rapidly and most sharply for newly hired

workers on the "active labor market" (e.g., Freeman, 1977), our discussion

focuses primarily on the group of workers with little experience. As Smith

(1977), Krueger (1988a), and others have noted, federal workers earn more

than private sector workers, while state and local government workers (who

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[7]The experience variable is defined as age minus education minus six.
Furthermore, we specified the experience effect as a spline function with two
terms for each of our subsamples, with a break point in the spline function
occurring at 10 years for the 0-20 year experience group and 30 years for the
over 20 years of experience group.

Table 1: Estimated Mean Log Real Hourly Wage Rates
by Education, Experience, Gender, and Sector

Class of Worker: Private Sector

		High School (12 years)				College Grads. (16 years)			
Experience	1973-75	1979	1983	1988	1973-75	1979	1983	1988
Males								
5 years	2.197	2.182	2.017	1.967	2.505	2.472	2.414	2.443
	(.006)	(.006)	(.005)	(.005)	(.011)	(.010)	(.008)	(.008)
25 years	2.565	2.573	2.518	2.467	2.975	2.940	2.919	2.908
	(.008)	(.008)	(.007)	(.007)	(.021)	(.020)	(.016)	(.013)
Females								
5 years	1.915	1.905	1.839	1.800	2.178	2.212	2.233	2.290
	(.006)	(.005)	(.005)	(.005)	(.020)	(.013)	(.009)	(.008)
25 years	2.067	2.080	2.053	2.053	2.288	2.270	2.265	2.378
	(.009)	(.008)	(.006)	(.006)	(.041)	(.032)	(.024)	(.019)

Class of Worker: All Government

Education

		High School (12 years)				College Grads. (16 years)			
Experience	1973-75	1979	1983	1988	1973-75	1979	1983	1988
Males								
5 years	2.212	2.081	2.027	2.029	2.463	2.349	2.306	2.310
	(.021)	(.019)	(.018)	(.018)	(.016)	(.016)	(.014)	(.015)
25 years	2.563	2.523	2.490	2.490	2.902	2.828	2.810	2.795
	(.017)	(.017)	(.014)	(.013)	(.027)	(.024)	(.020)	(.017)
Females								
5 years	1.988	1.958	1.935	1.943	2.323	2.242	2.221	2.258
	(.017)	(.015)	(.014)	(.016)	(.014)	(.014)	(.012)	(.011)
25 years	2.135	2.113	2.093	2.157	2.518	2.411	2.422	2.468
	(.018)	(.016)	(.013)	(.012)	(.025)	(.025)	(.019)	(.016)

Class of Worker: Federal Government

		High School (12 years)			College Grads. (16 years)			
Experience	1973-75	1979	1983	1988	1973-75	1979	1983	1988
Males								
5 years	2.341 (.032)	2.178 (.033)	2.211 (.041)	2.118 (.039)	2.595 (.037)	2.458 (.031)	2.501 (.028)	2.494 (.029)
25 years	2.641 (.023)	2.580 (.027)	2.599 (.020)	2.539 (.018)	3.101 (.043)	2.969 (.042)	3.037 (.030)	2.929 (.029)
Females								
5 years	2.105 (.030)	2.055 (.030)	2.030 (.027)	2.050 (.030)	2.425 (.065)	2.460 (.047)	2.396 (.036)	2.311 (.032)
25 years	2.397 (.035)	2.362 (.032)	2.317 (.026)	2.332 (.024)	2.779 (.111)	2.578 (.098)	2.540 (.054)	2.650 (.055)

Class of Worker: State and Local Government

		High School (12 years)			College Grads. (16 years)			
Experience	1973-75	1979	1983	1988	1973-75	1979	1983	1988
Males								
5 years	2.170 (.025)	2.054 (.022)	1.999 (.019)	2.006 (.021)	2.398 (.018)	2.289 (.018)	2.233 (.016)	2.245 (.017)
25 years	2.497 (.023)	2.495 (.021)	2.429 (.017)	2.455 (.017)	2.739 (.032)	2.699 (.030)	2.646 (.025)	2.714 (.022)
Females								
5 years	1.928 (.021)	1.921 (.016)	1.904 (.016)	1.897 (.018)	2.307 (.014)	2.215 (.014)	2.193 (.012)	2.248 (.012)
25 years	2.029 (.020)	2.029 (.016)	2.031 (.013)	2.102 (.013)	2.485 (.026)	2.391 (.026)	2.403 (.020)	2.449 (.017)

Education

Table 1: continued

Note: Each estimate is from a separate cross-section regression for an education-experience-gender-sector group of log real hourly earnings on a linear spline of years of experience with a break every ten years, 2 race dummy variables, and dummy variables for metropolitan area and part-time status.   The education classes used are exactly 12 and 16 or more years of schooling; the experience classes are 0-19 and 20 or more years of potential experience.   The regressions for college graduates include dummy variables for individual years of schooling.   The estimates for each group are the predicted values of the log hourly earnings regression for that group evaluated at the indicated schooling and experience levels and for a full-time, white employee living in a metropolitan area.

Sources: The data used are from the May 1973 and 1975 CPSs and the Full-Year 1979, 1983, and 1988 CPSs (Outgoing Rotation Groups).   The samples used include wage and salary workers who do not have imputed (allocated) earnings. Earnings are deflated by the personal consumption expenditures implicit price deflator for GNP and are in 1988 dollars.

dominate the all government category) earn less than observationally
equivalent private sector workers. The federal pay differential is
especially large for women.

The table also reinforces the findings of Figures 1 and 3 by
indicating that government workers' earnings (even for workers with a fixed
set of characteristics) decreased substantially relative to private sector
workers between the mid and late 1970s. For example, from 1973 to 1979 real
government wages fell by 12% for high school educated men with five years of
experience, but fell by only 1.5% for similar private sector men. Inflation
eroded government workers' pay far more than it eroded private sector
workers' pay in the 1970s. In fact, time series analysis using NIPA data
indicates a general tendency for public/private sector pay ratios to decline
during periods of rapid price deflation (Freeman, 1987).

In contrast to the 1970s, the figures for the 1980s show a huge decrease
in the real wage rate of less-educated workers in the private sector, while
less-educated workers in the government experienced a much smaller decline in
real wages. For young, male high school graduates the real average wage rate
fell by more than 20% in the private sector in the decade between 1979 and
1988, while the real wage of similar government workers fell by only 5% over
the same time period.

Evidence on changes in nonwage compensation suggests that the relative
gain in total compensation made by less-educated government workers in the
1980s was even greater than indicated by the wage changes in Table 1. Data
from the NIPA indicate that from 1979 to 1988 the nonwage share of total
compensation increased from 15.5 to 21.8 percent in the federal government
and from 17.1 to 18.9 percent in state and local governments. The nonwage

share actually fell slightly from 15.4 to 15.1 percent over the same period in the private sector. The relative decline in nonwage benefits in the private sector is likely to have been most important for less-educated workers. For example, tabulations from the May 1979 and May 1988 CPS Pension Supplements indicate that the share of workers with 12 years of schooling covered by employer health insurance declined from 46 to 42 percent in the private sector and increased from 56 to 61 percent in the public sector from 1979 to 1988.[8] No similar relative private sector decline in health insurance coverage for college-educated workers is apparent: the fraction of employed college graduates covered by health insurance increased from 75 to 78 percent in the private sector and from 80 to 84 percent in the public sector over this period. Thus the consideration of nonwage benefits is likely to have expanded public sector compensation gains for less-educated workers in the 1980s and may not have greatly affected public/private sector relative compensation changes for more-educated workers.

The wage patterns shown in Table 1 imply that the college/high school log wage differential for males with 5 years of experience increased from 0.29 in 1979 to 0.48 in 1988 in the private sector. In the public sector over the same period, the wage differential remained fairly stable increasing by only 0.01, from 0.27 to 0.28. Similarly, experience differentials for high-school workers increased by much more in the 1980s in the private sector than in the government.

Women who were college graduates in the private sector experienced substantial gains in earnings in the 1980s, while earnings remained relatively constant for college educated women in the public sector. As a

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[8] These tabulations were provided to the authors by Jonathan Gruber.

result of the latter trend, young college educated women, who earned 15% more
in the government than in the private sector in the early 1970s, now earn
slightly _less_ in the government than in the private sector.

In general, the trends detailed in this section suggest that the
government sector has been fairly unresponsive to the major swings in the
wage structure that occurred in the private sector in the 1980s. As a
consequence, the government wage structure has become even more compressed
relative to the private sector. The adjustment has been most sluggish for
recent labor market entrants with advanced degrees.

Another important trend worth noting is that in the early 1970s more
than 65% of college educated female workers were employed by some branch of
government, but by 1987 only 42% of all college educated women (and less than
30% of those with 1 to 5 years of potential experience) were employed by the
government. Although the government remains an important source of
employment for well-educated women, it clearly has decreased in importance.
Furthermore, female college and high school graduates gained approximately 8-
14 percent on males with similar levels of education and experience in the
private sector in the 1980s; the analogous groups gained just 4 to 8 percent
in the public sector. Thus, despite the comparable worth movement in the
public sector in the 1980s, private sector employment and earnings growth for
women have been largely responsible for the substantial narrowing of the
gender gap in earnings since the late 1970s.

C. Wage Differentials in the Federal Government, 1976-88

Since the small sample size for federal workers in the CPS makes it

difficult to draw precise conclusions about changes in educational wage
differentials in the federal government, we use a large extract of micro-data
from the Central Personnel Data File (CPDF) of the U.S. Office of Personnel
Management (OPM) to analyze changes in the college wage premium in the
federal government from 1976 to 1988. This extract contains over 1.4 million
observations and includes information on workers' annual salary, tenure, age,
occupation, and other characteristics for a 10 percent random sample of full-
time, permanent General Schedule-equivalent and blue-collar workers in the
federal government for even-numbered years from 1976 to 1988.

We used the CPDF to estimate cross-section regressions by gender and
year for samples of workers with exactly 12 and exactly 16 years of
schooling. The dependent variable is the log annualized salary, and the
independent variables are a quartic in potential experience (age - years of
schooling - 6), three race dummies, seven interaction terms between a college
graduate dummy variable and dummy variables for experience brackets (0-5, 6-
10, 11-15, 16-20, 21-25, 26-30, and 31+ years), and an interaction term
between the black dummy and the college graduate dummy. The estimated
college/high school wage differentials by gender and experience from these
regressions for 1976, 1980, 1984, and 1988 are presented in Table 2.

Table 2 indicates that the college wage premium expanded only moderately
in the federal government in the 1980s. In contrast to the greater than 20
log point increase in the college/high school differential for young workers
in the private sector, the college wage premium increased by only about 5 log
points for those with less than 5 years of experience in the federal
government. Increases for more experienced workers were also much more
moderate than those for the private sector.

Table 2: College/High School Log Wage Differentials for Full-Time Workers
in the U.S. Federal Government, 1976-1988

Experience Group	1976	1980	1984	1988
Males				
0-5 years	0.291	0.280	0.287	0.327
	(0.008)	(0.010)	(0.010)	(0.009)
6-10 years	0.322	0.336	0.299	0.328
	(0.005)	(0.006)	(0.006)	(0.007)
16-20 years	0.383	0.368	0.377	0.347
	(0.006)	(0.006)	(0.005)	(0.005)
26-30 years	0.368	0.334	0.362	0.373
	(0.006)	(0.007)	(0.006)	(0.006)
Females				
0-5 years	0.343	0.341	0.370	0.399
	(0.006)	(0.007)	(0.008)	(0.008)
6-10 years	0.395	0.388	0.397	0.405
	(0.008)	(0.007)	(0.009)	(0.007)
16-20 years	0.317	0.358	0.365	0.371
	(0.014)	(0.012)	(0.009)	(0.007)
26-30 years	0.295	0.242	0.243	0.283
	(0.013)	(0.013)	(0.012)	(0.011)

Note: The reported estimates are from cross-section regressions of log annualized
salary on a quartic in experience (age - years of schooling - 6), 3 race dummies,
7 interaction terms between a college graduate dummy variable and dummy variables
for experience brackets (0-5, 6-10, 11-15, 16-20, 21-25, 26-30, and 31+ years),
and an interaction term between the black dummy and the college graduate dummy.
Separate regressions were run for each of the indicated years by gender for
samples containing Federal workers with exactly 12 or exactly 16 years of
schooling. Each reported estimate is the coefficient on the interaction term
between college graduate status and the indicated experience bracket dummy
variable. The numbers in parentheses are standard errors. Sample sizes for males
(females) are 62,091 (40,511) in 1976; 59,718 (44,171) in 1980; 65,189 (47,829) in
1984; and 64,936 (52,875) in 1988.

Source: The data are from the U.S. Office of Personnel Management's Central
Personnel Data File (CPDF) and cover full-time, permanent GS-and-equivalent and
blue collar federal employment.

D. Changes in Public/Private Sector Wage Differentials by Percentile

Given the compression in government pay relative to the private sector

noted above, there has been a great deal of concern that the government is

unable to recruit qualified workers at the high-end of the skill

distribution. This concern is especially strong in the federal government,

as demonstrated by the formation of the National Commission on the Public

Service to study this issue. Consequently, we next contrast trends in pay at

the upper and lower ends of the earnings distribution in the government and

the private sector.

Figure 4 plots the federal/private log hourly wage differential by

percentile for full-time college and high school graduates by sex for 1979

and 1988. These plots compare the log hourly earnings of federal and private

sector employees who hold the same relative position within their respective

earnings distributions. The plots use wage residuals to control for

differences in the wage distributions arising from differences in the age,

location, and race compositions of the workforces in each sector.

Specifically, we estimate regressions of log hourly earnings on a quartic in

years of potential experience, eight region dummy variables, two race dummy

variables, and a metropolitan area dummy variable. Separate regressions are

estimated for full-time, private-sector workers in four education-sex groups

in 1979 and in 1988.[9] Wage residuals for each individual in the federal and

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[9] The two education groups examined are college graduates and high school
graduates. The earnings regressions for college graduates include two dummy
variables for 17 and for 18 or more years of schooling. Since we are
interested in looking at the entire wage distribution and since a substantial
fraction of workers in some groups in 1988 have edited usual weekly earnings
that are top coded at $999 (e.g., over 20 percent of male college graduates
are top coded in 1988), we use the unedited usual weekly earnings variable

Figure 4: Federal Govt/Private (Residual) Wage Diffs by Percentile
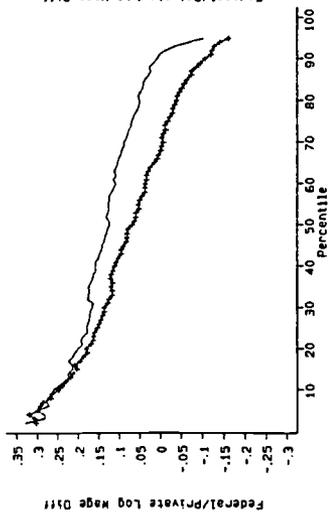
A. Males, 16 or more Years of Schooling
( ) 1979   (+) 1988

B. Females, 16 or more Years of Schooling
( ) 1979   (+) 1988

C. Males, 12 Years of Schooling
( ) 1979   (+) 1988

D. Females, 12 Years of Schooling
( ) 1979   (+) 1988

STATA™
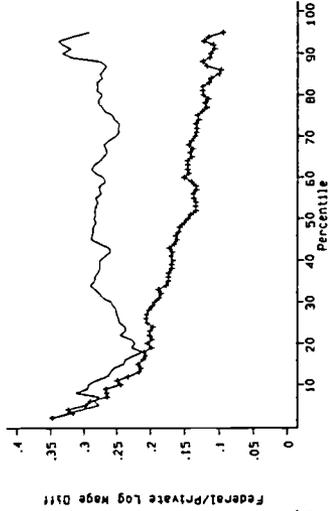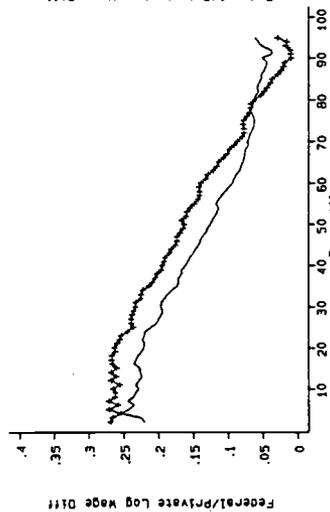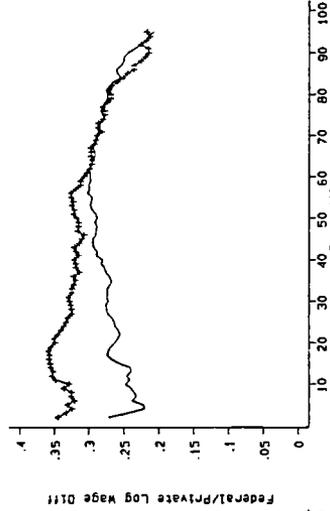
private sectors are given by the difference between actual and predicted log hourly earnings. Predicted earnings for an individual are calculated using the individual's observed characteristics and the estimated coefficients from the private sector earnings function for that individual's education-sex group.

Figure 4 illustrates pay compression in the federal government relative to the private sector. It is clear that the earnings advantage of federal workers is much greater at the bottom part than at the top part of the earnings distribution in each group. Panel A shows that for males with college degrees the substantial earnings premium of federal workers in the bottom fifteen percent of the distribution remained steady from 1979 to 1988, but the relative earnings of federal workers declined at an increasing rate as one moves up the earnings distribution. From 1979 to 1988, the earnings of college-educated males in the top quintile of the federal government earnings distribution fell by approximately 10 percent relative to private sector workers in comparable positions in the earnings distribution. In fact, the log (residual) wage differential between the 90th percentile and 10th percentile workers increased by 0.07 in the private sector and declined by 0.03 in the federal government for male college graduates from 1979 to 1988. Panel B shows a similar pattern for college-educated females.

Figure 5 uses the same approach as Figure 4 to display wage differentials by percentile between state and local government and private

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for 1988 in our analysis of wage changes by percentile. The wages of individuals with usual weekly earnings top coded at $999 in 1979 and at $1999 in 1988 are adjusted by multiplying the wages of such workers by 1.40. Since changes at the very top end of the (residual) earnings distribution appear to be quite sensitive to the treatment of top coded wages, we truncate the plots presented in Figures 4 and 5 at the 95th percentile.

Figure 5: State & Local/Private (Residual) Wage Diffs by Percentile
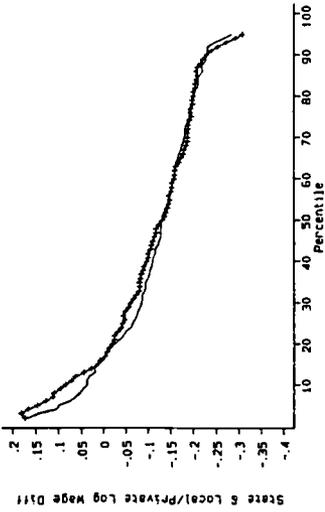
A. Males, 16 or more Years of Schooling
( ) 1979   (+) 1988

B. Females, 16 or more Years of Schooling
( ) 1979   (+) 1988

C. Males, 12 Years of Schooling
( ) 1979   (+) 1988

D. Females, 12 Years of Schooling
( ) 1979   (+) 1988

Stata™
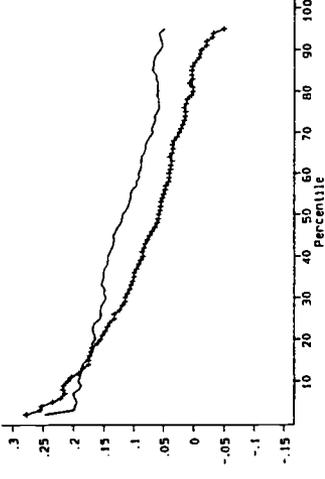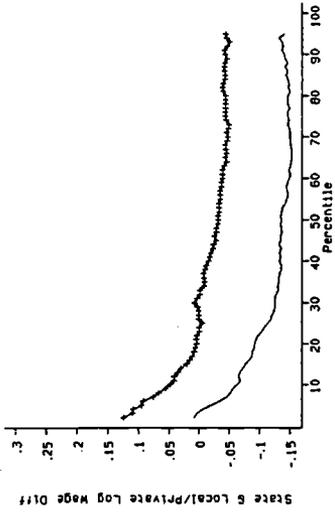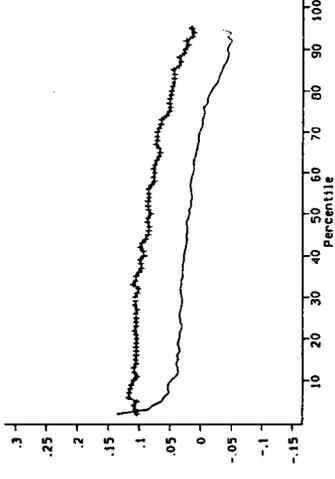
sector workers for 1979 and 1988.[10]   Panel A of Figure 5 shows some small

gains at the bottom end of the distribution and small losses at the top end

for male college graduates in state and local governments relative to the

private sector.   Panel B of Figure 5 indicates a significant decline in wages

relative to the private sector for female college graduates in the top half

of the earnings distribution in the state and local sector.

In contrast, panels C and D of Figures 4 and 5 show a quite different

pattern for high school graduates. For high school educated workers the

premium for working in the federal government increased throughout most of

the earnings distribution for both male and females in the 1980s, but

decreased at the upper end for males. The earnings of high school graduates

in state and local government increased relative to private sector workers

throughout the distribution.

Taken together, Figures 4 and 5 tell strikingly different stories for

low-paid and high-paid workers in the government relative to the private

sector. Over the last decade, less-educated workers fared extremely well in

the government relative to the private sector, while highly-educated federal

workers lost ground. Upper-tail federal workers now earn substantially less

than upper-tail private sector workers. In the state and local government

sector, pay compression reflects improvements in wages for less educated

workers relative to the private sector, rather than sharp declines in the

wages of highly educated workers. These patterns suggest that it should have

become more difficult to recruit and retain highly-skilled workers in the

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[10]Appendix Table A1 further illustrates changes in earnings dispersion
in the private and public sectors by presenting summary measures of log
hourly earnings inequality for college and high school graduates by sex and
sector in 1979 and 1988.

federal government, while there should be long queues of less-educated
workers seeking government employment.

III.   Variation in Pay Across Space in the Private and Public Sectors

A. Pay Variation Across States in the Public and Private Sectors

    In this section, we examine variation across states in pay levels in the
public and private sectors and analyze the responses of public and private
sector pay to changes in local labor market conditions. Private sector wages
vary considerably across states and cities in the United States. Because,
with few exceptions, the federal government pays the same wage to white-
collar workers who are in the same grade of an occupation nationwide, the
federal/private pay relationship is likely to vary greatly by location and
federal wages are unlikely to be very responsive to changes in local
economies.[11] State and local government wages are typically set within
localized labor markets with some attempt to maintain local pay
comparability. Furthermore, state and local governments face hard budget
constraints and therefore are likely to respond to local economic shocks that
affect their tax revenues in a manner similar to private sector employers
responses to changes in market conditions and ability-to-pay. The wage
premia earned by state and local government workers may also vary across
regions because of regional differences in the relative political strength of
public sector unions.

    We use data from the Full Year ORG files of the 1979 and 1988 CPSs to
analyze these issues. In each year, we estimate separate log hourly earnings

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    [11]We note, however, that special area wage rates and the potential to
use discretion in sorting workers among job classifications (grades) may
introduce some regional wage flexibility into the federal wage schedule.

regressions for private, state and local, and federal workers. Each

regression includes a set of standard control variables and a full set of

state dummy variables as independent variables.[12]

The extent to which public sector pay varied across states with private

sector pay in 1988 is illustrated in panels A and B of Figure 6. The panels

plot the state dummy variable coefficients for state and local government and

federal workers respectively against the coefficients for private sector

workers.[13] Panel A shows a tight correspondence across states between state

and local government pay levels and private sector pay levels. The standard

deviation of the state dummy variable coefficients is larger for state and

local workers than for private sector workers in 1988 (0.13 versus 0.10).[14]

Furthermore, the employment-weighted regression of the state and local

government coefficients on those of public sector workers yields a regression

coefficient of 1.26 with a standard error of 0.07 and an R^2 of 0.87.[15] This

implies that the state and local government pay premium relative to the

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[12]Each regression includes a quartic in experience; years of schooling;
two race dummies; marital, metropolitan area and part-time status dummies; a
female dummy and the interaction of the female dummy with the marital status
dummy and the quartic in experience, and a set of one-digit occupation
dummies. The private sector regressions also include a set of two-digit
industry dummy variables. The sample sizes were 70,946 in 1979 and 112,256
in 1988 for the private sector, 3554 in 1979 and 5184 in 1988 for the federal
government, and 13,790 in 1979 and 20,418 in 1988 for state and local
governments.

[13]The coefficients are normalized so that California is the origin (the
base group) in all the plots. Alaska is the outlier with the highest wages
in all plots of levels of state-level wage differentials.

[14]All reported standard deviations of regression coefficients have been
adjusted for sampling error following the procedure described in Krueger and
Summers (1988). The results are quite similar if we compute weighted
standard deviations using state employment as the weights.

[15]The weights are 1987 state employment levels.

Figure 6: Public vs. Private Sector Wage Variation Across States

A. State and Local vs. Private, State Log Wage Diffs, 1988

B. Federal vs. Private, State Log Wage Diffs, 1988

C. Changes in State Log Wage Diffs, S&L vs. Private, 1979-88

D. Changes in State Log Wage Diffs, Fed vs. Private, 1979-88
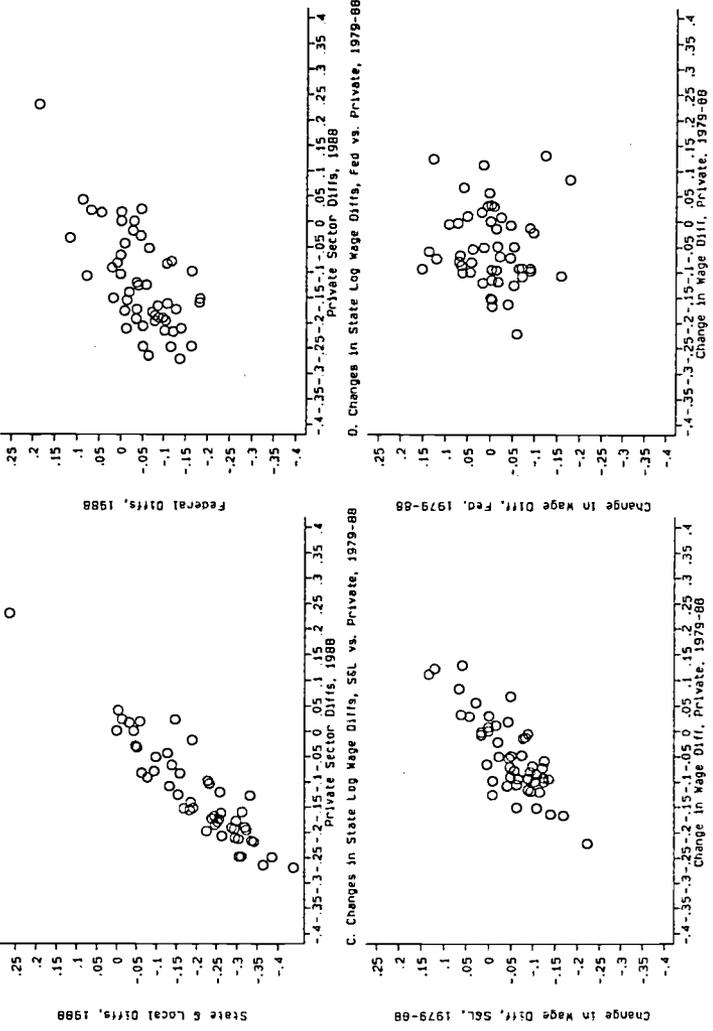
private sector is larger on average in states where private sector wages are particularly high. Thus state and local government pay levels appear to be even more responsive to local economic factors than private sector wages.

One explanation for the greater regional pay variation for state and local government workers than for private sector workers is that tax revenues for state and local governments depend on local economic conditions while many private employers operate in national product markets. When we use an analogous approach to compare private sector workers in industries operating in localized product markets to other private sector workers, we find support for this type of explanation.[16] In 1988 the standard deviations of state dummy variable coefficients are 0.11 and 0.08 for private sector workers in localized and national industries respectively.

Panel B of Figure 6 shows the story is quite different in the federal government. If one ignores Alaska, there is little positive relationship between federal pay and private pay across states. Furthermore, the standard deviation of the state dummy variable coefficients for federal government workers in 1988 is 0.06 which is substantially below the overall private sector level and even below the variation found for private sector industries with national product markets.[17] Because federal pay does not vary

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[16] We assign private sector workers in construction, local transportation services, real estate, and other (nonfinancial) services to the sample of localized industries, and assign all other private sector workers to the sample of national industries.

[17] We have also examined regional pay variation in the federal government in 1988 using our micro data from the CPDF. This much larger sample (178,000 observations) yields precisely estimated state differentials that tell a story that is similar to the CPS results. The standard deviation of state dummy variable coefficients is equal to 0.05 in 1988 for estimates using the CPDF data. Furthermore, we find little difference in the average General Schedule (GS) grades of workers with comparable education levels in the states with the highest and lowest private sector wages in the 1984-1988

substantially across regions, the federal/private pay differential is strongly negatively related to the level of private sector pay. In fact, an employment-weighted regression of the state dummy variable coefficients of federal workers on those of all private sector workers yields a coefficient of 0.418 with a standard error of 0.08 and an R^2 of 0.32.

Panels C and D of Figure 6 show how public sector pay levels responded to changes in private sector pay levels across states from 1979 to 1988. Wage levels moved in tandem across states for private sector and state and local government employees, while changes in federal pay levels across areas are essentially orthogonal to changes in private sector wage levels.

B. Wage Curves for the Public and Private Sectors

We next analyze the extent to which pay in the private and public sectors respond to local labor market conditions by examining the relationship between pay levels and state unemployment rates. The state dummy variable coefficients (from the regressions described above in section III-A) for each sector are plotted against state unemployment rates for 1979 and 1988 in Figures 7 and 8. Upward sloping wage curves (in the terminology of Blanchflower and Oswald (1990)) are apparent for all three sectors in 1979, while downward sloping wage curves are apparent for the private sector and state and local government workers in 1988.

To eliminate the impact of permanent state effects and focus on how pay changes across sectors in response to changes in labor market conditions, we plot the changes in the state wage coefficients by sector against the changes

period. It does not appear that the GS schedule is manipulated to adjust federal wages to local labor market conditions.

Figure 7: State Hrly Wage Diffs. vs. Unemp Rates, 1979
(o) Actual Values   (+) Predicted Values from Emp. Wtd. Regression
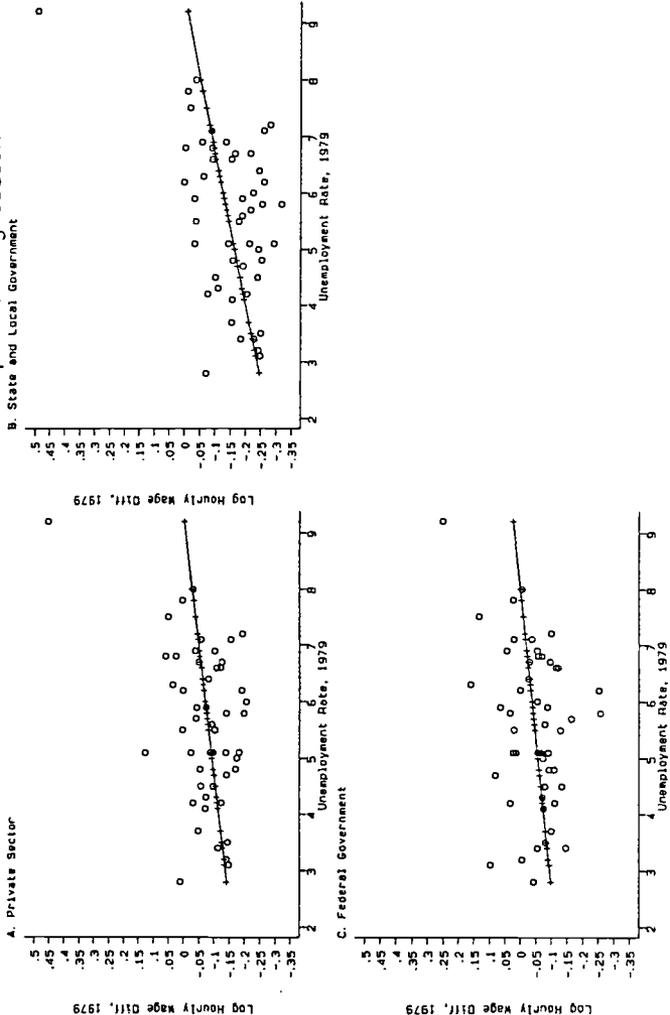
Public vs. Private Sector Wage Curves, U.S., 1979

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Figure 8: State Hrly Wage Diffs. vs. Unemp Rates, 1988
(o) Actual Values   (+) Predicted Values from Emp. Wtd. Regression
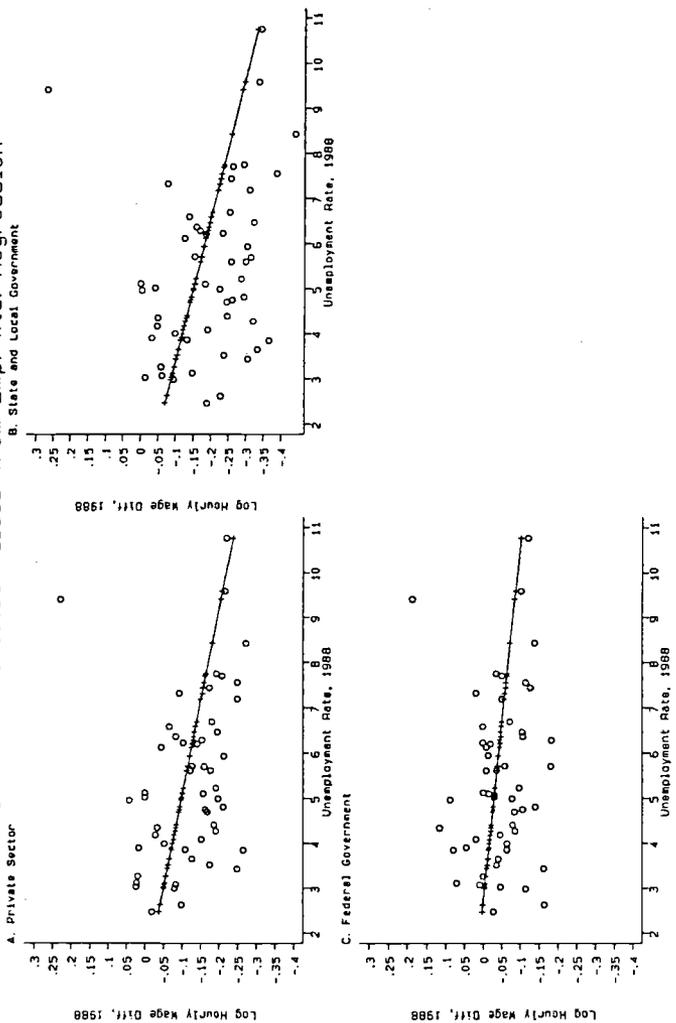
Public vs. Private Sector Wage Curves, U.S., 1988

in state unemployment rates in Figure 9. The figure indicates strong
negative responses of private sector and state and local government wages to
changes in state unemployment rates, but virtually no response of federal
wages to changes in state labor markets. The employment-weighted regressions
of changes of wage differentials on changes in state unemployment from 1979
to 1988 yield:[18]

Private sector: $dw = -.038 \quad -.019*$ du, $R^2 = 0.32$;
$\quad\quad\quad\quad\quad\quad\quad$ (.007) (.004)

State and Local: $dw = -.036 \quad -.021*$ du, $R^2 = 0.39$;
$\quad\quad\quad\quad\quad\quad\quad$ (.007) (.004)

Federal: $dw = -.006 \quad -.003*$ du, $R^2 = 0.01$.
$\quad\quad\quad\quad\quad\quad\quad$ (.008) (.004)

where dw is the change in the estimated log wage differential and du is the
change in the unemployment rate measured in percentage points.

We conclude that private sector and state and local government pay
levels seem to respond similarly to changes in local economic conditions,
while federal pay levels seem almost completely unresponsive. One plausible
interpretation of the difference between flexibility to local conditions of
state and local government pay and federal pay is that state and local
government fiscal conditions depend directly on local economic factors, while
the federal government pay levels are mainly affected by aggregate economic
conditions. While government pay _levels_ may be sensitive to economic
conditions which affect tax revenues and budget size, our findings in section
II suggest that economic factors affecting relative skill prices do not have

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[18]Unweighted regressions yield quite similar estimates of these first-
differenced wage curves.

Figure 9: Changes in State Wage Diffs. vs. Changes in Unemp Rates
(o) Actual Values   (+) Predicted Values from Emp. Wtd. Regression
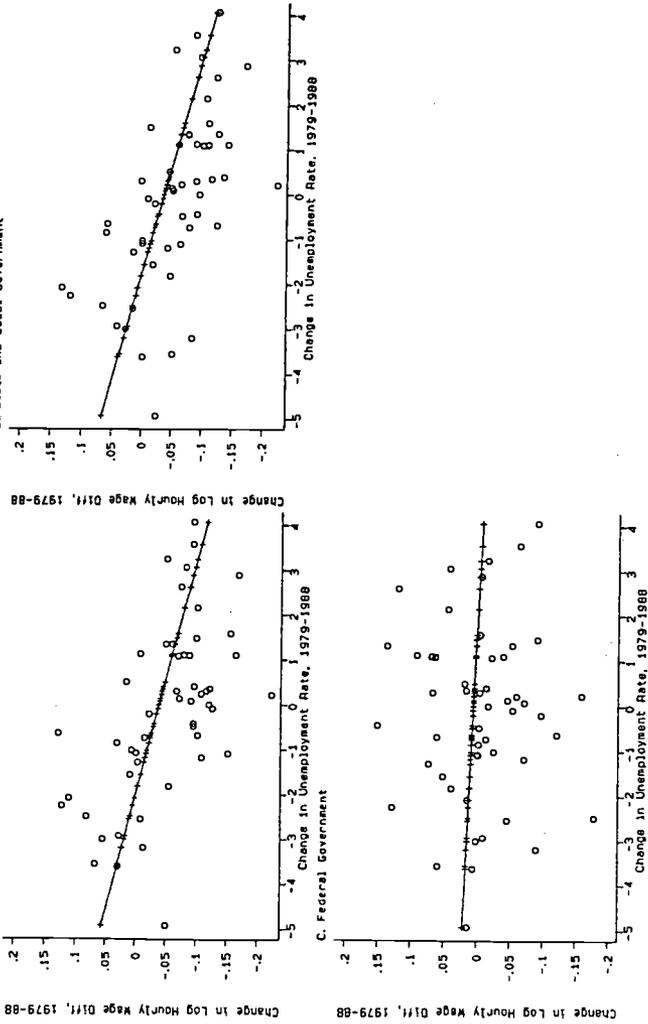
Public vs. Private Wage Curves in Changes, 1979-88

much affect on the relative wage structure in the public sector.

IV. Explanations for Wage Structure Rigidity in the Public Sector

In this section, we examine several potential explanations for the
apparent stability of the internal wage structure in the public sector during
the 1980s. We first examine whether stable educational wage differentials
were also apparent in large private sector firms and in private nonprofit
organizations. We then explore the roles of public sector unionization and
civil service systems.

A. Is Relative Pay Rigidity Also Apparent in Large Private Sector Firms?

One possible explanation for the rigid pay differentials within the
government is that this type of inflexibility is a characteristic common to
all large organizations with highly bureaucratized personnel systems. The
same political forces that make pay somewhat unresponsive to individual
performance and market conditions in the public sector may restrict the
responsiveness of pay in large private sector firms. Ideally, we would like
to examine this hypothesis by examining whether skill differentials have
expanded in the 1980s within large private sector firms that operate on a
national basis. This type of analysis would require data from the personnel
records of individual large private sector firms at different points of time
comparable to the CPDF data file.

Since we do not have access to data for individual private sector firms,
we are limited to using CPS data with information of firm size from the May
1979 and May 1988 Pension Supplements to examine differences in changes in
skill differentials in the large firm sector (as a whole) and in the small

firm sector. We categorize workers as being in the large firm sector if they work for a multi-establishment firm (firms with employees at more than one location) that employs over one thousand workers. All other workers (those in multi-establishment firms with less than 1000 workers and those in single establishment firms) are placed in the small firm sector.

Table 3 contrasts the "regression-adjusted" mean log hourly wages of college and high school graduates by gender and experience at large and small firms in 1979 and 1988. The table highlights the well-know employer-size wage differential, with large firms paying substantially higher wages (from approximately 8 to 25 percent higher) for workers with similar education and experience. Furthermore, education differentials have moved similarly in small and large firms in the private sector in the 1980s. The college/high school log wage differential for males with 5 years of experience expanded by 0.21 in large firms and 0.20 in small firms from 1979 to 1988. In fact, the real wages of young, high-school graduates fell by more in the 1980s in the large firm sector than in the small firm sector of the private economy.

The results from Table 3 indicate that the structure of relative pay by education, experience, and sex changed dramatically in the large firm sector of the private economy. While the CPS data do not allow us to determine the extent to which these changes have taken place within individual organizations as opposed to changes in relative wages between organizations with different labor force characteristics, evidence on the sharp increase in the relative pay of executives of large private sector firms (Mishel and Frankel, 1990, p. 124) suggests that much of this has likely occurred within individual firms. Groshen's (1990) recent analysis of data from an annual private wage and salary survey conducted by the Federal Reserve Bank of

Table 3: Estimated Mean Log Real Hourly Wage Rates for Private Sector
Workers by Education, Experience, Gender, and Firm Size

A. Workers in Large Firms (Multi-Establishment Firms with at least 1000
Employees)

	Education			
	High School (12 years)		College Grads. (16 years)	
Experience	1979	1988	1979	1988
Males				
5 years	2.271 (.020)	2.044 (.025)	2.566 (.028)	2.539 (.028)
25 years	2.617 (.022)	2.557 (.022)	2.980 (.046)	2.987 (.039)
Females				
5 years	1.981 (.020)	1.867 (.022)	2.311 (.057)	2.301 (.037)
25 years	2.209 (.028)	2.139 (.025)	2.345 (.085)	2.534 (.079)

B. Workers in Small Firms (Multi-Establishment Firms with less than 1000
Employees or Single Establishment Firms)

	Education			
	High School (12 years)		College Grads. (16 years)	
Experience	1979	1988	1979	1988
Males				
5 years	2.153 (.014)	1.967 (.017)	2.390 (.027)	2.405 (.028)
25 years	2.486 (.023)	2.409 (.026)	2.789 (.048)	2.845 (.053)
Females				
5 years	1.858 (.013)	1.766 (.018)	2.114 (.031)	2.205 (.028)
25 years	2.014 (.018)	2.003 (.021)	2.144 (.079)	2.410 (.058)

Table 3: continued

Note: Each estimate is from a separate cross-section regression for an
education-experience-gender-firm size group of log real hourly earnings on a
linear spline of years of experience with a break every ten years, 2 race
dummy variables, and dummy variables for metropolitan area and part-time
status.   The education classes used are exactly 12 and 16 or more years of
schooling; the experience classes are 0-19 and 20 or more years of potential
experience.   The regressions for college graduates include dummy variables for
individual years of schooling.   The estimates for each group are the predicted
values of the log hourly earnings regression for that group evaluated at the
indicated schooling and experience levels and for a full-time, white employee
living in a metropolitan area.

Sources: The data used are from the May 1979 and 1988 CPS Pension Supplement
Surveys.   The 1979 data include earnings for both the May 1979 and June 1979
Outgoing Rotation Groups.   Earnings are deflated by the personal consumption
expenditures implicit price deflator for GNP and are in 1988 dollars.

Cleveland provides further evidence of this phenomenon. Groshen finds that occupational wage differentials within large private sector employers in Cleveland, Cincinnati, and Pittsburgh did indeed expand substantially in the 1980s. This evidence indicates that the internal wage structures of large private sector firms did change in the 1980s and that government relative pay rigidity is not something shared by all large bureaucratic organizations.

Finally the insensitivity of pay in the federal government to changes in local labor market conditions documented in section III does not appear to be a characteristic shared by large private sector employers in the United States. Rebick (1990) finds for the 1979 to 1988 period that wages in small firms (10 to 99 employees), medium firms (100 to 999 employees), and large firms (1000 or more employees) in the private sector responded substantially and similarly to changes in state unemployment rates.

B. Is Pay Rigidity A Characteristic of All Nonprofit Organizations?

A second potential explanation for the insensitivity of the government internal wage structure to market changes in skill differentials is that such behavior is characteristic of all "not-for-profit" organizations. This hypothesis can be evaluated by examining whether wage differentials by skill category behave similarly in the government and in private sector nonprofit organizations.[19]

We examine changes in wage differentials by education in the private "for-profit", private nonprofit, and government sectors using data from the

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[19]Furthermore, the "labor donations" model of Preston (1989) suggests that the supply of workers willing to accept a reduced wage to work for organizations that produce positive social externalities may be similar in both the government and private nonprofit sectors.

1979 and 1988 CPS outgoing rotation groups. Since the CPS does not identify

the whether workers are employed by nonprofit firms, a private sector worker

is classified in the nonprofit sector if he or she works in a three-digit

industry that has at least two-thirds of total employment in nonprofit firms.

Following Preston (1989), we classified three-digit industries into the for-

profit and nonprofit sectors on the basis of information reported in the 1977

census of service industries and tabulated by Rudney and Weitzman (1983).

Private sector workers in all other industries are classified as part of the

for-profit sector.

Table 4 presents estimates of the college/high school log wage premium

for males and females by sector in 1979 and 1988. The table shows that the

college wage premium increased substantially in the 1980s in both the private

for-profit and private nonprofit sectors. In contrast, the college/high

school wage differential barely changed in the 1980s in the government

sector. Thus, relative pay rigidity in the 1980s is not apparent in the

private nonprofit sector and seems to be confined to public sector labor

markets.

C. The Role of Unionization

Freeman (1990) and others have argued that declining unionization may

have played an important role in rising skill differentials and wage

inequality in the United States in the 1980s. Since unions have largely

represented workers without college degrees in the private sector,

deunionization and losses of union wage premia are likely to reduce the wages

of less-educated workers relative to more-educated workers in the private

sector. Furthermore, much evidence (e.g., Freeman, 1980) suggests that

Table 4: College/High School Log Wage Differentials by Sector, 1979-1988[a]

Group	Males			Females		
	1979	1988	Change 1979-88	1979	1988	Change 1979-88
Private Sector						
All	0.288 (0.006)	0.420 (0.006)	0.132	0.269 (0.007)	0.406 (0.006)	0.137
For-Profit Sector[b]	0.311 (0.024)	0.433 (0.030)	0.122	0.257 (0.022)	0.398 (0.023)	0.141
Nonprofit Sector[b]	0.232 (0.036)	0.328 (0.037)	0.096	0.281 (0.014)	0.405 (0.014)	0.124
Government						
All	0.278 (0.011)	0.286 (0.011)	0.008	0.316 (0.009)	0.330 (0.010)	0.014
State and Local Government	0.270 (0.013)	0.277 (0.013)	0.007	0.354 (0.010)	0.366 (0.011)	0.012
Federal Government	0.301 (0.018)	0.303 (0.019)	0.002	0.298 (0.026)	0.278 (0.025)	-0.020

[a]Each estimate is from a separate cross-section regression for a gender-sector group of log hourly earnings on dummy variables for individual years of schooling, a quartic in potential experience, two race dummy variables, a dummy variable for metropolitan area status, and a dummy variable for part-time status. The samples include workers with exactly 12 and with 16 or more years of schooling. Each reported estimate is the coefficient of the dummy variable for exactly 16 years of schooling with those with exactly 12 years of schooling as the base group. The numbers in parentheses are standard errors.

[b]The nonprofit sector includes private sector workers in the following industries: hospitals; health services; elementary and secondary schools; colleges and universities; libraries; educational services; museums, art galleries, and zoos; religious organizations; welfare services and welfare facilities; nonprofit membership organizations. Private sector workers in all other industries are classified as part of the for-profit sector. This classification scheme is based on Appendix A of Preston (1989).

Source: The data are from the Full-Year 1979 and 1988 CPSs (Outgoing Rotation Groups).

unions compress wages among organized workers in the private sector. These factors suggest that the high and relatively stable level of unionization in the public sector since the mid-1970s may help explain much smaller increases in wage differentials by education in the public sector than in the private sector.

Our approach to assessing the role played by unionization in moderating movements in skill differentials in the public sector relative to the private sector is to compare changes in skill differentials in states with high and low public sector unionization rates. Table 5 compares changes in the college/high school log wage differential in the public and private sectors from 1979 to 1988 for the ten states with the lowest and the ten states with the highest public sector unionization rates in the early 1980s. We ranked states according to their public sector union coverage rate in 1983 using tabulations from the CPS outgoing rotation groups reported by Curme, Hirsch, and Macpherson (1990, Table 5, pp. 20-26). The public sector union coverage rates in the high unionization states in 1983 ranged from 61.7 percent in Maine to 73.5 percent in New York, while they ranged from 17.2 percent in Georgia to 30.1 percent in Oklahoma in the low unionization states.

Table 5 indicates that the college wage premium increased substantially more in the private sector than in the public sector in both groups of states. Even in states with low public sector unionization rates, changes in education differentials in the public sector were negative for men and quite moderate for women in the 1980s. On the other hand, the table does indicate that the college/high school wage differential is a bit lower in the public sector in high unionization states. Although unions may play a role in moderating movements in skill differentials in the public sector, stable

Table 5: College/High School Log Wage Differentials for States
with High and Low Public Sector Union Coverage Rates

Group	Low Unionization			High Unionization		
	1979	1988	Change 1979-88	1979	1988	Change 1979-88
Males						
Private	0.313 (0.014)	0.456 (0.011)	0.143	0.332 (0.011)	0.421 (0.010)	0.089
State and Local Government	0.332 (0.024)	0.274 (0.030)	-0.058	0.283 (0.022)	0.260 (0.023)	-0.023
Females						
Private	0.270 (0.017)	0.412 (0.015)	0.142	0.294 (0.014)	0.384 (0.012)	0.090
State and Local Government	0.364 (0.019)	0.402 (0.022)	0.038	0.359 (0.021)	0.378 (0.023)	0.019

Note: Each estimate is from a separate cross-section regression for a gender-
sector-unionization group of log hourly earnings on dummy variables for
individual years of schooling, a quartic in potential experience, two race
dummy variables, a dummy variable for metropolitan area status, and dummy
variables for state of residence. The samples used include full-time workers
with exactly 12 and with 16 or more years of schooling. Each reported
estimate is the coefficient of the dummy variable for exactly 16 years of
schooling with those with exactly 12 years of schooling as the base group.
The numbers in parentheses are standard errors. The states in the low
unionization sample are Georgia, Virginia, Arkansas, Texas, South Carolina,
Missouri, Mississippi, North Carolina, Iowa, and Oklahoma. The states in the
high unionization group are New York, Rhode Island, Washington, Maine, New
Jersey, Pennsylvania, Connecticut, Michigan, Vermont, and Maine.

Source: The data are from the Full-Year 1979 and 1988 CPSs (Outgoing
Rotation Groups).

differentials in the face of major private sector changes are apparent even in the public sectors of states with limited public sector unionization.

D. Do Discretionary Changes in Job Classifications Provide Wage Flexibility?

Although the federal government strives to maintain a nationwide wage scale in which all workers in a given job classification are paid the same wage regardless of their location or private sector opportunities, it is nevertheless likely that federal agencies have some discretion in setting pay. Perhaps most obviously, if a federal agency experiences difficulty recruiting a high-skill employee because of a low wage rate specified in that employee's grade of the General Schedule (GS), the agency could try to classify that worker into a higher grade level.[20] In fact, it is possible that the rigidity caused by the nationwide GS wage policy could be completely circumvented by clever manipulation of employees' job classifications.

In view of trends in private sector skill differentials and a policy of uniform percentage pay increases at all GS levels, we would expect to find more grade-level inflation for high-skill workers than for low-skill workers in the 1980s if the government is to compete for employees with the private sector. The small increase in education differentials in the federal government that were illustrated in Table 2 indicate that classification changes have not been used to offset uniform percentage wage increases throughout the GS schedule from 1977 to 1989.

Thus, it appears that federal agencies did not manipulate GS

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[20] Borjas' (1980) finding of large and systematic pay variation across federal agencies for workers with similar observed human capital characteristics suggests that agencies with strong constituencies may be able to alter with GS classifications to meet their personnel goals.

classifications in the 1980s to upgrade workers with high levels of
education relative to workers with low levels of education. Instead,
calculations with our CPDF data indicate that at all levels of education GS
grades of new workers (those with five of fewer years of seniority) appear to
have been somewhat inflated relative to workers with comparable levels of
education in the late 1970s. For example, the average GS grade of new male
employees with 12 years of education increased from 5.36 to 6.09 from 1976 to
1988, and the analogous increase for new male employees with 16 years of
schooling was from 8.20 to 8.70. One interpretation of this finding is that
the GS is not easily manipulated to target specific groups of workers; either
the whole system is upgraded or there is no upgrading.

Finally, we note that although the majority of federal workers are
covered by the GS pay schedule, there are several other pay schedules
used by the federal government. Examples of other pay schedules
include the Senior Executive Service, which covers high-ranking federal
officials, and the Federal Wage System, which covers many blue collar
workers. Furthermore, some agencies, such as the Tennessee Valley
Authority and Veterans Administration, have their own wage systems, and a
growing number of federal workers are assigned special rates and
classifications. It is entirely possible that flexibility is introduced by
assigning different pay schedules to different agencies and different
categories of workers.

Nevertheless, in view of our findings that federal workers' pay did
not seem to respond to changes in skill and geographic wage differentials
in the 1970s and 1980s, and the finding that the GS schedule is not widely
manipulated to upgrade workers with various educational levels, we doubt

that there is considerable "backdoor" discretion in wage setting in the
federal government. The nationwide wage system appears to place a binding
constraint on pay flexibility in the federal government.

V. The Implications of Pay Rigidity for Public Sector Personnel Outcomes

A. Job Application Rates

The decline in the public/private wage differential for college
graduates and the rise in the differential for less-educated workers in the
1980s suggest that it should have become more difficult for public sector
employers to recruit highly-educated workers and that there should be queues
of lower-educated workers seeking government employment. We explore these
predictions for the federal government by examining changes in application
rates for broad occupational categories from the late 1970s to the mid-
1980s.

We use data on applications to federal jobs drawn from lists of
applications maintained by OPM.[21] Figure 10 compares the movements in job
applications per hire for blue-collar and white-collar positions in the
federal government from 1979 to 1986.[22] Applications have increased for
blue-collar jobs largely filled by high school workers and have fallen for
white-collar jobs largely filled by workers with at least some college
education. With such a short time series and much variability in application
rates from year to year, it is difficult to sort out the effects of business

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[21] See Krueger (1988) for a detailed discussion of the federal job
application process and of data on applications to federal government
positions.

[22] The figure plots the average of this measure of the application rate
in the current year and the previous year.

Figure 10
Application Rates to the Federal Government
Blue Collar vs. White Collar, MA(2)
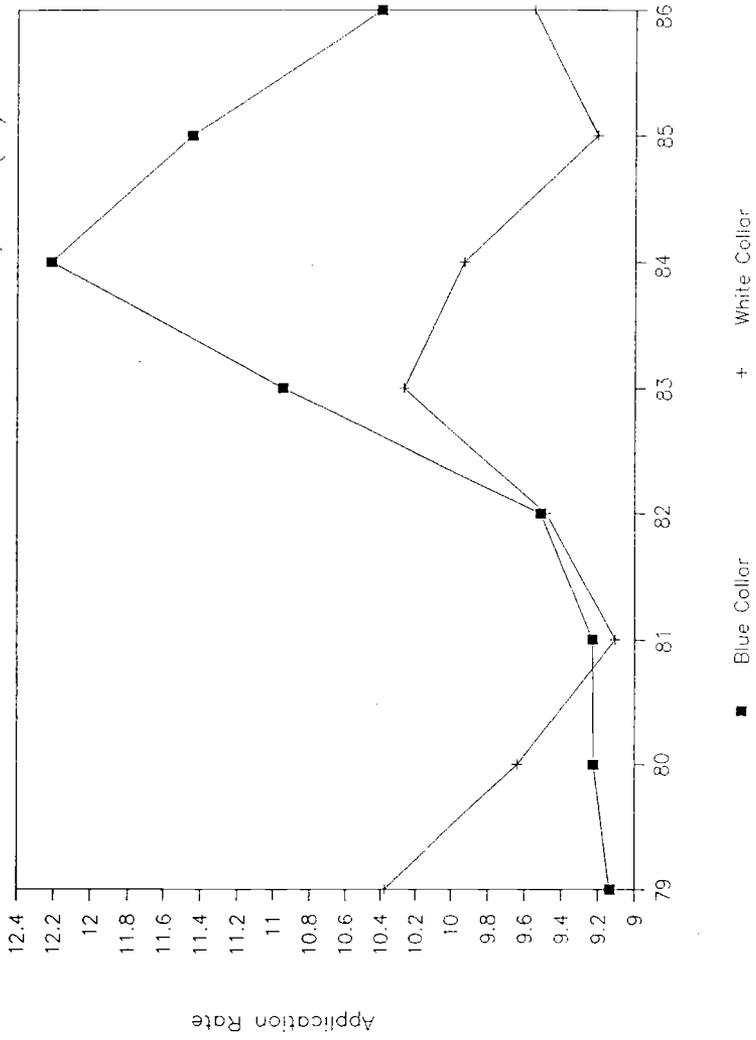
cycle conditions (which are likely to have a larger effect on blue-collar than white-collar applications) from secular changes. Nonetheless, the plot suggests that the government found it easier to recruit blue-collar workers and more difficult to attract workers for positions requiring college graduates in the 1980s.

B. Employee Quality

Although it is difficult to obtain information on trends in the quality of the federal work force, we have been able to obtain some shreds of relevant evidence. Estimates of average grade level by education group based on the CPDF data indicate that the educational qualifications of new hires into federal government positions with constant GS grades declined in the 1980s. Furthermore, some evidence indicates that the decline in the relative pay of highly-educated workers in the federal government relative to the private sector since the early 1970s has made it more difficult to recruit and retain high-quality scientists and engineers in the government. For example, the Department of Defense (DOD) reports that the median Math SAT score of new scientists and engineers at the DOD declined at a greater rate than that for the national student population between 1970 and 1983, and that the separation rates for DOD scientists and engineers scoring above 650 on the Math SAT have been 50 percent greater than for those who scored below that level (Alderman, 1984). Furthermore, the DOD reports that quit rates for engineers increased in all age groups up to 50 from 1975 to 1985 (U.S. General Accounting Office, 1987).

The evidence examined in this section suggests that pay compression in the public relative to the private sector has affected the federal

government's ability to attract and retain employees. If the changes in the private sector wage structure that occurred in the private sector do not reverse themselves in the 1990s, the federal government is likely to experience increased difficulty recruiting skilled professionals and is likely to provide rents to less-educated employees. Reforms allowing for more vertical flexibility in the government wage structure and regional pay variation seem to be especially important in the face of recent labor market trends. If the federal government is unable to reform its wage structure, other attempts to gain flexibility in labor utilization, such as the greater reliance on subcontracting, may be desirable.

VI. Conclusions

Our empirical analysis of changes in the structure of wages in the public and private sectors has documented that the sharp rise in skill differentials of the 1980s was largely a private sector phenomenon. Education differentials and overall wage inequality barely increased in the federal government, and increased only moderately in the state and local government sector. These findings suggest that, despite the asserted goals of comparability with private sector pay in similar jobs, government pay in the United States responds only sluggishly to shifts in relative wages within the private sector.

Our examination of regional pay variation indicates that wages in the state and local government sector vary greatly across states in a manner analogous to wages of workers in private sector industries that operate in localized product markets. Wages in state and local governments respond substantially to changes in local economic conditions. Federal government

pay is set on a national level and does not vary much with local factors. Furthermore, the overall rate of pay growth at all government levels appears sensitive to economic conditions and political factors that affect budgetary conditions and the growth of public sector employment (Freeman, 1987).

We conclude that models of public sector pay determination need to provide an explanation of personnel policies that yield a rather inflexible internal wage structure that is insensitive to labor market conditions and an overall rate of pay growth that appears quite sensitive to economic conditions. Future research also needs to examine more fully the effects of relative wage rigidities in the public sector on the ability of government employers to recruit and retain qualified employees.

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Table Al: Log Hourly Wage Inequality Measures Based on Regression Residuals
for Full-Time Workers by Education and Sector, 1979 and 1988

	Males			Females		
Inequality Measure	1979	1988	Change 1979-88	1979	1988	Change 1979-88

A. College Graduates

Private Sector

Standard Deviation	0.48	0.50	0.02	0.41	0.45	0.04
90-10 Differential	1.15	1.22	0.07	0.97	1.10	0.13

Federal Government

Standard Deviation	0.37	0.37	0.00	0.40	0.39	-0.01
90-10 Differential	0.89	0.86	-0.03	1.01	0.97	-0.04

State and Local Government

Standard Deviation	0.37	0.38	0.01	0.35	0.36	0.01
90-10 Differential	0.88	0.90	0.02	0.84	0.88	0.04

B. High School Graduates

Private Sector

Standard Deviation	0.38	0.41	0.03	0.33	0.38	0.05
90-10 Differential	0.91	1.02	0.11	0.79	0.94	0.15

Federal Government

Standard Deviation	0.31	0.32	0.01	0.31	0.33	0.02
90-10 Differential	0.73	0.76	0.03	0.79	0.83	0.04

State and Local Government

Standard Deviation	0.34	0.37	0.03	0.30	0.35	0.05
90-10 Differential	0.84	0.93	0.09	0.70	0.86	0.16

Table A1: Continued

Note: Separate cross-section regressions of log hourly earnings on a quartic
in years of potential experience, eight region dummy variables, two race dummy
variables, and a metropolitan area dummy variable were run for full-time
workers by sex and education group (16 or more and exactly 12 years of
schooling) in both 1979 and 1988. Dummy variables for 17 and for 18+ years of
schooling were included in the regressions for college graduates. The
earnings residuals used in the calculation of the inequality measures
represent the difference between actual and predicted log hourly earnings.
Predicted wages were calculated for each individual using the coefficients
from the corresponding private sector earnings regression.

Sources: The data used are from the Full-Year 1979 and 1988 CPSs (Outgoing
Rotation Groups). The samples include full-time, wage and salary workers who
do not have allocated (imputed) usual weekly earnings. The 1988 sample uses
the unedited usual weekly earnings variable to compute usual hourly earnings;
the 1979 sample uses the edited usual weekly earnings variable. Sample sizes
for males (females) for the private sector regressions for college graduates
are 9262 (3662) in 1979; and 12,009 (6751) in 1988. Sample sizes for males
(females) for the private sector regressions for high school graduates are
23,162 (17,111) in 1979; and 22,710 (17,992) in 1988.