What's in a Name? Title Inflation in the Federal Government

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I. Introduction

The Federal Salary Reform Act of 1962 established the principle that Federal worker pay should be comparable to the pay of workers performing equivalent jobs in the private sector. Each year, the Federal government computes the Federal-private sector pay differential for workers in similar detailed occupations. Since 1978, the legislated increase in the Federal government pay scale was insufficient to reach parity with the private sector according to the Federal government estimates. By 1988, the Federal government estimated that Federal workers earned 26.3% less than private sector workers in similar detailed occupations.

There are two strategies for Federal government managers when the Federal government pays far less per position than the private sector pays. First, managers may hire and retain workers less skilled than workers in the same position in the private sector. Second, managers may inflate the positions of their subordinates, with no change in the worker's duties.

From a public policy standpoint, these two strategies have quite different implications. US citizens may decide they are only willing to spend the money necessary to employ Federal workers from the bottom 75th percentile of the wage distribution for each position. The citizens give Federal managers an amount of money per position and expect the managers hire the most qualified workers possible. If Federal managers can inflate the worker's title, what constrains Federal pay?

Empirically, it is difficult to determine whether Federal workers are less skilled but perform the same duties as private sector workers in their position or whether Federal workers experience title inflation by receiving promotions with no change in their duties. I attempt to distinguish between these competing hypotheses using a unique BLS pilot survey of establishments to examine these issues. The data from the pilot provides information on both the level of responsibility in an occupation and the demographic

characteristics of individual workers. These data allow me to compare the distribution of wages, skills, and responsibility levels across the Federal and private sectors.

I find that Federal workers have significantly fewer years of education and experience than private sector workers in the same level of responsibility in an occupation. It appears likely that title inflation occurs because, conditional on observed characteristics, Federal government workers are employed at significantly higher levels of responsibility in an occupation than in the private sector. At the same time, the wage and skill distribution within broad occupations is similar across the Federal government and the private sector. Finally, there is a significantly higher return to tenure in the Federal government, but very low returns to previous labor market experience. Thus, it appears Federal government managers have a more difficult time bending the rules when initially hiring a worker.

II. Data

I use two data sets to analyze Federal-private sector pay differentials. Appendix A describes these data sets in greater detail. First, I use a unique Bureau of Labor Statistics' (BLS) pilot conducted as part of the White Collar Pay Survey (WCP). The WCP provides the Federal government with estimates of the earnings of private sector employees. The WCP surveys a random sample of private sector employers with 50 or more employees in March of each year[1]. Employers are asked to report the straight-time pay for each of their full time white collar workers. The white collar occupations that are surveyed in the WCP are those that are similar in nature to occupations in the Federal government[2]. Occupations are disaggregated into "levels of work" based on the duties, responsibilities,

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[1] The probability that an establishment is sampled is approximately proportional to its employment.

[2] The WCP occupations are: accountants, chief accountants, auditors, public accountants, personnel specialists, personnel supervisors/managers, directors of personnel, attorneys, buyers, computer programmers, computer systems analysts, computer systems analysts supervisor/manager, chemists, engineers, tax collectors, registered nurses, licensed practical nurses, nursing assistants, medical machine operating technicians, civil engineering technicians, engineering technicians, drafters, computer operators, photographers, accounting clerks, file clerks, key entry operators, messengers, secretaries, typists, personnel clerks/assistants, purchasing clerks/assistants, and general clerks.

and often the experience requirements of a position. Entry level jobs are denoted as Level 1. The number of levels within an occupation varies across occupations[3]. The BLS collects individual worker pay in the WCP only when the private sector worker's job maps into a specific level of responsibility within an occupation that also occurs in the Federal government. As a result, the WCP disproportionately surveys large firms (specifics and cites)

As part of a pilot survey conducted in 1989 and 1990, establishments were also asked to report the worker's demographic characteristics for a random sample of their "matched" employees.[4] The pilot survey asked the employer to report matched worker's race, sex, years of education, highest educational degree obtained, age, and tenure with the employer. 300 establishments reported all demographic information for 1,740 workers and this comprises the WCP pilot sample[5]. Pay in the WCP pilot survey closely tracks the pay by occupation and level in the full WCP sample[6].

The second data set is from the Central Personnel Data File of the U. S. Office of Personnel Management (OPM) which contains records for nearly all civilian, executive branch Federal employees.[7] There are over 400 thousand Federal workers in positions that meet the White Collar Pay Survey criteria. From the December 1988 OPM files, I

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[3] See BLS Bulletin 2374 (1990) for a description of the levels of work in each occupation.

[4] The number of white collar workers in the firm sampled for this pilot survey was a function of establishment size. The number of workers per establishment in the pilot survey ranges from 1 to 33. The mean establishment reported information on 11.87 workers and the mean worker was employed by an establishment that reported information on 6.92 workers.

[5] 21 percent of the observations were collected from 1989 employers and the remaining observations were collected from 1990 employers. The WCP surveys service-producing industries in odd numbered years and goods-producing industries in even numbered years. I used the goods-producing component of the Employer Cost Index (ECI) to deflate 1990 pay to 1989.

[6] I compared mean pay by occupation and level in the pilot survey (March 1989 and March 1990) to mean pay by occupation and level in March 1988 as reported in an internal OPM memo. (1988 is the last time the memo reports average as opposed to median pay by occupation and level). Mean pay in the pilot survey in March 1989 dollars is 3.36 percent higher than mean pay in the full WCP sample in March 1988 (current) dollars. This difference is comparable to the change in the ECI over this period. Moreover, the correlation in pay across samples for 98 occupations and levels is .987.

[7] U.S. postal employees and agencies which do not have to report personnel information by law, such as the CIA, are not included in the OPM data

drew a ten percent random sample. After imposing the sample selection criteria detailed in the Appendix A, my final sample of OPM workers is 43,797 workers. In October of 1988, there was a 4.1% increase in the Federal pay schedule. The next schedule adjustment for Federal workers did not occur until October 1990.

The distribution of occupations differs across the OPM and WCP data sets. I use sample weights for the WCP data so that the distribution of workers across professional, administrative, technical, and clerical occupations is identical to the distribution in the OPM data. Table 1 presents sample statistics for the OPM data and the weighted WCP sample.

The distribution of industries in the WCP pilot is weighted towards manufacturing. Most of the WCP pilot was collected in 1990, when goods producing industries were surveyed (service producing industries are surveyed in odd numbered years). I compared full time, white collar workers from the CPS to the WCP pilot and I find that there is a nearly constant percentage pay gap for workers in the WCP, regardless of their demographic characteristics or occupation and level[8]. I estimate that WCP wages would be 3.2 to 5.2% higher, using the estimated WCP and CPS industry wage differentials respectively, if the distribution of workers across industries in the WCP was identical to the industry composition in the CPS. Therefore, when adjusting for industry composition throughout the remainder of the paper, I adjust average WCP pay down by 4.2% (the average of the industry wage effects).

VII. Pay and Worker Skill Differences by Occupation

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[8] There are alternatives to treating the WCP pilot's non-random industry composition as a constant that can be simply differenced out of average WCP pay: re-weighting the WCP or including industry dummy variables through out the analysis. I decided against re-weighting because this would place too much emphasis on the much smaller sample of service industry workers in the WCP. I decided against including industry dummy variables since the inclusion of these variables has little effect any of the estimated coefficients and so needlessly complicate the discussion.

In this section I document that there are substantial differences in the estimated Federal-private pay and skill gap depending upon the degree of occupational detail used in the comparison. I use three occupational classifications: 4 broad occupations (professional, administrative, technical, and clerical workers), 22 detailed occupations, and 63 levels of work within detailed occupations. There are 63 occupational levels with at least three workers in each sample. The occupational levels with fewer than three observations per cell are distributed non-randomly across the data sets. The highest levels within an occupation tend to be under-represented in the WCP. Federal workers are less likely to be employed at the lowest levels in an occupation[9]. Only workers in the 63 occupations and levels common to all three samples are included in the analysis in Table 7. Thus I analyze 82% of the WCP sample, 71% of the DC sample, and 85% of the not DC sample. In all comparisons by occupation, I use the distribution of occupations across the total OPM sample as weights.

In Table 7, I report the difference in log monthly pay, years of education, experience, and tenure across the two Federal government samples and the private sector[10]. Table 7 also reports two summary measures of workers' skills: predicted earnings based on the estimated coefficients from wage regressions that include and exclude tenure variables. Column 1 reports differences within four broad occupations, column 2 reports differences within the 22 detailed occupations, and column 3 reports differences within 63 occupations and levels. Wages and skills are most similar across the private sector and the Federal government when comparing workers within broad occupations. Adjusting the numbers in Table 7 to account for the WCP over sample of

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[9] There are 40 levels with less than 3 WCP workers; 18 of these levels are the maximum level and 11 are the minimum level in the occupation. There are 32 levels with less than 3 DC workers; 4 of these were the highest level while 17 were the minimum level in an occupation. There are 11 levels with less than 3 non-DC workers and of these, 4 were the highest level while 7 were the minimum level in an occupation.
[10] I calculated the number in column 1, row 1 (-.026) as follows: I pool the DC Federal government and the WCP sample. I regress log monthly pay on a full set of occupation dummies and a DC Federal government dummy variable. The regressions were weighted by the overall OPM occupational distribution. The coefficient and standard error on the DC dummy variable are reported in Table 7.

high wage industries, I find that DC Federal workers are paid 1.6% more than private sector workers in the same broad occupation. However, within a level of responsibility in a detailed occupation, DC Federal workers are paid 20.9% less than private sector workers. Within a broad occupation, DC Federal workers are concentrated in the highest paid detailed occupations and levels of responsibility. A similar pattern is found when comparing Federal workers outside of Washington, DC to the private sector.

The ratio of Federal to private sector pay decreases the more narrowly one defines the occupation. In addition, there is a decrease in the skills of Federal worker relative to the private sector in an occupation, the more narrowly the occupation is defined. For example, WCP workers have 2.86 more years of experience than DC workers in the same broad occupation. Within an occupation and level, WCP workers have 5.92 more years of experience than DC workers. In every observed dimension of worker skills--even years of tenure--DC Federal workers are less skilled than WCP workers within the same occupational level. Using the index of worker skills that excludes tenure, and adjusting for the WCP over sample of high wage industries, I find that observed worker skills account for 16.2 percentage points of the 20.9% WCP-DC Federal government pay gap and 8.8 percentage points of the 21.4% WCP-non-DC Federal government pay gap within occupation and level. When tenure is included as a measure of skills, skills in the Federal government rise relative to the private sector.

In the Federal government, I find that the DC pay premium declines and DC skills become less valuable as occupations are defined more narrowly. The pay premium for DC Federal workers is 6.9% for workers in the same broad occupation. The DC Federal pay premium is only .5% for workers at the same level of responsibility within an occupation, which is not surprising given the Federal pay scale is very closely related to occupation and level. The skill differential between DC workers and non-DC workers is larger within an occupation and level (-12.0 to -12.6%) than within a broad occupation (-7.3 to -9.6%).

The large private sector premium paid to workers in an occupation and level is largely explained by the more valuable skills of private sector workers within an occupation and level. Within the Federal government there is essentially no pay gap by occupation and level, but there is a large within occupation and level skill differential across geographic areas.

VIII. Distribution of Levels of Work Occupation.

I have shown that Federal workers are paid less and are less skilled than private sector workers at the same level of work in a detailed occupation. I am interested in determining whether Federal government managers circumvent the Federal pay scale by promoting workers with no change in the worker's duties. Unfortunately, I have no direct evidence on the actual duties performed by Federal workers, only the worker's job title. In this section I examine the distribution of level of work, or responsibility, within an occupation. Concentration of Federal government workers in the highest levels of work in an occupation, given worker skills, is consistent with title inflation.

There are fifteen occupations where there are at least 50 workers in the WCP. In Appendix E, I present the empirical distribution of occupation and level for each sample. It is clear from an examination of Appendix E that Federal government workers are employed at higher levels in an occupation than private sector workers. Table 8 presents the mean level of work within each occupation minus the mean level of work for non-DC Federal employees[11]. One interpretation of the value of -.634 in column 1 row 1 is that 63.4% of private sector purchasing clerks are employed at one lower level of responsibility than non-DC Federal workers[12]. Table 8 illustrates that DC Federal workers are generally

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[11] Note that there were no drafters in my DC Federal government sample so, for this occupation, I compare the WCP to the non-DC Federal government only.

[12] Of course, there are infinitely many differences in distributions that would yield the same mean level of work differential. For example, a value of -.634 is also consistent with 31.7% of private sector purchasing clerks employed at two levels lower than non-DC Federal purchasing clerks.

employed at the highest levels, followed by the non-DC Federal workers, and then the private sector workers. On average across 15 occupations, 90.2% of the private sector workers would have to be promoted one level to reach the mean responsibility level of Federal workers outside of DC. The mean level difference between DC Federal government workers and the private sector, averaging across 14 occupations, is 1.363: all private sector workers would have to be promoted one level and 36.3% would have to be promoted two levels of work to attain the mean DC Federal government level. On average across 14 occupations, 44.9% of the non-DC Federal workers would have to move up one level to reach the mean level of DC Federal workers.

It is possible that the concentration of Federal government workers at the highest levels of responsibility in an occupation can be accounted for by the skills of Federal workers. The unconditional level of work differential in Table 8 does not control for worker skill differences across samples. I pool DC Federal, non-DC Federal, and WCP workers in an occupation and estimate level of work ordered probits for each of the 15 occupations. The ordered probits divide the distribution of workers within an occupation into levels on the basis of observed worker characteristics and a normally distributed unobserved factor. The independent variables are years of education, experience, and tenure, and dummy variables for DC Federal worker, non-DC Federal worker, race, sex, city size and region. The ordered probits for selected occupations are reported in Appendix F. For each occupation, I hold constant worker characteristics at the mean in the OPM sample and then calculate the expected fraction of workers at each occupational level in the Federal DC, Federal non-DC, and private sectors. For each occupation in each sector, I then calculate the expected mean level of work, subtract out the expected mean level of work for non-DC Federal employees, and present these conditional level of work differentials in the rows labeled "conditional" in Table 8.

One interpretation of the value of -.522 in column 1 row 2 is that 52.2% of private sector purchasing clerks are employed at one lower level of responsibility than non-DC

Federal workers, holding constant worker characteristics at the mean for a purchasing clerk in the Federal government. Worker characteristics have a significant impact on a worker's occupational level. There is a 13.2 percentage point drop, on average, in the level of work differential between the WCP and the non-DC Federal workers in an occupation after controlling for worker characteristics. These demographic effects are nevertheless overwhelmed by the remaining large differences in levels of work across the samples. Conditional on worker characteristics, and averaging across the 15 occupations, 77% of the private sector workers would have to move up one occupational level to yield the same average level of work as the non-DC Federal sample. Averaging across 14 occupations, the conditional mean level of work for DC Federal workers is 1.223 more than for WCP workers. Differences in worker characteristics account for none of the difference in mean levels of work across the DC and non-DC Federal sectors: the conditional level of work differential is -.453

Federal workers are employed in higher occupational levels than private sector workers, but are Federal workers promoted more quickly or are they initially hired into higher levels than the private sector? To answer this question, I re-estimate the occupational level ordered probits including interactions between tenure and Federal government dummy variables (for DC and non-DC). I calculate the expected fraction of workers in each occupational level for workers with low tenure and high tenure for each of the three samples[13]. For low and high tenure workers, I calculate the mean level of work in each of the three sectors, subtract the mean predicted level for a non-DC Federal worker with low tenure, and report these results in Table 9. One interpretation of the value of -.568 in column 2 row 1 is that 56.8% of low tenure purchasing clerks are employed at one lower level of responsibility in the private sector than in the non-DC

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[13] Low and high tenure are defined to be the 25th and 75th percentile of the tenure distribution for OPM workers in the occupation. Experience is adjusted accordingly, but all other worker characteristics are fixed at the mean OPM worker's characteristics in the occupation.

Federal government sector, holding constant worker characteristics. An interpretation of the value of -.119 in column 2 row 2 is that 11.9% of purchasing clerks with *high* tenure in the private sector are still employed at one lower level of responsibility than non-DC Federal purchasing clerks with *low* tenure, holding constant other worker characteristics. The results in Table 9 show that even when tenure is low, DC Federal workers are employed at substantially higher levels of responsibility than private sector workers in each of the 14 occupations: averaging across 14 occupation and holding constant other worker characteristics, the mean level of low tenure DC Federal workers is 1.208 higher than the mean level for low tenure private sector workers. Low tenure DC Federal workers are employed at significantly higher levels than more experienced private sector workers are expected to attain: 60.7% of *high* tenure private sector workers would have to be promoted one level to attain the conditional mean level of *low* tenure DC Federal workers. There is also evidence of significantly faster rates of promotion in the Federal sector. Averaging across the 14 occupations where I have workers in all three samples, I find that 65% of non-DC federal workers, 71.8% of DC Federal workers, and only 59.8% of private sector workers, will be promoted one level of responsibility as tenure increases from the 25th to the 75th percentile of the (within occupation) tenure distribution. I find evidence that the Federal government, particularly in Washington, DC, hires workers at initially higher levels of work. These differentials are so large that, even after a number of years on the job, private sector workers are employed at substantially lower levels of responsibility than the starting levels of responsibility for DC Federal government workers. In addition, the Federal government, particularly in DC, promotes workers more quickly than in the private sector, conditional on observed worker characteristics.

How different are Average Pay and Skills across the Federal and Private Sector?

OPM Federal workers earn .7% more than WCP private sector workers, as shown in Table 1, but this difference is not statistically significant[14]. (Mention other mean differences?)

Consider the log wage regression given by:

$$(1) \qquad \ln W_i = X_i\beta + Z_i\gamma + \varepsilon_i$$

where $\ln W_i$ is the logarithm of worker i's current real monthly wage, X_i is a vector of worker demographic characteristics, Z_i is a vector of location characteristics (region and city size dummy variables), and ε_i is an i.i.d. error term. The variables in X_i include fourth order polynomials in education and experience, and interactions between these polynomials and dummy variables for sex and race[15]. I group workers with 11 or less years of education into a single category because of the way education is reported in the OPM data. $\ln W_i$ is decomposed into three components: an index of worker demographic characteristics, $X_i\beta$, a location wage effect, $Z_i\gamma$, and the log wage residual, ε_i. $X_i\beta$ is the wage that worker i expects to receive when location variables are set to zero, and can be viewed as an index of worker i's quality.

I reject the hypothesis that pay differences across samples can be represented by a Federal government dummy variable in a single pooled regression. I use separate regressions of (1) for each sample, reported in Appendices B and C, to decompose the OPM Federal and WCP private sector wage differential. Conditional on worker characteristics and adjusting for the WCP industry composition, OPM workers are paid .7% more to 1.0% less than WCP workers. OPM worker skills are 0.0 to 1.7% more

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[14] Not result generally found using CPS data. Explain what I found.

[15] I reject a third order polynomial in education and experience in favor of the quartic specification in the OPM and CPS data. I also reject the hypothesis that all coefficients on either female or black interaction terms are jointly equal to zero in the OPM data. It was not possible to include fourth order "other" race interactions in the CPS Federal data so "other" race is interacted with cubics in education and experience.

valuable than private sector worker skills using the WCP and OPM coefficients, respectively.

Conclusion: Within broad occupation groups, average pay and skills across the Federal government and large firms in the private sector are quite similar.

IV. Pay Differences Within the Federal Government

In 1989 and 1990 there was a single national pay scale set for the entire Federal government. Prior to 1994, there was no formal pay premium for Federal workers employed in high cost of living locations. Despite these rules, Johnson and Libecap (1989) find that DC Federal workers are paid 12% more than non-DC Federal workers with the same demographic characteristics. Moreover, OPM (1983) reports that 30.8% of DC Federal positions were inflated relative to 8.3% overgrading of Federal positions outside of DC. These facts suggest that the Federal pay regulations are less strictly enforced in the DC metropolitan area.

In my OPM sample, there are 8,546 Federal workers in the Washington, DC MSA[16]. Washington, DC Federal workers are more likely to be in administrative occupations and less likely to be in technical occupations than Federal workers outside of the DC metropolitan area. I construct sample weights so that the distribution of workers across professional, administrative, technical, and clerical occupations in both the DC and non-DC samples equals the distribution in the full OPM sample. Table 3 reports weighted sample means and standard deviations of key variables for Federal workers inside and outside of the DC metropolitan area. DC workers, on average, earn 16.2% higher pay, are more than twice as likely to be black, have 1.6 fewer years of experience and .6 more years of tenure than non-DC Federal workers.

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[16] It would be problematic to examine this issue using the CPS because the total sample of Federal government workers is small.

I first estimate the wage regression in (1) for the OPM sample and include a Washington DC dummy variable in addition to the 3 city size and 3 region dummy variables already included in the model. In Table 4, I present geographical wage differentials in both the OPM and WCP based on estimates of (1). In both sectors, the base wage corresponds to a Federal worker employed in the South in an MSA with 1-5 million residents. There are small regional pay differences in both the WCP and the OPM samples. In the WCP there is a large premium for working in an MSA, but the size of the MSA has a relatively small effect on pay. Excluding DC, there is little variation in Federal pay across metropolitan and non-metropolitan areas, but there is a substantial pay premium for Federal employees working in Washington, DC. The premium earned by Federal workers in Washington, DC is comparable to the private sector location wage premia in the largest MSAs.

DC may be to the Federal govenrment what the head quarters is to a large firm. It is likely that the headquarters of a firm has the preponderence of upperlevel decisionmakers and so has the highest average quality of workers. Thus the DC pay preimum may be explained by Federal government employees the highest quality workers. To test his hypothesis, I estimate weighted regressions of (1) separately for Federal workers in Washington, DC and outside of Washington, DC and reject the hypothesis that pay differences across samples can be represented by a Washington, DC dummy variable in a single pooled regression. I report the separate regressions of (1) in Appendix D. These regressions explain 72.6 and 63.7% of the variation in the DC and non-DC sample, respectively. Despite the fact that demographic characteristics explain much of the wage variation within samples, differences in demographic characteristics accounts for none of the DC versus non-DC pay differential in the Federal government. Moreover, Federal workers in Washington, DC. have 1 to 2.2% less valuable skills than Federal workers outside of DC, so that the conditional Washington DC pay premium is slightly larger than the unconditional wage differential.

Key: no pay premium in the legislation, yet DC workers earn a premium that is comparable to what the private sector wage premia is for the largest MSAs. Pay premium is not explained by DC Federal workers having higher observed quality than Federal workers outside of DC.

V. Federal-Private Sector Pay Differentials Conditional on Worker Demographics

The size of the Federal pay premium is likely to influence the skill differential between Federal and private sector workers. If the Federal government pays less than the private sector, Federal workers will be less skilled than private sector workers in similar occupations. Federal workers who can earn more in the private sector will leave the Federal government, and new hires will be those without the skills to obtain a private sector job. If however, the Federal government pays more than the private sector, the government may choose to ration jobs to more educated and experienced workers. Alternatively, there may be queues for Federal jobs and skilled workers may be no more likely to hold a government job. In this section I compare private sector workers to Federal workers in Washington DC and to Federal workers outside of DC separately. I am particularly interested in determining how Federal worker quality adjusts in response to different Federal-private sector pay gaps.

Adjusting for the WCP industry composition, WCP workers are paid 13.6% *less* than Federal workers in Washington, DC and 2.5% more than non-DC Federal workers. DC Federal workers have significantly more years of education (.2 years more)and job tenure (3.6 more years) than private sector workers. The labor market experience of DC Federal workers is significantly less than private sector workers by .7 years. Compared to private sector workers, Federal workers outside of DC have significantly more experience (1 year) and more tenure (3 years) and there is no significant difference in education.

I use the estimates of (1) presented in Appendices C and D to decompose the Federal-private sector pay gap. I find that WCP worker characteristics are 1.9 to 3.2%

more valuable than DC Federal worker characteristics, using the DC and WCP coefficients respectively. WCP worker characteristics are .1 to .7 % less valuable than non-DC Federal workers, using the non-DC and WCP coefficients respectively. Thus both the DC Federal-private sector pay gap and the non-DC Federal-private sector pay gap conditional on observed worker characteristics exceeds the unconditional differential.

There is a substantial difference across samples in the length of job tenure. I also estimate wage regressions that include fourth order polynomials in education and tenure, and interactions between these polynomials and dummy variables for sex and race[17]. If tenure variables are included in the wage regressions, DC and non-DC Federal worker characteristics are 5 to 5.6% more valuable than private sector worker characteristics, regardless of the regression coefficients used. Conditional on worker characteristics including tenure, DC Federal workers are paid 8.6% more, and non-DC Federal workers are paid 8% less, than private sector workers.

Average worker skills and pay are similar in the WCP private sector and the non-DC Federal government samples. Pay and tenure are significantly higher for Federal workers in DC than in the WCP private sector sample. Long tenure and high pay in the DC Federal government may be the result of the acquisition of specific skills or low quits due to rents. Given that pay and tenure is significantly higher for Federal workers in Washington DC than for non-DC Federal workers, this suggests that high rents in DC lead to low quit rates and high tenure.

VI. Returns to Worker Skills

A. The Return to Education

The return to education I analyze is the college - high school wage premia because such a large fraction of these white collar workers report either exactly 12 or 16 years of

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[17] Given the small fraction of black and "other" race workers, I only interact the education-tenure quartics with sex in the WCP wage regressions.

education[18]. Table 5 reports the college - high school wage premia by race and sex based on the coefficients from the wage regressions that condition on tenure. The smallest college premium is paid to Federal workers outside of DC. On average the return to education is the highest in the WCP. The difference between the private sector and the Federal government college premium is largest for race-sex groups other than white men. Though there is evidence that the return to education is lower in the Federal government, particularly outside of DC, this does not appear to affect the Federal government's ability to hire educated workers: the average amount of education in the WCP is .17 years significantly lower than in DC and there is no significant difference in average education across the WCP and non-DC Federal workers. Note however, that I only analyze the wage premium for more educated workers. There may be other aspects of Federal government compensation that reward educated workers more highly than in the private sector.

B. The Return to Tenure and Experience

There are large differences in the average amount of tenure across sectors. The Federal government is the largest employer in the US, and large employers have longer tenure[19]. Next I examine the rewards to previous experience and the cumulative returns to time on the job across the three sectors. By return to time on-the-job I mean the estimated wage gains that accrue when increasing both tenure and experience. Since I have cross section data, estimates of on-the-job wage growth are based on a comparison of different workers who started the job at different times and who have different years of tenure. Bronars and Famulari (1997) compared the cross section return to time on-the-job in the WCP with the actual wage growth of the worker (using the worker's starting pay).

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[18] 76% of the private sector workers, 55.4% of the DC Federal workers, and 61.3% of the non-DC Federal workers

[19] Ippolito (1987) has pointed to pension benefit differences to account for tenure differences across the Federal government and the private sector.

We found that cross section returns to time on-the-job for women substantially underestimate women's actual return. In contrast, the cross section returns for men closely approximated the workers actual wage growth and were similar to the returns estimated for men in the PSID by Topel (1991). I further limit my analysis of the return to time on the job to white men because there are so few black men in the WCP.

In the top panel of Table 6, I report starting pay and the return to 15 years on the job for white men with a high school education and with varying amounts of starting experience. Both starting pay and 15 year wage growth for a new labor market entrant are quite similar across the two Federal samples and the private sector. A key difference across the Federal government and the private sector is the treatment of high school graduates' previous labor market experience. Previous labor market experience significantly increases the starting pay of private sector workers and decreases the rate of wage growth on the job. In the WCP, workers with 10 years of previous labor market experience have starting pay that is 40.1% higher than new labor market entrants. However, on the job wage growth (15 years) is 73.8% for new labor market entrants and only 45.2% for white men with 10 years of previous labor market experience. In contrast, previous labor market experience has little effect on wage growth or the starting pay of DC Federal workers. When starting experience increases from zero to 10 years, DC workers starting pay increases by only 14.9%. Wage growth over the first 15 years on the job is 71.7% for workers with zero labor market experience and is 73.3% for workers with 10 years of labor market experience. Previous experience has a greater impact on the starting wages and subsequent wage growth for Federal workers outside of DC, but these effects are still smaller than in the WCP.

In the bottom panel of Table 6, I examine the effect of starting experience on college graduates' starting pay and 15 year cumulative wage gain. The patterns across the private sector and the Federal government are similar to those found for high school graduates. The wage gains associated with a 10 year increase in starting experience are

the greatest in the private sector. Cumulative wage gains over 15 years declines as starting experience increases in all three samples, but the decline is the greatest in the private sector. For both college and high school graduates previous labor market experience has little effect on starting pay in the Federal sector, but wage growth on the job is higher than in the private sector.

The substantial differences in the return to starting experience and tenure across the Federal and private sectors are reflected in the composition of workers across sectors. The return to tenure is substantially lower in the private sector, and average tenure is significantly shorter in the WCP than in the Federal government: WCP workers have 3.56 less years of tenure than DC workers and 2.98 less years of tenure than non-DC Federal workers. The private sector rewards previous experience more highly than does the Federal government. I divided years of tenure by years of experience to obtain the fraction of white men's time in the labor market that has been spent on the current job. The median Federal worker in DC has spent 80% of his adult life working for the Federal government. The median non-DC Federal worker has spent 75.9% of his adult life working for the Federal government. The median private sector worker has spent only 50% of his adult life working for his current employer.

In conclusion, I find that the return to education is lower in the Federal government, particularly outside of DC, but this does not appear to affect the Federal government's ability to hire educated workers. The return to time on the job is higher and the return to previous labor market experience is lower in the Federal government. On average, Federal workers have significantly longer tenure and have spent a significantly greater fraction of their working lives with their employer.

X. Conclusions

The Federal government estimates that Federal workers were paid 26.3% less than private sector workers in the same detailed occupation in 1988. How is the Federal

government able to hire and retain workers given this large pay gap? I find that Federal government workers are substantially less skilled than private sector workers in the same detailed occupation. The results in this paper suggest that the Federal pay setting process has led to underpaid Federal government workers within detailed job positions, but the effects of underpayment are largely mitigated by Federal managers inflating the titles of Federal government workers, particularly in Washington, DC. The primary effect of the Federal-private sector pay gap within an occupational level is that Federal workers are concentrated in the highest paying occupations and the highest levels of responsibility within each occupation. Title inflation is accomplished at least in part by on the job promotions: promotions to higher levels of work occur at a faster rate, there is a higher return to tenure, and lower return to previous labor market experience in the Federal government. Given the wage and skill distribution by broad occupation is quite similar across the non-DC Federal government and private sector, the main effect of the Federal-private sector pay gap appears to be that the Federal government brings workers in with less experience and promotes them on the job.

Table 1: Weighted Sample Means (Standard Deviations in Parenthesis)

Variable	Federal: OPM	Private Sector: WCP
Monthly Wage	2419.18 (1125.78)	2532.87 (1233.75)
Log(wage)	7.688 (.453)	7.723 (.481)
Tenure	11.335 (8.915)	8.246 (7.913)
Education	14.390 (2.288)	14.309 (2.311)
Experience	19.268 (10.753)	18.602 (10.710)
Female	.548 (.498)	.541 (.498)
Black	.164 (.371)	.070 (.256)
Other	.094 (.292)	.088 (.284)
MSA size		
not an MSA	.087 (.281)	.197 (.398)
<1 million	.280 (.449)	.223 (.416)
1-5 million	.484 (.500)	.403 (.491)
>5 million	.149 (.356)	.177 (.382)
Region		
Northeast	.136 (.343)	.239 (.427)
Midwest	.152 (.359)	.324 (.468)
South	.498 (.500)	.306 (.461)
West	.214 (.410)	.130 (.337)
Sample size	44,235	1,740

***DO THIS ADJUSTMENT Note: WCP wage and log wage are unadjusted for over sample of high wage industries.

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Table 3: Weighted Sample Means for Federal Workers Inside and Outside of Washington, DC

(Standard Errors in Parentheses)

	Washington DC Federal Workers		Federal Workers Outside of DC		Difference (DC- not DC)	
Wage	2764.34	(1298.94)	2329.60	(1056.05)	434.74**	(13.33)
Log wage	7.817	(.463)	7.655	(.442)	.162**	(.005)
Female	.569	(.495)	.541	(.498)	.028**	(.006)
Black	.314	(.464)	.132	(.338)	.182**	(.004)
Other	.050	(.217)	.104	(.306)	-.055**	(.003)
Education	14.513	(2.425)	14.378	(2.190)	.136**	(.027)
Experience	17.906	(10.535)	19.554	(10.799)	-1.648**	(.129)
Tenure	11.810	(8.904)	11.229	(8.926)	.581**	(.107)
Age at Job Start	26.576	(7.482)	28.686	(8.413)	-2.111**	(.099)
Sample Size	8546		35689			

**indicates significant at the 5% level

Table 4: Location Pay Premia Conditional on Worker Demographic Characteristics

Dependent Variable is the Log of Monthly Pay

	Federal Government	Private Sector
Not an MSA		
Northeast	-4.37%	-1.62%
Midwest	-4.44%	-1.01%
South	-3.91%	-.09%
West	-5.03%	1.90%
Less than 1 million in MSA		
Northeast	-2.50%	11.76%
Midwest	-2.57%	12.37%
South	-2.04%	12.45%
West	-3.16%	15.27%
1-5 million in MSA		
Northeast	-.46%	11.01%
Midwest	-.53%	11.62%
South	0	11.71%
West	-1.12%	14.53%
Washington, DC	19.61%	
More than 5 million in MSA		
Northeast	2.39%	13.89%
Midwest	2.32%	14.51%
South	2.85%	14.59%
West	1.73%	17.41%

Note that all percents reported in this table are the percentage differences relative to the Federal government pay premium in a non-DC, Southern MSA with 1-5 million people.

Table 5: The College - High School Log Wage Differential

	Private Sector	Federal Workers Outside of DC	Washington, DC Federal Workers
White Female	.504	.365	.434
Black Female	.593	.346	.398
White Male	.453	.419	.477
Black Male	.543	.400	.441
Weighted Average	.484	.387	.441

Table 6: 15 Year Cumulative Return to Tenure and Experience for White Men

I. 12 Years of Education

A. 15 Year Cumulative Return to Time on the Job

	Start Exp=0	Start Exp=5	Start Exp=10
Private Sector	.738	.594	.452
Non-DC Federal	.731	.596	.537
DC Federal	.717	.730	.733

B. Starting Wage

	Start Exp=0	Start Exp=5	Start Exp=10
Private Sector	7.058	7.281	7.459
Non-DC Federal	6.947	7.098	7.170
DC Federal	7.053	7.126	7.202

II. 16 Years of Education

A. 15 Year Cumulative Return to Time on the Job

	Start Exp=0	Start Exp=5	Start Exp=10
Private Sector	.653	.518	.378
Non-DC Federal	.481	.402	.394
DC Federal	.683	.579	.517

B. Starting Wage

	Start Exp=0	Start Exp=5	Start Exp=10
Private Sector	7.547	7.742	7.898
Non-DC Federal	7.622	7.684	7.688
DC Federal	7.586	7.728	7.817

Table 7: Log Pay and Skill Differences within an Occupation

Workers Employed in 63 Occupation and Levels

	Broad Occupation		Detailed Occupation		Level in an Occupation	
I. Log Monthly Pay Differential						
DC Federal - Private	-.026**	(.011)	-.101**	(.006)	-.251**	(.003)
Non-DC Federal - Private	-.095**	(.011)	-.156**	(.005)	-.256**	(.003)
DC - Not DC Federal	.069**	(.006)	.054**	(.003)	.005**	(.001)
II. Years of Education Differential						
DC Federal - Private	.025	(.066)	-.159**	(.043)	-.375**	(.043)
Non-DC Federal - Private	.019	(.058)	-.136**	(.039)	-.280**	(.039)
DC - Not DC Federal	.005	(.030)	-.023	(.020)	-.094**	(.012)
III. Years of Experience Differential						
DC Federal - Private	-2.860**	(.316)	-3.045**	(.305)	-5.920**	(.286)
Non-DC Federal - Private	.197	(.293)	.281	(.281)	-1.235**	(.268)
DC - Not DC Federal	-3.057**	(.152)	-3.327**	(.146)	-4.685**	(.139)
IV. Years of Tenure Differential						
DC Federal - Private	1.185**	(.245)	.973**	(.235)	-1.421**	(.215)
Non-DC Federal - Private	2.261**	(.234)	2.194**	(.221)	1.109**	(.203)
DC - Not DC Federal	-1.076**	(.121)	-1.221**	(.114)	-2.530**	(.103)
V. Log Skill Differential: Excluding Tenure						
DC Federal - Private	-.062		-.084		-.162	
Non-DC Federal - Private	-.010		-.031		-.088	
DC - Not DC Federal	-.096		-.089		-.126	
VI. Log Skill Differential: Including Tenure						
DC Federal - Private	-.001		-.025		-.112	
Non-DC Federal - Private	.035		.015		-.040	
DC - Not DC Federal	-.073		-.072		-.120	

Note: WCP predicted wages in (I) are unadjusted for over sample of high wage industries.

**indicates significant at the 5% level

Table 8: Differences in Work Levels by Occupation Across the Federal and Private Sectors

Dependent Variable is the Level of Responsibility in the Occupation

	Private Sector Workers - Non-DC Federal Worker	DC Federal Worker - Non-DC Federal Workers
1. Purchasing Clerk		
Unconditional	-.634**	.616**
Conditional	-.498**	.694**
2. Accounting Clerk		
Unconditional	-1.223**	.067
Conditional	-1.176**	.088
3. Secretaries		
Unconditional	.140	1.034**
Conditional	.139	1.036**
4. Personnel Specialist		
Unconditional	-1.063**	.842**
Conditional	-.701**	.818**
5. Chemists		
Unconditional	-1.721**	.231**
Conditional	-1.346**	.505**
6. Engineers		
Unconditional	-1.525**	1.013**
Conditional	-1.366**	.722**
7. Accountants		
Unconditional	-1.369**	.673**
Conditional	-1.035**	.601**

8. General Clerks

Unconditional	-1.034**	-.048
Conditional	-1.105**	-.072

9. Engineering Technician

Unconditional	-1.057**	.005
Conditional	-1.126**	.114

10. Buyers

Unconditional	-.399**	.085
Conditional	-.468**	.147

11. Computer Operators

Unconditional	-.965**	.423**
Conditional	-.833**	.482**

12. Personnel Clerk

Unconditional	-.589**	.181**
Conditional	-.523**	.312**

13. Computer Programmers

Unconditional	.965**	.731**
Conditional	.794**	.612**

14. Registered Nurse

Unconditional	-.393**	.433**
Conditional	-.465**	.285**

15. Drafter

Unconditional	-.734**
Conditional	-.817**

* indicates difference is significant at the 10% level
** indicates difference is significant at the 5% level

Note: The omitted comparison is between the private sector and the DC Federal Workers. This difference can be obtained by subtracting column (1) from column (2). The conditional difference is always significant at the 1 percent level.

Table 9: Differences in Work Levels by Occupation and Tenure Across the Federal and
Private Sectors

Dependent Variable is the Level of Responsibility in the Occupation

	Non-DC Federal - Non-DC Federal with Low Tenure	Private Sector - Non-DC Federal with Low Tenure	DC Federal - Non-DC Federal with Low Tenure
1. Purchasing Clerk			
Low Tenure	0	-1.355	.103
High Tenure	.174	-.825	.259
2. Accounting Clerk			
Low Tenure	0	-.294	1.103
High Tenure	1.158	.209	1.261
3. Secretaries			
Low Tenure	0	.248	.834
High Tenure	.485	.442	1.674
4. Personnel Specialist			
Low Tenure	0	-.717	.867
High Tenure	.568	-.343	1.340
5. Chemists			
Low Tenure	0	-1.481	.372
High Tenure	.846	-.136	1.478
6. Engineer			
Low Tenure	0	-1.307	.683
High Tenure	1.456	-.220	2.243
7. Accountants			
Low Tenure	0	-1.045	.482
High Tenure	.926	-.333	1.651
8. General Clerks			
Low Tenure	0	-1.386	-.074
High Tenure	.112	-.732	.037

Table 9: Differences in Work Levels by Occupation and Tenure (continued)

	Non-DC Federal - Non-DC Federal with Low Tenure	Private Sector - Non-DC Federal with Low Tenure	DC Federal - Non-DC Federal with Low Tenure
9. Engineering Technician			
Low Tenure	0	-1.261	.161
High Tenure	.563	-.502	.656
10. Buyers			
Low Tenure	0	-.426	.003
High Tenure	.549	.043	.828
11. Computer Operators			
Low Tenure	0	-.718	.402
High Tenure	.631	-.438	1.175
12. Personnel Clerk			
Low Tenure	0	-.667	.345
High Tenure	.374	.004	.632
13. Computer Programmers			
Low Tenure	0	-.896	.477
High Tenure	.968	-.060	1.748
14. Registered Nurse			
Low Tenure	0	-.400	.138
High Tenure	.157	-.396	.556
15. Drafter			
Low Tenure	0	-.999	
High Tenure	.243	-.374	

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